
**Information processing — Magnetic
ink character recognition —**

**Part 2:
Print specifications for CMC7**

*Traitement de l'information — Reconnaissance des caractères à
encre magnétique —*

Partie 2: Spécifications d'impression CMC7

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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. www.iso.org/directives

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

The committee responsible for this document is ISO/TC 68, *Financial services*, Subcommittee SC 7, *Core banking*.

This first edition of ISO 1004-2, together with ISO 1004-1, cancels and replaces ISO 1004:1995, which has been technically revised.

ISO 1004 consists of the following parts, under the general title *Information processing — Magnetic ink character recognition*:

- *Part 1: Print specifications for E13B*
- *Part 2: Print specifications for CMC7*

[Annex A](#) is for information only.

Information processing — Magnetic ink character recognition —

Part 2: Print specifications for CMC7

1 Scope

This part of ISO 1004 specifies the shapes, dimensions and tolerances for the 10 digits 0 to 9, five symbols, and 26 letters, to be printed with magnetic ink for the purpose of character recognition. It describes the various types of printing defects and other printing considerations, together with the tolerances permitted, and also contains specifications to signal level measurement.

The characters specified in [Clause 4](#) of this part of ISO 1004 were developed initially for use in banks to permit automatic document handling for bank data processing, but they have application to other automatic processing systems as well.

2 Normative references

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 1004-1:2013, *Information processing — Magnetic ink character recognition — Part 1: Print specifications for E13B*

3 Terms, definitions, symbols and abbreviations

3.1 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1.1

magnetic ink

ink capable of being magnetized and sensed

3.1.2

vertical misalignment

deviation of the printed character from the nominal vertical position on the document

3.1.3

void

absence of magnetic ink outside the printed edge zone and outside the segment end zones in an area that should be inked

3.1.4

segment end zones

zone of maximum height of 0,22 mm that can be located at both ends of strokes and stroke segments

3.1.5

residual signal level

maximum signal level delivered by a character which has been voided

3.2 Symbols and abbreviations

Symbol or abbreviation	Corresponding clause or subclause	Characteristic
A	9.1.4	Character width
A_1	9.1.4	Character width of a character with one long interval
A_2	9.1.4	Character width of a character with two long intervals
A_3	9.1.4	Character width of a character with three long intervals
A_L	9	Alignment
b	10.2.1	Printed edge zone width
B	9.1.1	Character pitch
CB	8	Clear band
D	9.1.2	Intercharacter distance
D_m	9.1.1	Minimum interchange distance
D_{m1}	9.1.3	Minimum interchange distance for character with one or two long intervals
D_{m2}	9.1.3	Minimum interchange distance for character with three long intervals
DM	15	Debossment
ExB	11.2	Extraneous ink back
ExF	11.1	Extraneous ink front
FT	18	Format
h	10.1.2	Segment height
H_c	10.1.4	Character height
H_f	10.1.5	Font height
L	10.4	Stroke width
M	10.1.3	Stroke height
P	10.5	Stroke interval
P_{L1}	10.5.2	Short stroke interval between left mean edges
P_{L2}	10.5.2	Long stroke interval between right mean edges
P_{R1}	10.5.1	Short stroke interval between right mean edges
P_{R2}	10.5.1	Long stroke interval between right mean edges
SP	9	Character spacing
UI	14	Uniformity of ink
V	12	Voids

Symbol or abbreviation	Corresponding clause or subclause	Characteristic
VM	9.2	Vertical misalignment
α	10.3	Character skew angle

4 Character configuration

4.1 Code description

The coded character is composed of six intervals contained within seven strokes cut to the shape of a conventional character.

Two interval widths are used: “long” and “short”. It is the combination of these “long” and “short” intervals that determines the character code.

Two long and four short intervals may be combined in 15 possible ways (C_6^2) – a total which is available for the 10 digits and five symbols.

The alphabetic code uses one or three long intervals, allowing a total of $C_6^1 + C_6^3 = 26$ combinations which are thus available for 26 letters.

[Table 1](#) shows the correspondence between codes and the characters. The intervals are numbered 1 to 6 from left to right on the printed character. Their values are represented by the digit 0 for short intervals and by the digit 1 for long intervals.

4.2 Configuration

There are four font heights (see [10.1.5](#)): 3,20 mm, 3,00 mm, 2,85 mm and 2,70 mm. [Figures 3](#) to [23](#) give full details of the alphanumeric character set and symbols.

