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Postal services - ID-tagging of letter mail items - Part 2: BNB-78 Encoding Specification

Postalische Dienstleistungen – ID-Kennzeichnung von Briefsendungen – Teil 2: Festlegung der BNB-78-Codierung

Traitement automatisé des envois postaux - Chronomarquage des envois postaux - Partie 2: Spécification de codage en BNB (Bar No Bar)- 78 caractères

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Postal services - ID-tagging of letter mail items - Part 2: BNB-78 Encoding Specification

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Postalische Dienstleistungen - ID-Kennzeichnung von Briefsendungen - Teil 2: Festlegung der BNB-78-Codierung

This Technical Specification (CEN/TS) was approved by CEN on 1 December 2008 for provisional application.

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Foreword

This document (CEN/TS 15844-2:2010) 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 15844-2), is the CEN equivalent of UPU [1)] standard S18b-7. 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".

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 specification is provided in CEN/TS 15844-1. This part deals only with the encoding of ID-tags in the form of a 78-position bar-no-bar code, BNB-78, printed on the reverse side of items, in area R1, using fluorescent ink. It is arranged under six main headings:

Clause No. Description of content

5 *Usage limitations – requirement for a special issuer code*: explains the requirement for issuers wishing to use the BNB-78 ID-tag representation to obtain a special issuer code for this purpose;

6 *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-78 bar code;

7 *Encoding specification*: specifies the construction of a 78-position bar-no-bar code from ID-tag data elements;

8 *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;

9 *Reading and interpretation of BNB-78 bar codes*: specifies the validation and error correction requirements associated with the reading of ID-tags represented using BNB-78 bar codes;

10 *Conversion to the message and binary representations*: describes the correspondence between BNB-78 representation and the binary and message interchange representations defined in CEN/TS 15844-1.

The above definition is supported by two informative annexes:

— *Error detection and correction algorithms*: provides example implementations of the error detection and correction algorithms used in encoding and reading the BNB-78 representation of the ID-tag. Other implementations are possible and, depending on the environment, might well be more efficient. The examples nevertheless serve as a possible baseline, and can be used for verifying the correctness of a different implementation.

— *S18 ID-tag 78-position BNB bar code template:* provides a template which can be used for manual decoding of the data elements in printed BNB-78 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 78-position bar-no-bar code (BNB-78) printed in fluorescent ink in area R1 on the reverse side of items.

BNB-78 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-62, which is specified in CEN/TS 15844-3.

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-78 encoding supersedes the earlier specified BNB-62 encoding and shall be applied in all cases in which ID-tags are placed in area R1 on the reverse side of letter mail items of size up to and including C5, by issuers other than those explicitly authorised to continue use of BNB-62 encoding, namely An Post (Ireland), Canada Post and United States Postal Service.

NOTE 2 ID-tags encoded in area R1 are required by article RL 123 of the UPU Letter Post Regulations [1] 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 herein and BNB-62 as defined in CEN/TS 15844-3. 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-78 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

A number of common terms used in this document are defined in documents referred to in Normative References and in the Bibliography. Definition of frequently used or particularly important terms as well as other terms introduced in this document are given below.

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

4 Symbols and abbreviations

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

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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 2.

5 Usage limitations – Requirement for a special issuer code

The allocation of ID-tags and their application to items using BNB-78 representation is restricted to issuers to whom an issuer code in the range {NNN, …, ZZZ} has been assigned. Issuers wishing to commence use of the ID-tag should request the UPU Standards Board secretariat to issue them with such a code at least three months prior to the planned implementation date.

NOTE 1 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 allocation of ID-tags and their encoding on items is restricted to licensed issuers which have requested and obtained an appropriate issuer code, together with their designated agents.

NOTE 2 Issuer codes are allocated in accordance with UPU standard S31. The Standards Board secretariat will need information on the applicant's mail processing infrastructure (number of main processing facilities, sorting offices, etc.) in order to determine the number of issuer codes required and to select the most appropriate code value(s).

NOTE 3 The supported range allows for the identification of up to 2 197 (13*13*13) issuers, out of the range of 33 696 covered by UPU standard S31. Many high-volume generators of ID-tags, with multiple processing facilities, are expected to require several issuer codes for ID-tag issuance. Thus, the number of issuers which may be licensed to use BNB-78 representation is limited.

