SLOVENSKI STANDARD
SIST EN 12323:2003

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Ļrtno kodiranje - Simbologķke specifikacije - "Kod 16K"

Bar coding - Symbology specifications - "Code 16K"

Strichcodierung - Symbologiespezifikation - Code 16K

Code a barres - Spécifications des symbologies - Code 16K

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35.040	Nabori znakov in kodiranje informacij	Character sets and information coding

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English version

Bar coding - Symbology specifications - "Code 16K"

Code à barres - Spécifications des symbologies - "Code 16K"

Strichcodierung - Symbologiespezifikation - "Code 16K"

This European Standard was approved by CEN on 10 November 1997.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

Central Secretariat: rue de Stassart, 36 B-1050 Brussels

Contents

Foreword

This European Standard has been prepared by Technical Committee CEN/TC 225 "Bar coding", the secretariat of which is held by NNI.

This document shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by August 1998, and conflicting national standards shall be withdrawn at the latest by August 1998.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Switzerland and the United Kingdom.

Organisations contributing to the development of the standard include:

- AIM Europe (Automatic Identification Manufacturers)

Introduction

The technology of bar coding is based on the recognition of patterns encoded in bars and spaces of defined dimensions. There are a number of methods of encoding information in bar code form, known as symbologies, and the rules defining the translation of characters into bar and space patterns and other essential features are known as the symbology specifications. "Code 16K" is one such symbology.

Previously, symbology specifications have been developed and published by a number of different private organisations, resulting in certain instances in conflicting requirements for certain symbologies.

Manufacturers of bar code equipment and users of bar code technology require publicly available standard symbology specifications to which they can refer when developing equipment and application standards.

1 Scope

This European Standard

- specifies the requirements for the multi row bar code symbology known as "Code 16K";
- specifies "Code 16K" symbology characteristics, data character encodation, dimensions, tolerances, decoding algorithms and user-defined application parameters;
- describes a subset of "Code 16K" assigned to EAN International.

2 Normative References

This European Standard incorporates by dated or undated reference provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed below. For dated references, subsequent amendments to or revisions of any of the publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

EN 796	Bar Coding - Symbology Identifiers
EN 841	Bar Coding - Symbology Specifications - Format Description
EN 1571	Bar Coding - Data Identifiers
prEN 1556	Bar Coding - Terminology
EN 1635	Bar Coding - Test Specifications for Bar code Symbols
ISO 646:1991	Information technology - ISO 7-bit coded character set for information interchange
ISO 8859-1:1987	Information Processing 8-bit Single Byte coded Graphic Character Sets -Part 1 (Latin Alphabet Number 1)

"General EAN Specifications" (EAN International, Brussels, 1994)

3 Definitions

For the purposes of this standard the definitions of prEN 1556 and the following apply:

3.1 guard bar: An additional bar used to separate the trailing space of a start character from the leading space of the first symbol character in a row.

NOTE: This definition is specific to "Code 16K", to be consistent with previously published specifications for the symbology.

3.2 mode character: The symbol character in the first position after the start character in the first row of a symbol, used to define the initial code set and any implied special characters.

3.3 separator bar: A horizontal bar separating two rows of a symbol or abutting the top or bottom of the first or last row respectively.

4 Requirements

4.1 Symbology characteristics

The characteristics of "Code 16K" are:

a) Encodable character set:
   1) All 128 ASCII characters, i.e. ASCII characters 0 - 127 inclusive, in accordance with ISO 646.

      NOTE 1: Code set C permits two numeric data digits to be expressed in one symbol character. See 4.3.3.3.

      NOTE 2: Characters with ASCII values 128 - 255 in accordance with ISO 8859-1 may also be encoded. See 4.3.4.3.d.

   2) 4 non data function characters,
   3) 3 code set selection characters,
   4) 7 shift characters,
   5) 8 start characters,
   6) 8 stop characters,
   7) 1 pad character;

b) Code type: continuous, multi row;
c) Elements per symbol character: 6, comprising 3 spaces and 3 bars, each of 1,2,3 or 4 modules in width;
d) Character self-checking: yes;
e) Row self-checking: yes;
f) Symbol width: 81X inclusive of minimum quiet zones;
g) Symbol height: variable (2 to 16 rows);
h) Bidirectional decoding: yes;
i) Number of symbol check characters: 2, mandatory (see annex A);
j) Symbol character density: 11 modules per symbol character representing data (equivalent to 5,5 modules per data character in code set C);
k) Representative data capacity: 2 row symbol: 7 ASCII characters, 14 numeric characters;
l) Maximum data capacity 16 row symbol: 77 ASCII characters, 154 numeric characters;
m) Non-data overhead:
   per row: 15 modules
   per symbol: 33 modules minimum, 81 modules maximum.