Table 1 — Character code description (0 = short interval. 1 = long interval)

Interval pattern						Coded character	Interval pattern						Coded character
1	2	3	4	5	6		1	2	3	4	5	6	
1	0	0	0	1	0	1	0	1	0	0	0	0	A
0	1	1	0	0	0	2	1	0	1	0	1	0	B
1	0	1	0	0	0	3	0	0	0	1	1	1	C
1	0	0	1	0	0	4	1	0	0	1	1	0	D
0	0	0	1	1	0	5	0	0	0	1	0	0	E
0	0	1	0	1	0	6	0	0	1	0	1	1	F
1	1	0	0	0	0	7	1	0	0	0	1	1	G
0	1	0	0	1	0	8	1	0	1	1	0	0	H
0	1	0	1	0	0	9	0	0	0	0	0	1	I
0	0	1	1	0	0	0	1	0	1	0	0	1	J
1	0	0	0	0	1	SI	0	1	1	0	1	0	K
0	1	0	0	0	1	SH	0	1	0	0	1	1	L
0	0	1	0	0	1	SIII	0	0	1	1	1	0	M
0	0	0	1	0	1	SIV	0	0	1	0	0	0	N
0	0	0	0	1	1	SV	1	0	0	0	0	0	O

Table 1 (continued)

Interval pattern						Coded character	Interval pattern						Coded character
1	2	3	4	5	6		1	2	3	4	5	6	
							0	1	0	1	1	0	P
							1	1	1	0	0	0	Q
							0	1	1	1	0	0	R
							0	1	0	1	0	1	S
							0	0	0	0	1	0	T
							1	1	0	1	0	0	U
							1	1	0	0	0	1	V
							1	0	0	1	0	1	W
							1	1	0	0	1	0	X
							0	1	1	0	0	1	Y
							0	0	1	1	0	1	Z

5 Means of automatic sensing

The automatic character recognition takes place by means of identification of the interval lengths between adjacent strokes. Stroke sensing takes place magnetically.

6 Reference edges of documents

For the purpose of measuring the printed image, the right-hand and the bottom edges are the reference edges of the document.

7 Print location

7.1 Horizontal location

The extreme right mean edge of the printed line should be located at least 6,0 mm from the right reference edge of the document. The distance between the left-hand edge of the document and the extreme left mean edge in the printed line should be at least 4,0 mm. In some cases, by agreement between parties concerned, this latter distance may be reduced to 2,0 mm. System consideration may dictate a 6,0 mm minimum margin on both sides, if the document is to be readable in both directions. (See [Figure 1](#)).

7.2 Vertical location

The character shall be printed entirely within a printing band 6,4 mm high. The bottom edge of this printing band is located 4,8 mm above and parallel to the bottom reference edge of the document. (See [Figure 1](#)).

This subclause does not apply to punched cards.

8 Clear band

Over the whole length and on both sides of the document a clear band, 16 mm measured from the bottom edge of the document, shall be free from any magnetic ink other than CMC 7 character (see [Figure 1](#)). Under no circumstances may CMC 7 characters be printed within the clear band using non-magnetic ink.

CMC 7 and E13 B fonts shall not be permitted in the same clear band on any document. CMC 7 shall only appear on the front of the document.

9 Character spacing and alignment

9.1 Horizontal character spacing

9.1.1 Character pitch, B

The distance between the orthogonal projections upon the bottom reference edge of the extreme right mean edges (see 10.2.2) at mid-character height of adjacent characters. The nominal character pitch B may be as small as 3,17 mm. The horizontal spacing between characters shall be such that a minimum inter-character distance D_m is maintained.

9.1.2 Intercharacter distance D between two adjacent characters

The distance between the orthogonal projections upon the bottom reference edge of the right mean edges (see 10.2.2) at mid-character height of the left-hand stroke of the right-hand character and the right-hand stroke of the left-hand character.

9.1.3 Minimum inter character distance

$D_{m1} = 0,67$ mm if the right-hand character has one or two long intervals: and $D_{m2} = 0,50$ mm if the right-hand character has three long intervals.

9.1.4 Character width A

The distance between the right mean edges of the outer most strokes of a character. The nominal values for characters with one, two and three long intervals respectively, are as follows:

$$A_1 = 2,0 \text{ mm}$$

$$A_2 = 2,2 \text{ mm}$$

$$A_3 = 2,4 \text{ mm}$$

9.2 Vertical misalignment

Vertical misalignment should be consistent with good printing practice and can be tolerated as far as the characters are completely contained in the printing band of the document. (See 7.2 and Figure 1).

10 Character definition and tolerances

10.1 Definitions

10.1.1 Stroke

One or more segments.

10.1.2 Segment height, h

The distance between the top and bottom of that segment.

10.1.3 Stroke height, M

The sum of the heights of the segments contained in that stroke.