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Poštne storitve - Označevanje poštnih pošiljk z identifikacijsko številko - Specifikacija kodiranja BNB-62

Postal services - ID-tagging of letter mail items - BNB-62 encoding specification

Postalische Dienstleistungen - Identkennzeichnung von Briefsendungen - Teil 3: Festlegung der BNB-62 Kodierung

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Postal services - ID-tagging of letter mail items - Part 3: BNB-62 encoding specification

Traitement automatisé des envois postaux - Chronomarquage des envois postaux - Partie 3: Spécification de codage en BNB (Bar No Bar)- 62 caractères

Postalische Dienstleistungen - ID-Kennzeichnung von Briefsendungen - Teil 3: Festlegung der BNB-62-Codierung

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Foreword

This document (CEN/TS 15844-3:2010) has been prepared by Technical Committee CEN/TC 331 “Postal services”, the secretariat of which is held by NEN.

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

NOTE This document has been prepared by experts coming from CEN/TC 331 and UPU, under the framework of the Memorandum of Understanding between the UPU and CEN.

This document, CEN/TS 15844-3, is the CEN equivalent of UPU [1)] standard S18c-6. It may be amended only after prior consultation, between CEN/TC 331 and the UPU Standards Board, in accordance with the Memorandum of Understanding between CEN and the UPU.

The UPU’s contribution to the document was made, by the UPU Standards Board [2)] and its sub-groups, in accordance with the rules given in Part V of the "General information on UPU standards".

This document forms Part 3 of a multi-part CEN/TS 15844, *Postal services — ID-tagging of letter mail items*. It should be read in conjunction with the main body of the specification, Part 1.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to announce this Technical Specification: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

1) The Universal Postal Union (UPU) is the specialized institution of the United Nations that regulates the universal postal service. The postal services of its 189 member countries form the largest physical distribution network in the world. Some 5 million postal employees working in over 660 000 post offices all over the world handle an annual total of 425 billion letters-post items in the domestic service and almost 6,7 billion in the international service. Some 4,5 billion parcels are sent by post annually. Keeping pace with the changing communications market, posts are increasingly using new communication and information technologies to move beyond what is traditionally regarded as their core postal business. They are meeting higher customer expectations with an expanded range of products and value-added services.

2) The UPU's Standards Board develops and maintains a growing number of standards to improve the exchange of postal-related information between posts, and promotes the compatibility of UPU and international postal initiatives. It works closely with posts, customers, suppliers and other partners, including various international organizations. The Standards Board ensures that coherent standards are developed in areas such as electronic data interchange (EDI), mail encoding, postal forms and meters. UPU standards are published in accordance with the rules given in Part VII of the General information on UPU standards, which may be freely downloaded from the UPU world-wide web site (www.upu.int).

Introduction

A general introduction to all parts of the Technical Specification is provided in CEN/TS 15844-1. This part deals only with the encoding of ID-tags in the form of a 62-position bar-no-bar code, BNB-62, printed on the reverse side of items, in area R1, using fluorescent ink. It is arranged under six main headings:

— *Usage limitations – limited issuance*: explains that only designated issuers may apply BNB-62 ID-tags in accordance with this specification, though any organisation with appropriate equipment may read and use them;

— *Value range limitations*: defines limitations on the values of data elements used in ID-tags which are to be represented on items in the form of a BNB-62 bar code;

— *Encoding specification*: specifies the construction of a 62-position bar-no-bar code from ID-tag data elements;

— *Printing of the bar code*: to allow the association of computer data with a physical item, the ID-tag is printed on the item itself. This clause defines required ink and printing parameters;

Reading and interpretation of BNB-62 bar codes: specifies the validation and error correction requirements associated with the reading of ID-tags represented using BNB-62 bar codes;

Conversion to the message and binary representations: describes the correspondence between BNB-62 representation and the binary and message interchange representations defined in CEN/TS 15844-1.

The above definition is supported by an informative annex:

— S*18 ID-tag 62-position BNB bar code template*: provides a template which may be used for manual decoding of the data elements in printed BNB-62 representations of an ID-tag. Such manual decoding should be used with caution since, unless the complete bar code is read and processed through the appropriate error detection/correction algorithm, there is no certainty that the value obtained has been read correctly.

1 Scope

This part of the Technical Specification defines the representation of ID-tags as a 62-position bar-no-bar code (BNB-62) printed in fluorescent ink in area R1 on the reverse side of items.

BNB-62 encoding is one of two encoding specifications supported by this Technical Specification [3)] for the printing of ID-tags in area R1, the other being BNB-78, which is specified in CEN/TS 15844-2.