4.2 Symbol structure

Each "Code 16K" symbol consists of 2 to 16 rows. Each row shall comprise:

a) leading quiet zone;
b) start character;
c) 1X guard bar (where X is the nominal width of a narrow bar or space);
d) 5 symbol characters;
e) 1 stop character;
f) trailing quiet zone.

Figure 1 illustrates the row structure. Rows shall be separated from each other by a horizontal separator bar. The top and bottom of the symbol shall also have separator bars which shall extend to the ends of the quiet zones.

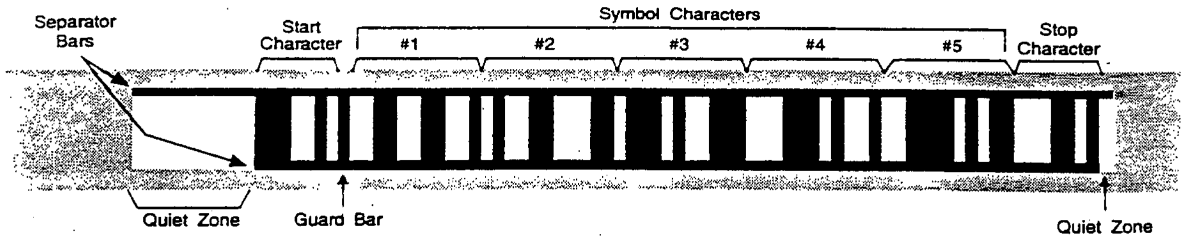

Figure 1: "Code 16K" row structure

Figure 2 shows the structure of a full 16-row symbol. The symbol characters are ordered from the leftmost character of the first (top) row, through each row left to right to the rightmost character in the last (bottom) row. The first symbol character is the "mode" character S. The last two characters are the check characters C1 and C2. The remaining symbol characters encode the data for the symbol.

Figure 2: "Code 16K" symbol structure

Figure 3 illustrates a complete symbol encoding the data "ab0123456789" in "Code 16K".

Figure 3: "Code 16K" symbol encoding "ab0123456789"

4.3 Character assignments

4.3.1 Symbol character encodation

There are 107 "Code 16K" symbol characters. Each symbol character consists of eleven 1X-wide modules. Each symbol character consists of three spaces alternating with three bars, starting with a space. Each bar or space may consist of 1 to 4 modules.

Table 1 defines all the "Code 16K" character assignments. In the column headed 'Symbol Character Structure' the numeric value represents the widths of the elements in modules or multiples of the X dimension.

Symbol character parity is defined by the sum of the bar modules in any symbol character. In "Code 16K" this sum shall always be odd (odd parity). This odd parity feature enables character self-checking to be carried out. Figure 4 illustrates the symbol character value 33.

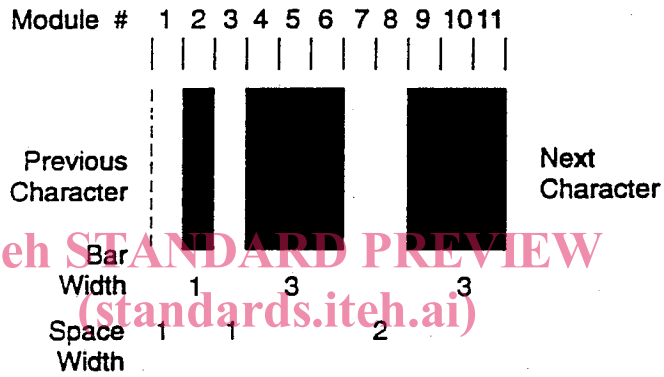

Figure 4: Symbol character value 33

4.3.2 Data character encodation

"Code 16K" has three unique data character sets, shown in table 1 as code sets A, B and C. The symbol character bar and space patterns shown are equivalent to the data characters listed in the columns for code A, B or C. The choice of data character set depends on the mode character (starting symbol character), or the use of code set A, code set B or code set C characters or the shift characters. The code set can be redefined within the symbol by the use of code set or shift characters.

The same data may be represented by different "Code 16K" symbols characters, through the use of different combinations of mode, code set or shift characters. Annex F contains guidelines to generate the smallest symbol for given data. An application need not specify the code set to be used.

Each symbol character is assigned a numeric value listed in Table 1. This value is used in calculating the check characters C1 and C2. It may also be used to provide a conversion to and from ASCII decimal values when encoding in code sets A and B (see annex G).

