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**INTERNATIONAL STANDARD**



**1073 / II**

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INTERNATIONAL ORGANIZATION FOR STANDARDIZATION • МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ • ORGANISATION INTERNATIONALE DE NORMALISATION

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**Alphanumeric character sets for optical recognition —  
Part II : Character set OCR-B — Shapes and dimensions  
of the printed image**

*Jeux alphanumériques de caractères pour la reconnaissance optique —  
Partie II : Jeu de caractères ROC-B — Formes et cotes de l'image imprimée*

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## FOREWORD

ISO (the International Organization for Standardization) is a worldwide federation of national standards institutes (ISO Member Bodies). The work of developing International Standards is carried out through ISO Technical Committees. Every Member Body interested in a subject for which a Technical Committee has been set up 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.

Draft International Standards adopted by the Technical Committees are circulated to the Member Bodies for approval before their acceptance as International Standards by the ISO Council.

International Standard ISO 1073/II was drawn up by Technical Committee ISO/TC 97, *Computers and information processing*, and was circulated to the Member Bodies in May 1975.

It has been approved by the Member Bodies of the following countries :

Australia	Hungary	Sweden
Belgium	Italy	Switzerland
Brazil	Japan	Turkey
Czechoslovakia	Netherlands	United Kingdom
Denmark	New Zealand	U.S.A.
France	Romania	U.S.S.R.
Germany	South Africa, Rep. of	Yugoslavia

No Member Body expressed disapproval of the document.

This International Standard, together with ISO 1073/I, cancels and replaces ISO Recommendation R 1073-1969.

# Alphanumeric character sets for optical recognition — Part II : Character set OCR-B — Shapes and dimensions of the printed image

## 1 GENERAL

### 1.1 Scope

This International Standard for character shapes and sizes is intended to facilitate and foster the use of Optical Character Recognition (OCR) in data processing, by defining character shapes suitable for both human and machine reading.

It establishes a common basis for printing equipment and optical scanning equipment for OCR interchange applications.

Additional International Standards will cover the print quality and the relevant characteristics of the formats needed to satisfy interchange requirements.

### 1.2 Field of application

This International Standard specifies the printed image shapes and sizes of alphanumeric characters, graphics and symbols designed for use in Optical Character Recognition. They are also suitable for general purposes.

In order to satisfy present requirements and encourage the wide extension of OCR applications, two sets of characters are specified. These are named OCR-A and OCR-B.

Character set OCR-A includes the numeric sub-set which was recommended in draft ISO Recommendation No. 890 (now part of this International Standard). The shapes of the characters have been designed to be suitable for use in many applications of OCR. Dimensions of OCR-A are given in three sizes. (See part I.)

The shapes of the OCR-B characters have been designed for use in OCR systems without undue sacrifice of their suitability for general purposes in a wide range of applications. Dimensions of OCR-B are given in three sizes.

### 1.3 Definitions

For the purpose of this International Standard the following definitions apply :

**1.3.1 OCR-A :** A repertoire of 69 characters of which 56 are graphics included in the ISO 7-bit coded character set (ISO 646-1973). It comprises digits, capital letters, capital national letters and other graphics. (See part I.)

**1.3.2 OCR-B :** A repertoire of 121 characters comprising

digits, capital and small letters, all the graphics specified in the ISO 7-bit coded character set (ISO 646-1973), national letters, diacritical signs and further graphics.

### NOTES

1 For applications which involve circulation of documents across boundaries between areas in which different national characters are in use, agreement between the sender and the recipient of the documents is required.

2 The metric and inch dimensions in this International Standard are rounded and therefore consistent but not exactly equal. Either system may be used but the two should not be intermixed.

3 It is recognized that some type-making and printing processes will not be able to produce sharp corners. Corners not specified as having a specific radius should be as sharp as practicable. However, it is not necessary for OCR purposes that the radii of the corners of the nominal printed image be less than 0,08 mm (0.003 5 in).

## 2 STYLES

The OCR-B font (see clause 13) comprises 121 characters, but, in general, only a subset will be used for a specific application.

The character shapes and dimensions are specified by reference drawings on a reference grid. The nominal strokewidth is constant for each character of the standard set entitled "constant-strokewidth font"; the centreline of each character is indicated on the reference grid.

A second style of characters entitled "letterpress font" may be used with printing equipment which can reproduce fine details with sufficient accuracy. For many classes of printers, however, the strokewidth is less controllable and therefore for these printers the constant-strokewidth font shall be used.

For aesthetic reasons, the strokewidth of the letterpress font characters is varied deliberately and the stroke endings are specially designed. But the centrelines are the same for both fonts and these centrelines, as defined for the constant-strokewidth font, are the definitive part of this standard.

## 3 OCR-B SIZES

**3.1** Three sizes are specified for OCR-B characters in order to provide for use with a wide range of printing equipment processing differing print quality characteristics. Devices such as typewriters, cash registers, numbering machines, high-speed printers, and credit card imprinters, besides printing processes such as letterpress and offset lithography, are all suitable.

3.2 The letterpress font is specified in size I (the smallest) only. It provides the option of a variable pitch between characters as is usual with letterpress.