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-78 bar codes:

NOTE 1 Given current technology, it is necessary to limit the coding density of bar-no-bar (BNB) codes to a pitch of 1,3 mm or more (less than 7,7 bars per centimetre). The BNB-78 representation has been defined so as to fit on a minimum-sized envelope (127 mm in the USA). With allowance for leading and trailing space, this results in the requirement for the BNB encoding of an ID-tag to be 80 bar positions or less. Furthermore, for reader synchronisation reasons, there is a need to ensure that the bar code does not contain runs of more than four bar-positions without bars. Lastly, to ensure a high degree of readability in practice, the bar code contains error detection and correction information, enabling it to be read even if some of the bars have been obliterated or are otherwise unreadable. These requirements result in the need to limit the value ranges of certain fields, to utilise a specific coding scheme based on groups of four bars, and to place the data elements in a specific sequence. The value limitations are described below; the coding scheme and data element sequence are described in Clause 7.

— the format identifier is limited to the value *18A;*

— issuers are required to have, and use, an issuer code in the range *NNN–ZZZ*;

— domain codes are limited to the range {*0*, 1, …, *9*, *A*, *B*, *C*};

— the second character of the equipment identifier (after the domain code) is limited to value *0*; the third character is limited to the range {*0*, 1, …, *9*, *A*, *B*, *C*};

NOTE 2 This allows for up to 13 domains, each of which may have up to 13 items of equipment. Issuers for which the allowed range of domain codes and equipment identifiers is insufficient may apply for additional issuer codes and may then use the combination of issuer code and domain code to distinguish between an extended number of domains.

— priority is limited to the values *N* and *L*;

NOTE 3 The first value, *N*, should be used for normal and high priority letters and as a default value where the priority is considered not relevant or is unknown at the time of ID-tag allocation. Value *L* may, at the discretion of the issuer, be used to indicate lower-than-normal priority.

— the item number is limited to the range *00000–15378*;

— tracking indicator is limited to the values *T* and *N*.

The normal specification allows for 13 ID-tag allocation systems per domain, each with an item number range of 15 379 values per 10-minute interval. It is permitted, but not recommended, to divide the coding range of 199 927 possible values offered by the combination of the last character of equipment identifier and the item number differently. If it is known that the maximum processing capacity of the equipment is, for example, below 10 000 items per 10-minute interval, this coding range may be split to allow support for 20 allocation systems, 19 with an item number range of 10 000 items and one with a range of 9 927 items. However, for representation purposes, the combined numbering range of 199 927 possibilities still has to be split into 13 ranges of 15 379 values, with the result that "equipment identifier" ceases to actually identify the unit of equipment which allocated the ID-tag.

NOTE 4 That is, where a combined number range is used, the value to be used as third character of equipment identifier is INT(extended item number/15 379) and **not** the real unit number or the equipment. Similarly, the value to be used as ID-tag item number is $|\text{extended item number}|_{15\,379}$ and **not** the allocation system's counter value. For example, if the extended range is split across 20 systems as in the example above, then the thirteenth system's item counter value 4327 would be represented as having equipment identifier third character value of INT(((13-1) • 10 000 + 4 327)/15 379) = INT(124 327/15 379) = 8, whilst the item number would be $|12\,4327|_{15\,379}$ = 1 295.

NOTE 5 Other divisions are also possible, e.g. into 15 ranges of 12 500 and one of 12 427. Again, this is not recommended because the "equipment identifier" ceases to actually identify the system responsible for allocating and printing the ID-tag.

7 Encoding specification

7.1 Data to be encoded

The ID-tag components shall be converted into an array of 14 4-bit fields, numbered F_0 to F_{13}, 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). The following specification is designed to make conversion between the different representations as simple as possible.

NOTE 2 The UPU identifier is not encoded in the BNB representations of ID-tags: given the restrictions on the encoding of area R1 which are defined in UPU standard S19 and in article RL 123 of the Letter Post Regulations [1], it is presumed that any fluorescent BNB bar code, found in area R1, which correctly decodes in accordance with this Technical Specification, is an S18 ID-tag.

F_0: a combination of the format identifier with the tracking indicator and the first (tens) digit of the day number of the generation date, generated as follows:

Format Identifier	Tracking Indicator	First Digit of Day	Value of F_0
18A	T	0	1111
		1	1110
		2	1101
		3	1100
	N	0	1011
		1	1010
		2	1001
		3	1000

NOTE 3 The BNB-78 representation supports only one value of format identifier, namely *18A*, and two values of the tracking indicator. The above effectively represents format identifier in the most significant bit of the field, with the tracking indicator represented in the second bit and the first digit of the day in the least significant two bits. This allows for future support of a second value of format identifier.

F_1: the second (units) digit of the day number of generation date (value 0 to 9), converted to a 4-bit value using Table 2 (in 7.2);

EXAMPLE 1 In generation date value *000229*, the units digit of the day number is *9*. Look-up of this in the table results in the 4-bit value *0101* (the table entry which corresponds to value *9*).