Table 1: "Code 16K" character encodations

VALUE	CODE SET A	CODE SET B	CODE SET C	ENCODATION PATTERN sbsbsb
0	SP	SP	00	212222
1	!	!	01	222122
2	"	"	02	222221
3	#	#	03	121223
4	$	$	04	121322
5	%	%	05	131222
6	&	&	06	122213
7	'	'	07	122312
8	(	(	08	132212
9	)	)	09	221213
10	*	*	10	221312
11	+	+	11	231212
12	,	,	12	112232
13	-	-	13	122132
14	.	.	14	122231
15	/	/	15	113222
16	0	0	16	123122
17	1	1	17	123221
18	2	2	18	223211
19	3	3	19	221132
20	4	4	20	221231
21	5	5	21	213212
22	6	6	22	223112
23	7	7	23	312131
24	8	8	24	311222
25	9	9	25	321122
26	:	:	26	321221
27	;	;	27	312212
28	<	<	28	322112
29	=	=	29	322211
30	>	>	30	212123
31	?	?	31	212321
32	@	@	32	232121
33	A	A	33	111323
34	B	B	34	131123
35	C	C	35	131321
36	D	D	36	112313
37	E	E	37	132113
38	F	F	38	132311
39	G	G	39	211313
40	H	H	40	231113
41	I	I	41	231311
42	J	J	42	112133
43	K	K	43	112331
44	L	L	44	132131
45	M	M	45	113123
46	N	N	46	113321
47	O	O	47	133121
48	P	P	48	313121
49	Q	Q	49	211331
50	R	R	50	231131
51	S	S	51	213113
52	T	T	52	213311
53	U	U	53	213131
54	V	V	54	311123
55	W	W	55	311321
56	X	X	56	331121
57	Y	Y	57	312113
58	Z	Z	58	312311
59	[	[	59	332111
60	\	\	60	314111
61	]	]	61	221411
62	^	^	62	431111
63	_	_	63	111224
64	NUL	`	64	111422
65	SOH	a	65	121124
66	STX	b	66	121421
67	ETX	c	67	141122
68	EOT	d	68	141221
69	ENQ	e	69	112214
70	ACK	f	70	112412
71	BEL	g	71	122114
72	BS	h	72	122411
73	HT	i	73	142112
74	LF	j	74	142211
75	VT	k	75	241211
76	FF	l	76	221114
77	CR	m	77	413111
78	SO	n	78	241112
79	SI	o	79	134111
80	DLE	p	80	111242
81	DC1	q	81	121142
82	DC2	r	82	121241
83	DC3	s	83	114212
84	DC4	t	84	124112
85	NAK	u	85	124211
86	SYN	v	86	411212
87	ETB	w	87	421112
88	CAN	x	88	421211
89	EM	y	89	212141
90	SUB	z	90	214121
91	ESC	{	91	412121
92	FS	|	92	111143
93	GS	}	93	111341
94	RS	~	94	131141
95	US	DEL	95	114113
96	FNC 3	FNC 3	96	114311
97	FNC 2	FNC 2	97	411113
98	1S B	1S A	98	411311
99	CODE C	CODE C	99	113141
100	CODE B	FNC 4	CODE B	114131
101	FNC 4	CODE A	CODE A	311141
102	FNC 1	FNC 1	FNC 1	411131
103	pad	pad	pad	211412
104	2S B	2S A	1S B	211214
105	2S C	2S C	2S B	211232
106	3S C	3S C	3S B	211133

Note: Shift is denoted as 1S
Double shift is denoted as 2S
Triple shift is denoted as 3S

Note: The numeric values in the "s" and "b" columns represent the number of modules in each of the symbol characters' bars and spaces.

Note: Dashed line indicates trailing edge of the preceding character.

4.3.3 Code sets

4.3.3.1 Code set A

Code set A includes all of the standard upper case alphanumeric keyboard characters together with the control characters (i.e. characters with ASCII values from 00 to 95 inclusive), and eleven special characters.

4.3.3.2 Code set B

Code set B includes all of the standard upper case alphanumeric keyboard characters together with the lower case alphabetic characters (i.e. characters with ASCII values from 32 to 127 inclusive), and eleven special characters.

4.3.3.3 Code set C

Code set C includes the set of 100 digit pairs from 00 to 99 inclusive, as well as seven special characters. This allows numeric data to be encoded, two data digits per symbol character, at effectively twice the density of standard data.

4.3.4 Special characters

Special characters defined below provide information to the reader and are not transmitted as data.

4.3.4.1 Mode character

The mode character, S, defines
initial mode value : m
the number of rows : r

The initial mode specifies the initial code set and may also represent an implied leading FNC1 character or implied leading Shift character as shown in table 2. Implied characters function as if they were actual symbol characters but do not occupy any space.

Table 2: Initial mode value

m	Initial code set	Implied character
0	Code set A	none
1	Code set B	none
2	Code set C	none
3	Code set B	FNC1
4	Code set C	FNC1
5	Code set C	Shift B
6	Code set C	Double shift B

The value, s, of the mode character is a packed number between 0 and 104 representing seven different initial mode set combinations and fifteen different numbers of rows:

$$s = 7\,(r-2) + m$$

where "r" is the number of rows (2 through 16) and "m" is the initial mode.

Where the Extended Data Length Symbol option is used (See Annex C), the value of s shall be 105.