SLOVENSKI STANDARD
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Poštne storitve - Označevanje poštnih pošiljk z identifikacijsko številko - 4. del: Specifikacija statusnega kodiranja za večja pisma

Postal services - ID-tagging of letter mail items - Part 4: State encoding specification for flats

Postalische Dienstleistungen - ID-Kennzeichnung von Briefsendungen - Teil 4: Spezifikation der Zustandscodierung für Großbriefe

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English Version

Postal services - ID-tagging of letter mail items - Part 4: State encoding specification for flats

Traitement automatisé des envois postaux - Chronomarquage des envois postaux - Partie 4: Spécification de codage en code 4 états pour les objets plats

Postalische Dienstleistungen - ID-Kennzeichnung von Briefsendungen - Teil 4: Spezifikation der Zustandscodierung für Großbriefe

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

The period of validity of this CEN/TS is limited initially to three years. After two years the members of CEN will be requested to submit their comments, particularly on the question whether the CEN/TS can be converted into a European Standard.

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Foreword

This document (CEN/TS 15844-4:2010) 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 15844-4, is the CEN equivalent of UPU [1)] standard S18d-10. 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 4 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.

The present document provides a specification of the encoding of S18 ID-tags using a 4-state symbology that may be applied to flats. CEN/TS 15844-5 provides a similar specification for application to the front side of small letters.

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.

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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 4-state bar code printed on the front side of flats. It is arranged under six main headings:

Clause No.	Description of content
5	*Usage limitations*: defines limitations on the use of the Postal-4i encoding of ID-tags specified in this document.
6	*Value range limitations*: defines limitations on the values of data elements used in ID-tags which are to be represented on flats in the form of a Postal-4i bar code.
7	*Encoding specification*: specifies the construction of a Postal-4i 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 Postal-4i bar codes*: specifies the validation and error correction requirements associated with the reading of ID-tags represented using Postal-4i bar codes.
10	*Conversion to the message and binary representations*: describes the correspondence between Postal-4i bar coded representation and the binary and message interchange representations defined in CEN/TS 15844-1.

These are complemented by two informative annexes, the first providing references to an example implementation of the Postal-4i ID-tag generation algorithm and the second providing a number of example ID-tags, generated using this implementation.

1 Scope

This part of the Technical Specification defines the representation of ID-tags as a Postal-4i symbology 4-state bar code printed on the front side of flats. Many of the provisions are applicable also to small letters and are therefore referenced by Part 5 of the specification (CEN/TS 15844-5), which covers these.

Postal-4i symbology 4-state encoding is the only encoding specification supported by this Technical Specification [3)] for the printing of ID-tags on the front of items.

NOTE Representation in the form of fluorescent BNB bar codes printed on the reverse side of small letters (not flats) is covered in CEN/TS 15844-2 and CEN/TS 15844-3.

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*

UPU S48, Postal-4i: *4-state symbology and its use for the encoding of data on postal items*

3 Terms and definitions

A number of common terms used in this document are defined in the UPU Standards glossary, 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.

4 Symbols and abbreviations

See CEN/TS 15844-1:2010.

5 Usage limitations

The 4-state bar coded representation of ID-tags defined in this part of the specification is intended for use only in area F4 or F4X on the front side of flats; it shall not be used in area R1 on the reverse side.

NOTE Usage in other areas on the front could result in interference with, or by, codes placed by other systems. Usage on the reverse side, and particularly usage in area R1, could seriously disturb the operation of older systems which are designed to work only with BNB encodings of ID-tags.

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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 4.

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 Postal-4i symbology bar codes:

— the format identifier is limited to the values 18C and 18D, the choice between these being dependent on the data content of the ID-tag value (see CEN/TS 15844-1), in turn dependent on the method of ID-tag allocation: format 18C shall not be used on pre-printed labels;

NOTE 1 Format 18C explicitly includes a date/time of ID-tag value generation and is intended for use only in situations in which the ID-tag value is dynamically assigned at the time of its application to an item. Pre-printed labels might be produced long before their application to items and may therefore use only format 18D.