F_2: the month number of the generation date (value 1 to 12), converted to a 4-bit value using Table 2;

NOTE 4 Note that, in order to limit the length of the bar code, the year is not encoded. It is assumed that items do not remain in the postal system for more than 1 year and that, therefore, the year may be assumed to be:

a) the current year, if the current month and date are the same as, or later than, those encoded in the ID-tag;

b) the previous year, if the current month and date are earlier than those encoded in the ID-tag.

F_3: the generation time hour, based on a twelve-hour clock (value 0-11), converted to a 4-bit value using Table 2;

F_4: the ten-minute interval number (first minute digit) of the generation time, plus either *0* for a.m. or *7* for p.m., with the result (in the range 0 to 5 or 7 to 12) converted to a 4-bit value using Table 2;

NOTE 5 This effectively represents a.m./p.m. in the most significant bit of the field, with the ten-minute interval number (i.e. the first digit of the time in minutes) being represented in the least significant three bits. For example, the generation time value *17:40* results in an F_4 value of *0011* (the table entry which corresponds to the value *11*, obtained by adding *4*, the first minute digit, and *7*, representing p.m.).

F_5: the first character of the issuer code, converted to a numeric value using Table 1 below and then to a 4-bit value using Table 2;

Table 1 — Issuer code character look-up table

Character	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
Look-up value	12	11	10	9	8	7	6	5	4	3	2	1	0

NOTE 6 All three characters of the issuer code should be in the range *N*–*Z*. If this is not the case, the value range limitations defined in Clause 9 have not been adhered to and the ID-tag value cannot be represented as a BNB-78 bar code.

F_6: the second character of the issuer code, converted to a numeric value using Table 1 and then to a 4-bit value using Table 2;

F_7: the third character of the issuer code, converted to a numeric value using Table 1 and then to a 4-bit value using Table 2;

F_8: the domain code (first character of the equipment identifier), converted to a 4-bit value using Table 2;

NOTE 7 This should be in the range *0*–*C*. If this is not the case, the value range limitations defined in Clause 9 have not been adhered to and the ID-tag value cannot be represented as a BNB-78 bar code.

F_9: the third character of equipment identifier, converted to a 4-bit value using Table 2;

NOTE 8 This should be in the range *0*–*C*. If this is not the case, the value range limitations defined in Clause 9 have not been adhered to and the ID-tag value cannot be represented as a BNB-78 bar code.

NOTE 9 The second character of the equipment identifier, which should always be 0, is not represented.

F_{10}: INT(item number/1 183), i.e. the result of integer division of the item number by 1 183, converted to a 4-bit value using Table 2;

F_{11}: INT(|item number|$_{1183}$/91), i.e. the result of integer division of the modulus 1 183 value of item number by 91, converted to a 4-bit value using Table 2;

F_{12}: INT(|item number|$_{91}$/7), i.e. the result of integer division of the modulus 91 value of item number by 7, converted to a 4-bit value using Table 2;

F_{13}: a combination of |item number|$_7$, i.e. the modulus 7 value of item number and the item priority, generated as follows:

Item Priority	Modulus 7 value of Item Number	Value of F_{13}
N (Normal or unknown Priority)	0	1111
	1	1101
	2	1011
	3	1001
	4	0111
	5	0101
	6	0011
L (Low Priority)	0	1110
	1	1100
	2	1010
	3	1000
	4	0110
	5	0100
	6	0010

NOTE 10 Priority should be *N* or *L*; if it is not, then the limitations described in Clause 6 have not been applied and the ID-tag cannot be represented in BNB-78 form.

NOTE 11 This effectively represents priority in the least significant bit of the field, with the last character of the serial number (limited to the range 0 to 6) in the most significant three bits.

NOTE 12 The combination *1000* is, exceptionally, supported in this field and in the corresponding part of the bar code. This is possible because the bar code representation of F_{13} is followed by the ECC fields, which always contain a *1* (*bar*) in the first and/or second bar positions.

EXAMPLE 2 The ID-tag with message representation *J18APZW601N110714505956N* (as used in Part A) results in the following data to be encoded:

F_0	F_1	F_2	F_3	F_4	F_5	F_6	F_7	F_8	F_9	F_{10}	F_{11}	F_{12}	F_{13}
1011	0111	0011	1101	0010	0100	1111	1100	1001	1110	1010	1111	1010	1001

7.2 Data field encoding table

To ensure that there are no runs of more than four no-bars, data to be encoded are divided into 4-bit fields, encoded according to the following table, in which bars are represented by 1, spaces by 0: