BS ISO 1004-2:2013

BSI Standards Publication

Information processing — Magnetic ink character recognition

Part 2: Print specifications for CMC7

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National foreword

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The UK participation in its preparation was entrusted to Technical Committee IST/12, Financial services.

A list of organizations represented on this committee can be obtained on request to its secretary.

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ISBN 978 0 580 78111 7

ICS 35.240.40

Compliance with a British Standard cannot confer immunity from legal obligations.

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 30 June 2013.

Amendments issued since publication

Date	Text affected

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INTERNATIONAL STANDARD

ISO 1004-2

First edition
2013-06-01

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

Reference number
ISO 1004-2:2013(E)

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Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
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Published in Switzerland

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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*

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INTERNATIONAL STANDARD ISO 1004-2:2013(E)

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

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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

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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.

Table1 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	**S I**		0	1	1	0	1	0	**K**
0	1	0	0	0	1	**S II**		0	1	0	0	1	1	**L**
0	0	1	0	0	1	**S III**		0	0	1	1	1	0	**M**
0	0	0	1	0	1	**S IV**		0	0	1	0	0	0	**N**
0	0	0	0	1	1	**S V**		1	0	0	0	0	0	**O**

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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 bank on any document. CMC 7 shall only appear on the front of the document.

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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 mm

A_2 = 2,2 mm

A_3 = 2,4 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.

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10.1.4 Character height, H_c

The distance between the top and bottom of that character.

10.1.5 Font height, H_f

The nominal height of the highest character of the font.

10.2 Stroke edge zones and mean edges

10.2.1 Printed edge zone

Printed edge zones are located at both edges of all strokes, each one being defined by two parallel lines having a fixed distance – the printed edge zone width b – from each other. The value of b is 0,06 mm.

There are 14 printed edge zones in a character. Each printed edge zone extends over the full height of the stroke, excluding inter segment interruptions and segment end zones.

10.2.2 Mean edge

The centre line of the printed edge zone dividing the irregularities of the printed edge, contained in the printed edge zone, in such a way that the sum of the non-inked areas on the stroke side is equal to the sum of the inked areas on the space side. If this sum is minimized, the centre line is then called theoretical mean edge.

10.2.3 Theoretical mean edge

The 14 theoretical mean edges of a character are used to determine the skew angle of the character (see 10.3); in this case the 14 mean edges of a character need not be parallel each other.

10.2.4 Practical mean edge

For practical measurements, parallel mean edges are used, placed so that their direction is the average direction of the 14 theoretical mean edges. Such parallel mean edges are called practical mean edges.

10.3 Skew angle α

The angle between any practical mean edge and a line perpendicular to the bottom reference edge. The absolute value of the skew angle of a character shall not exceed 1°30′.

10.4 Stroke width L

The distance between the right and left mean edges of a stroke. Its value shall lie within the range 0,10 mm to 0,19 mm.

10.5 Stroke interval P

The distance between the right mean edges of adjacent strokes or the distance between left mean edges of adjacent strokes. The value of the tolerances depends on the value of the skew angle α as specified in 10.3.

10.5.1 Right mean edges P_{R1} and P_{R2}

P_{R1} = 0,30 mm ± 0,04 mm for 0° < α < 45’

P_{R1} = 0,30 mm ± 0,03 mm for 45’ < α < 1°30′

P_{R2} = 0,50 mm ± 0,04 mm for 0° < α < 45’

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P_{R2} = 0,50 mm ± 0,03 mm for 45′ < α < 1°30′

10.5.2 Left mean edges P_{L1} and P_{L2}

P_{L1} = 0,30 mm ± 0,06 mm for 0° < α < 1°30′

P_{L2} = 0,50 mm ± 0,06 mm for 0° < α < 1°30′

11 Extraneous ink (spots)

11.1 Extraneous ink front

Magnetic ink located outside the printed edge zone and outside segment end zone and within the clear band in the area that should be ink free.

The integrated height of the extraneous ink front along any line parallel to the skew angle of the character shall not exceed 0,2 mm.

11.2 Extraneous ink back

Magnetic ink present in the clear band on the reverse side of the document.

The spots on the reverse side of the document are not acceptable if they are detectable by the unaided eye.

12 Voids

The integrated height of voids along any line parallel to the skew angle of the character shall not exceed 0,4 mm.

The absence of ink in an area extending over the full width of a stroke including its printed edge zones is allowable over a height greater than 0,4 mm provided the signal level specification is satisfied. However, voids are limited by the requirement that the character shall be readable visually without confusion.

13 Segment end zones

The width is equal to that of the stroke together with its printed edge zones.

The following rules apply:

a) any shape of stroke ends within the segment end is acceptable;

b) the segment end zones may be located at stroke ends at the most convenient vertical position to minimize the voids and extraneous ink;

c) the height of the segment end zone should be chosen such as to ease the fulfilment of the specification of voids. The sum of the heights of all segment end zones along any stroke shall be smaller than:

— 0,6 mm for two or three segment strokes;

— 0,4 mm for one segment strokes.

Where a stroke (segment) is interrupted, the new stroke ends may not be covered with segment end zones.

14 Uniformity of ink

The ink deposited shall be uniformly distributed within the outlines of each stroke. Conditions to be avoided include excessive squeeze out, halo and other uneven deposits which might result in a ridge of

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