NOTE 1 Representation in the form of a 4-state code printed on the front of the item is covered in CEN/TS 15844-4 for flats and CEN/TS 15844-5 for small letters.

BNB-62 encoding is authorised for use only by three issuers: An Post (Ireland), Canada Post and USPS. It should be encountered, on incoming items, only on mail items which originated in Canada, Ireland or the United States. Other issuers wishing to apply ID-tags in area R1 are required to use the BNB-78 encoding defined in CEN/TS 15844-2.

NOTE 2 ID-tags encoded in area R1 are required by article RL 123 of the UPU Letter Post Regulations [2] to be compliant with UPU standard S18 – and by this with the related CEN/TS 15844. This supports only two encodings in area R1, namely BNB-78 as defined in CEN/TS 15844-2 and BNB-62 as defined herein. The latter is authorised for continued use only by the three issuers mentioned above. Where ID-tags are used, and are applied in area R1 on the reverse side of letter mail items of size up to and including C5, the use of BNB-78 encoding is mandatory for all other issuers.

NOTE 3 BNB-62 encoding is not considered suitable for use on flats. CEN/TS 15844-4 defines a 4-state encoding which may be used for this purpose.

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.

CEN/TS 15844-1:2010, *Postal services — ID-tagging of letter mail items — Part 1: ID-tag structure, message and binary*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in CEN/TS 15844-1:2010 apply.

4 Symbols and abbreviations

See CEN/TS15844-1:2010, *Postal services — ID-tagging of letter mail items — Part 1: ID-tag structure, message and binary*.

5 Usage limitations – Limited issuance

The application of ID-tags to items using BNB-62 representation is restricted to three issuers: An Post (Ireland), Canada Post and USPS.

NOTE There are no constraints on the reading and use of ID-tags. Any mail handling organisation with appropriate reading equipment may read ID-tags on items and use these for their intended purposes. However, the encoding of ID-tags in BNB-62 format is restricted to the three identified issuers.

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3) References to "this Technical Specification" should be interpreted as references to CEN/TS 15844 as a whole, not only to Part 3.

6 Value range limitations

In addition to the component value limitations defined in CEN/TS 15844-1, the following limitations apply to ID-tags which are to be represented in the form of BNB-62 bar codes:

NOTE 1 These limitations derive from the specification of BNB-62 format, which preceded the definition of UPU standard S18.

a) the format identifier is limited to the value *18B;*

b) only four issuer codes are supported: *CAA* for Canada Post; *IEA* for An Post and *USA* and *USB* for USPS;

NOTE 2 In BNB-62 bar codes, the issuer code is represented by a combination of a single bit, called the C-bit, and the equipment identifier, based on the ranges specified below.

NOTE 3 Two issuer codes are used for USPS to allow a distinction to be made between ID-tags applied by USPS itself (issuer code *USA*) and ID-tags applied, under licence from USPS, by major mail producers (issuer code *USB*).

c) domain codes are not used;

d) the possible values of equipment identifier are limited to:

1) *F8C-F9F*, with C-bit value *1* for An Post (issuer code IEA);

2) *E10-F8B*, with C-bit value *1* for Canada Post (issuer code CAA);

3) *001-D47*, with C-bit value *0* for USPS (issuer code USA);

4) *D48-E0F*, with C-bit value *1* for USPS-licensed mailers (issuer code USB).

NOTE 4 In CEN/TS 15844, equipment codes are hexadecimal. In decimal notation, these ranges correspond to 0001-3599 for USPS; 3600-3979 for Canada Post and 3980-3999 for An Post. Values of *000* and in excess of *F9F* (decimal 3999) should not be encountered.

NOTE 5 Equipment codes in the range *D48-E0F* (decimal 3400-3599) are allocated, by USPS to agents (mailers) which ID-tag items on USPS' behalf. Items carrying ID-tags with equipment identifiers in this range typically enter the postal system only after a delay and, if the time interval in the ID-tag is used for quality measurement purposes, should be subject to different delay criteria. In ID-tag message and binary representations, these ID-tags carry a different issued code (*USB* instead of *USA*) to permit their easy identification.

NOTE 6 Should it ever become necessary to licence additional issuers to use the BNB-62 representation, this would be achieved by use of C-bit value 1 in association with equipment identifiers 001-D47 and of C-bit value 0 with equipment identifiers D48-E0F. Readers should therefore be designed to accommodate this possibility.

e) priority is not supported and always has value *N*.