— the use of domain codes is recommended, but not required.

NOTE 2 That is, it is recommended, though not required, that users allocate equipment identifiers in such a way that the first character indicates the allocation domain, normally corresponding to the geographic region or group of postal processing facilities in which the equipment which issued the ID-tag is situated. If this is done, and the domain table published, other organisations which read the ID-tags can determine the geographic origin of the item and apply appropriate procedures to determine whether the item has suffered any exceptional delay.

7 Encoding specification

The bar code shall be generated in compliance with UPU standard S48, using the following parameters:

1) format code (f) value: equal to bits 0-3 of the binary ID-tag value, as defined in CEN/TS 15844-1;

NOTE 1 This assists in distinguishing Postal-4i ID-tags from other bar codes which use Postal-4i symbology. See S48 for a definition of the symbology parameters f, l, r, c and n.

2) left synchronisation code (l) value : 010110 (22 decimal);

3) right synchronisation code (r) value : 100110 (38 decimal);

NOTE 2 The synchronisation codes are inserted to provide known patterns, separated by a fixed number of bar positions in the final bar code, which can be used for checking synchronisation of captured bar codes. The particular binary patterns and their position have been chosen: (a) to support detection of bar code orientation and (b) to minimise the probability of read errors occurring in the synchronisation codewords themselves. Thus, they are not situated at the ends of the final bar code and use only 4-state ascenders and descenders, which are less prone to read errors than full bars or timing signals. The chosen values also assist in distinguishing Postal-4i ID-tags from other bar codes which use Postal-4i symbology.

4) number of variable data codewords (c) value: 13;

5) bar code length (n): 75 if the resulting ID-tag is to be printed directly on the item; 57 or 75 if the ID-tag is to be printed on a label;

NOTE 3 Use of a 57 bar ID-tag on labels is an option, not a requirement: it is permitted to use the 75-position bar code on labels. However, use of the shorter form reduces the length of the overall bar code by 21,6 mm, allowing smaller labels to be used, without significant reduction in read rates or increase in error rates.

NOTE 4 Though the 75 bar format provides more error protection, the 57 bar format normally results in an adequate read rate on labels (where other printing is unlikely). The 57 bar format is not recommended for use directly on items because its error correction capability is not considered sufficient to support an adequate read rate in positions which could include printing or writing in other inks.

NOTE 5 Note that the data string, format code, left and right synchronisation codes and error correction data together add up to 150 bits or 25 6-bit codewords, but that, in the 57 bar version, only 19 codewords are actually printed. If the bar code is a Postal-4i bar code constructed in accordance with this specification, the left

synchronisation code, which is printed in the third codeword position, will be 010110 (22 decimal) and the right synchronisation code, printed in the third codeword position from the end, will be 100110 (38 decimal). The values of six codewords are recovered, during the reading process, using the error recovery capabilities of the Reed-Solomon decoding algorithm.

6) nominal height of a full bar (h): between 4,0 mm and 5,8 mm;

7) nominal pitch (p): 1,2 mm;

8) a 62-bit input data string consisting of bits 4-53 of the binary ID-tag value, as defined in CEN/TS 15844-1, followed by the tracking indicator value, represented as two bits using the convention: $T = 00; F = 01; D = 10; N = 11$, in turn followed by the last ten bits (bits 54-63) of the binary ID-tag value.

NOTE 6 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 the message representation of the ID-tag (as defined in CEN/TS 15844-1). The binary representation is used as a basis, but is manipulated as described above for bar coding purposes, in order to incorporate the tracking indicator.

NOTE 7 The UPU identifier is not explicitly encoded in the Postal-4i symbology representations of S18 ID-tags: rather, it is presumed that any 4-state bar code, found in the encoding area defined in this Technical Specification, which correctly decodes in accordance with this specification, is an S18 ID-tag.

EXAMPLE 1 The ID-tag with message representation *J18CUSA8E6N062315014880T* is the 14 880th one issued by USPS (issuer USA) machine number 8E6 (2 278 decimal) with normal priority (N) on 23 June (0623) between 15:00 and 15:10 (150). Tracking is requested (T). This ID-tag has binary representation (separation points introduced every four bits to improve legibility): *0010.0010.0000.0111.0001.1000.1110.0110.0001.1100.1010.1110.1011.1010.0010.0000*. The 62-bit value used in bar code generation is derived by dropping the first four bits and inserting the tracking code value 00 ten bits from the end:

0010.0000.0111.0001.1000.1110.0110.0001.1100.1010.1110.1011.100010.0010.0000

Conversion to 75 bar 4-state form results in:

Figure 1

or, expressed in character notation with F representing a full bar, A an ascender, D a descender and T a timing bar:

FDF.DFF.AAD.ATF.ADF.TDA.DFA.TFD.DTD.DTD.DFT.FTA.FDF.FAT.ATT.FAD.TFA.ATA.TAF.ATT.DDT.AFF.DAD.FDF.DFF

EXAMPLE 2 The ID-tag with message representation *J18DUSA8E6N001000000003N* is one without explicit date/time indicator (e.g. because it is applied to a pre-printed label) and is the 1 000 000 003rd one issued by USPS (issuer USA) machine number 8E6 (2 278 decimal) with normal priority (N). Tracking is not requested in this case (N). The binary representation of this ID-tag is: *0011.0010.0000.0111.0001.1000.1110.0110.0011.1011.1001.1010.1100.1010.0000.0011.* The corresponding 62-bit value is therefore:

0010.0000.0111.0001.1000.1110.0110.0011.1011.1001.1010.1100.101110.0000.0011

Conversion to 57 bar 4-state form for use on a label results in:

Figure 2

or, expressed in character notation with F representing a full bar, A an ascender, D a descender and T a timing bar:

FTF.DFF.AAD.ATF.ADF.TDA.DFT.DTD.ADD.TFD.FAF.TDD.FFD.TTD.DAD.TTF.DAD.TDF.FFT

8 Printing of the bar code

8.1 General

The resulting bar code shall be encoded on the item or label (as appropriate), in accordance with the specifications in UPU standard S48, except that horizontal skew shall be limited to ± 5°.

The specifications relate to the finished characteristics of production mail, 99 % of which is required to be within specification. To the extent possible and consistent with acceptable mis-read rates, reading systems should be designed to accommodate items on which the ID-tag does not meet all requirements and should not reject captured ID-tags merely because their specification is not in full compliance with printing specifications. For example, variations in transport speed might cause the pitch of a printed ID-tag to exceed the limit permitted by S48. This should not result in rejection of the ID-tag if the reader is reliably capable of capturing ID-tags with a greater variation in pitch.

8.2 Optical characteristics of the ink

The Postal-4i encoding of ID-tags may be printed using either fluorescent, black or heat sensitive ink. However, it is recommended that black ink be used on flats.

NOTE 1 Heat sensitive ink is ink which is translucent at normal ambient temperatures, but which becomes opaque and appears either white or black when heated, e.g. by an infra-red source. Using these properties it is theoretically possible to apply black heat sensitive printing to a white heat sensitive label. In ambient conditions, the label and bar code do not obscure the surface of the item to which they are applied; when heated, the label turns white (providing a clean background) and the ink turns black. However, it is not yet known whether such inks meet environmental requirements or can be economic in practical operation.

NOTE 2 The use of black ink on flats is a recommendation, not a requirement. However, failure to follow this recommendation might result in the ID-tags concerned not being readable by other posts and/or in inability to read ID-tags on incoming items. The recommendation is based on the following:

— heat sensitive ink is likely to require the use of labels to provide an appropriate background and implies the need for a suitable heat source fitted in front of readers; practical, economic application of such ink has not yet been demonstrated;

— fluorescent ink generally provides good performance on small letters; a less good performance on flats, which frequently have noisy backgrounds;

— black ink is unlikely to provide a satisfactory performance when applied directly to flats, but might be superior to fluorescent ink if printed on an applied label;

— conventional OCR systems are expected to be capable of adaptation to read Postal-4i codes printed in black or pre-heated heat sensitive ink, whereas special readers would almost certainly be required to read fluorescent Postal-4i codes on flats, where considerable placement latitude is allowed by the specification. This need for such readers considerably impacts the economics of ink choice, with the use of fluorescent ink being most economic where the majority of items are ID-tagged and the mail stream contains a low proportion of items with noisy background; black

ink being more economic if only a small proportion of items are ID-tagged and/or if there is a high proportion of items with noisy background;

— support for multiple possibilities, within a single mail-stream, carries operational disadvantages in the case of items which are exchanged between postal handling organisations which have adopted different solutions.

Where fluorescent ink is used, it is recommended that this be in accordance with the specifications in the CEN/TS 15844-2 clause on *Optical characteristics of the ink*. The use of ink with an excitation wavelength of 310-360 nm (peak 315-325 nm) and an emission wavelength with peak at 610-620 nm is permitted as an alternative.

NOTE 3 The alternative corresponds with the invisible ink traditionally used by Finland Post and Japan Post; other posts might also wish to use such inks for aesthetic reasons. However, users are advised that many readers designed for use with the inks specified in CEN/TS 15844-2 are now equipped with blue LED lamps and are unlikely to be able to read ID-tags printed with an ink, like the above specified alternative, that require UV illumination to excite them. This implies that other posts might be unable to read ID-tags printed in the alternative ink. Also, the possibility of interference cannot be excluded: the presence of an ID-tag, printed on an incoming item in one ink, could well interfere with the readability of any ID-tag printed in another ink by the delivery post. It is therefore recommended that tests be conducted, with samples of incoming items, before decisions are taken regarding the choice of ink and reader.

In the case of black ink, or heat sensitive ink which has been exposed to an appropriate heat source within the previous 2 s, printed symbols shall conform to the following specification when measured using a MacBeth PCM II with filter A in the spectral range 400 nm to 650 nm:

— variation in the reflectance of the support on which the symbol is printed: less than 5 %;

— bar Reflectance (Rb): less than 23 %;

NOTE 4 This is the reflectance of a symbol element which is present.

— space Reflectance (Rs): in the range 50 % to 90 %;

NOTE 5 This is the reflectance where no symbol element is present.

— Minimum Reflectance Difference (MRD): 50 %;

NOTE 6 The difference between Space and Bar Reflectance (Rs – Rb) should be at least 50 %.

— Print Contrast Signal (PCS): not less than 0,75.

NOTE 7 That is, the ratio of MRD to Space Reflectance ([Rs–Rb]/Rs) shall be at least 0,75.

8.3 Bar code placement

8.3.1 Printing directly on items

The Postal-4i ID-tag should preferably be printed in the area defined in UPU standard S19 as F4. Systems which are not capable of determining or aligning the rotational orientation of mailpieces may print it in area F4X on items which are not aligned such that area F4 passes in front of the print head.

NOTE 1 Systems which are capable of detecting and controlling the orientation of mail items should be designed to print the ID-tag in area F4. Where such control is not possible, the ID-tag may be printed in whichever of areas F4 and F4X passes under the print head. Note that this requires that such equipment is capable of detecting, and compensating for, rotation of oblong items by angles other than 180°.

NOTE 2 The complete 75 element code occupies an area of between 85 mm and 93,8 mm by between 4,0 mm and 5,8 mm. There is this considerable scope for positional variation within F4 (and F4X) since these are 35 mm by 135 mm (see UPU standard S19). This positional flexibility is designed to accommodate flats-related issues, such as the possibility of folding of the wrapper if this is substantially larger than the content, or the need to print well away from the edge of items with non-uniform thickness. Readers need to be designed to capture ID-tags printed anywhere within F4; those on