NOTE 7 The original USPS specification includes a priority-like component referred to as "mail class". However, this is not used in practice and the bar position concerned (the first position after the start bar) is always:

— space in BNB-62 ID-tags issued by USPS itself;

— bar in BNB-62 ID-tags issued by An Post, Canada Post and mailers authorised to apply ID-tags by USPS;

— the item number is limited to the range *00001-24999*;

— tracking indicator is not supported and always has value *N*.

The normal specification allows for allocation equipment with a peak processing speed of 24 999 items per 30-minute time interval. In cases in which two physically distinct allocation systems each have a throughput of

less than 12 500 items per 30-minute period, they may share a single equipment identifier. One of the systems then uses the item number range *00001-12499*; the other uses *12500-24999*. This implies that "equipment identifier" alone might not actually identify the unit of equipment which allocated the ID-tag.

7 Encoding specification

7.1 Data to be encoded

The ID-tag components shall be converted into an array of 13 fields, referred to as C, M_3, M_2, M_1, M_0, D_1, D_0, T_1, T_0, S_4, S_3, S_2, S_1 and S_0, as follows:

NOTE 1 This clause defines the data to be included in the bar code. Because of limitations on bar code length and pitch, it is not possible to encode the ID-tag information in the same format as is used in either the message or binary representations of the ID-tag (as defined in CEN/TS 15844-1).

NOTE 2 The UPU identifier is not encoded in the BNB representations of ID-tags: given the restrictions on the encoding of area R1 defined in UPU standard S19 and in article RL 123 of the Letter Post Regulations [2], it is presumed that any fluorescent BNB bar code, found in area R1, which correctly decodes in accordance with this specification or that in CEN/TS 15844-2, is an S18 ID-tag.

NOTE 3 Format identifier is not encoded in the BNB-62 representation of ID-tags: it is presumed that a fluorescent BNB bar code, found in area R1, which has approximately 62 positions and which correctly decodes in accordance with this specification, is an S18 BNB-62 ID-tag.

C: a single bit having value *0* in ID-tags issued directly by USPS (equipment identifier range *001-D47*) and value *1* in ID-tags issued by licensed US mailers, An Post and Canada Post.

M_3: the first digit of the equipment identifier expressed in decimal notation (value 0 to 3), converted to a 2-bit value using Table 1 below.

Table 1 — Data field encoding look-up table

Data value to be encoded	Encoded representation in		
	4-bit field	3-bit field	2-bit field
0	1111	111	11
1	1110	110	10
2	1101	101	01
3	1100	100	00
4	1011	011	
5	1010	010	
6	1001		
7	0100		
8	0111		
9	0110		

NOTE 4 The 2-bit combination 00 is only used in field M_3. The possibility of its resulting in a run of more than four spaces is prevented by ensuring that it is either preceded by a bar (and followed by a maximum of two spaces) or that it is followed by a maximum of one space. For this reason, the C-bit is not permitted to have value 0 in association with equipment identifiers above E0F (3599 decimal).

EXAMPLE 1 If the equipment identifier is 8E6, its decimal equivalent is 8•256 + 14•16 + 6 = 2278, which has first digit 2. **M_3** will be 01.

M_2: the second digit of the equipment identifier expressed in decimal notation (value 0 to 9), converted to a 4-bit value using Table 1.

EXAMPLE 2 If the equipment identifier is 8E6, its decimal equivalent is 8•256 + 14•16 + 6 = 2278, which has second digit 2, resulting in **M_2** being 1101.

M_1: the third digit of the equipment identifier expressed in decimal notation (value 0 to 9), converted to a 4-bit value using Table 1.

EXAMPLE 3 If the equipment identifier is 8E6, its decimal equivalent is 8•256 + 14•16 + 6 = 2278, which has third digit 7, resulting in **M_1** being 0100.

M_0: the fourth digit of the equipment identifier expressed in decimal notation (value 0 to 9), converted to a 4-bit value using Table 1.

EXAMPLE 4 If the equipment identifier is 8E6, its decimal equivalent is 8•256 + 14•16 + 6 = 2278, which has fourth digit 8, resulting in **M_0** being 0111.

D_1: the first digit of the date within the current calendar month (value 0-3), converted to a 3-bit value using Table 1.

EXAMPLE 5 If the date is the 6th, the first digit is 0, resulting in **D_1** being 111.

D_0: the second digit of the date within the current calendar month (value 0-9), converted to a 4-bit value using Table 1.

EXAMPLE 6 If the date is the 6th, the second digit is 6, resulting in **D_0** being 1001.

NOTE 5 Month is not encoded in the BNB-62 representation of ID-tags: on reading of such codes, it is presumed that the calendar month is:

- the current month if the day number in the ID-tag is less than or equal to the current day within the month;
- the previous calendar month otherwise.

T_1: the first decimal digit of the number (counting from 0) of the 30-minute interval within the day during which the ID-tag was allocated, converted to a 3-bit value using Table 1.

NOTE 6 30-minute intervals are counted from 00, for the time interval between 00:00 and just before 01:30, up to 47, for the time interval between 23:30 and just before 24:00. Hence, the first digit is in the range 0-4 and can be represented as a 3-bit value.

EXAMPLE 7 If the ID-tag was applied at 15:23, this corresponds to the 30th half hour period (counting form 0). The first digit is 3, resulting in **T_1** being 100.

T_0: the second decimal digit of the number of the 30-minute interval within the day, during which the ID-tag was allocated, converted to a 4-bit value using Table 1.

EXAMPLE 8 If the ID-tag was applied at 15:23, this corresponds to the 30th half hour period (counting form 0). The second digit is 0, resulting in **T_0** being 1111.

S_4: the first decimal digit of the item number, converted to a 2-bit value using Table 1.

NOTE 7 Item number is limited to the range 00001 to 24999, so the first digit is in the range 0-2 and can be represented as a 2-bit value.

EXAMPLE 9 If the ID-tag was the 14 880th to be applied in the half hour period concerned, the first digit of the serial number is 1, resulting in **S_4** being 10.

S_3: the second decimal digit of the item number, converted to a 4-bit value using Table 1.

EXAMPLE 10 If the ID-tag was the 14 880th to be applied in the half hour period concerned, the second digit of the serial number is 4, resulting in **S_3** being 1011.

S_2: the third decimal digit of the item number, converted to a 4-bit value using Table 1.

EXAMPLE 11 If the ID-tag was the 14 880th to be applied in the half hour period concerned, the third digit of the serial number is 8, resulting in **S_2** being 0111.

S_1: the fourth decimal digit of the item number, converted to a 4-bit value using Table 1.

EXAMPLE 12 If the ID-tag was the 14 880th to be applied in the half hour period concerned, the fourth digit of the serial number is 8, resulting in **S_1** being 0111.

S_0: the last decimal digit of the item number, converted to a 4-bit value using Table 1.

EXAMPLE 13 If the ID-tag was the 14 880th to be applied in the half hour period concerned, the last digit of the serial number is 0, resulting in **S_0** being 1111.

7.2 Calculation of the error detection and correction bits

The ID-tag data shall, for the purposes of representation on the item by means of a BNB-62 bar code, be protected by the incorporation of error control codes, calculated in accordance with the following algorithm:

NOTE 1 It is not sufficient to simply record the ID-tag data content as a BNB pattern, as read errors would make the result unusable. The algorithm defined uses a polynomial code with 47 information bits and twelve redundancy bits, numbered E_{11} to E_0. A thirteenth redundancy bit, E_P, ensures that the overall bar code has even parity. When the ultimate bar code is read, these bits are used to provide an error detection and correction capability, allowing the ID-tag to be read even when it is imperfectly printed and/or partly obliterated.

NOTE 2 The specified algorithm supports correction of errors in any two bar code positions and detection of errors in three bar positions.

NOTE 3 If the number of errors exceeds the error correction capacity of the algorithm, e.g. if there are more than three bar values in error, then the specified algorithm will not result in the original bar code, but might yield an apparently valid result. This means that the algorithm is potentially sensitive to shifting of the bar code in case of erasure of or failure to recognise the start bar. In theory, this could give rise to misreads. However, these are normally detected by the validation mechanisms defined in Clause 9 and in the clause on *Reading and validation of ID-tags on items* in CEN/TS 15844-1. Operational experience confirms that the BNB-62 ID-tag misread rate is low.

NOTE 4 It should be stressed that the algorithm specified below is expressed in a simple mathematical form. Computer-coded implementations need not follow the same logic, provided that the bar pattern which results is identical to that resulting from the algorithm given here.

1) Construct a 47 element binary array F_n, with n = *0-46*, by taking the fields defined in 7.1 in the order of their definition and using the bits in the order left to right;

2) treating each element of F as a binary (value 0 or 1) coefficient, construct the polynomial P:

$$\sum_{n=0}^{46} F_n x^{(58-n)}$$

3) perform modulus 2 division of P by the generator polynomial G:

$$x^{12} + x^{10} + x^{8} + x^{5} + x^{4} + x^{3} + 1$$

to give a quotient Q and remainder E such that:

$$P = Q \bullet G \oplus E$$