3.3 The constant-strokewidth font is specified in three sizes, I, III and IV. Mechanisms using the constant-strokewidth font will usually maintain a fixed pitch.

3.4 Size II which was in ISO/R 1073-1969 has been deleted. (See annex B.)

3.5 The centrelines for the three sizes are simply related by appropriate horizontal and vertical scale factors. The factors for size III and size IV referred to size I are :

for size III  
Vertical : 1,333    Horizontal : 1,086

for size IV  
Vertical : 1,500    Horizontal : 1,500

This scale relationship does not apply to the outline shapes, since nominal strokewidth is not strictly proportional to centreline dimensions. The strokewidths for each size are shown in the reference drawings.

3.6 The character with the greatest height in each size is digit EIGHT. It is the character which extends farthest above the base line for capital letters. The longest character is small letter j, because of its descender.

The centreline heights of the character EIGHT are :

for size I :            2,40 mm (0.094 in)  
for size III :         3,20 mm (0.126 in)  
for size IV :         3,60 mm (0.142 in)

3.7 The widest character in each size (except for the alternative small letter m) is digit ZERO. Its centreline widths are :

for size I :            1,40 mm (0.055 in)  
for size III :         1,52 mm (0.060 in)  
for size IV :         2,10 mm (0.083 in)

3.8 Constant-pitch printing

In constant-pitch printing for OCR applications, the following minimum nominal pitches are appropriate :

size I :                2,54 mm (0.100 in) min.  
size III :             2,54 mm (0.100 in) min.  
size IV :             3,63 mm (0.143 in) min.

4 TYPICAL DIMENSIONS OF THE NOMINAL PRINTED IMAGE

4.1 Constant-strokewidth font

Typical dimensions for the nominal printed image of the constant-strokewidth font in size I are given below. These dimensions are the heights above and below the horizontal base line of digits, capital and small letters, ascenders and descenders (see figure 1). These dimensions are for general information only. The values for individual characters are obtainable from the reference drawings.

4.2 Letterpress font

The shapes of the letterpress characters are similar except that the stroke ends are not rounded.

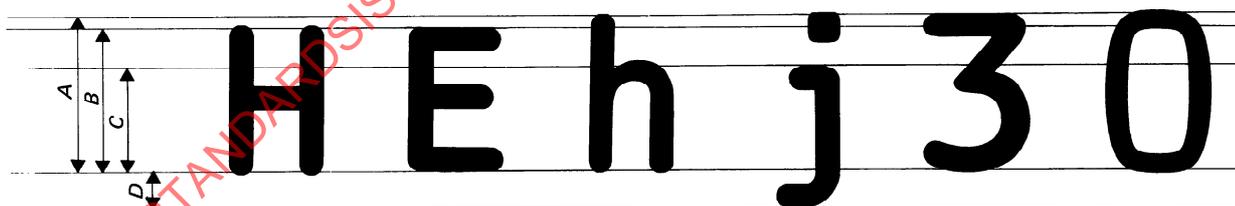


FIGURE 1 – Heights above and below base line

TABLE 1 – Typical dimensions A, B, C and D

Size	millimetres				inches			
	A	B	C	D	A	B	C	D
I	2,66	2,46	1,83	0,60	0.105	0.097	0.072	0.024

## 5 OCR-B CHARACTER SET

The full character set comprises 121 characters.

The following sub-sets can be distinguished.

### 5.1 Sub-set 1 : Numeric sub-set

This sub-set comprises 22 characters :

0 1 2 3 4 5 6 7 8 9

< + >

C E N S T X Z

⏏ SPACE

#### NOTES

1 The character ZERO is the only digit which had to be modified in this revision of ISO/R 1073-1969. The use of the original design is tolerated in numeric applications implemented before 1976. OCR reading of both old and revised design is subject to special agreement between OCR equipment supplier and user. For any application implemented after 1976, only the new design is standard.

2 The characters C E N S T X Z should preferably not be used in document reading applications.

### 5.2 Sub-set 2 : Initial alphanumeric sub-set

This sub-set comprises 47 characters :

0 1 2 3 4 5 6 7 8 9

A B C D E F G H I J K L M

N O P Q R S T U V W X Y Z

< + > \* - = / . ,

⏏ SPACE

5.3 Sub-set 3 : Extended alphanumeric sub-set

This sub-set comprises 98 characters, in particular those of the ISO 7-bit coded character set (ISO 646-1973) :

! " # £ ¤ \$ % & ' ( ) \* + , - . /  
0 1 2 3 4 5 6 7 8 9 : ; < = > ?  
@ A B C D E F G H I J K L M N O  
P Q R S T U V W X Y Z [ \ ] ^ \_  
` a b c d e f g h i j k l m n o  
p q r s t u v w x y z { | } ~  
| SPACE

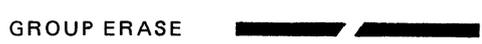
5.4 Sub-set 4 : Options sub-set

This sub-set comprises 8 capital national letters, 5 small national letters, 4 diacritical signs and 4 further characters :

À Á Â Ã Ä Å Æ Ç È É  
à á â ã ä å æ ç è é  
" ' ^  
,  
m \_

5.5 Sub-set 5 : Erase characters

This sub-set comprises 2 characters :



The dimensions of these two characters are as shown below :

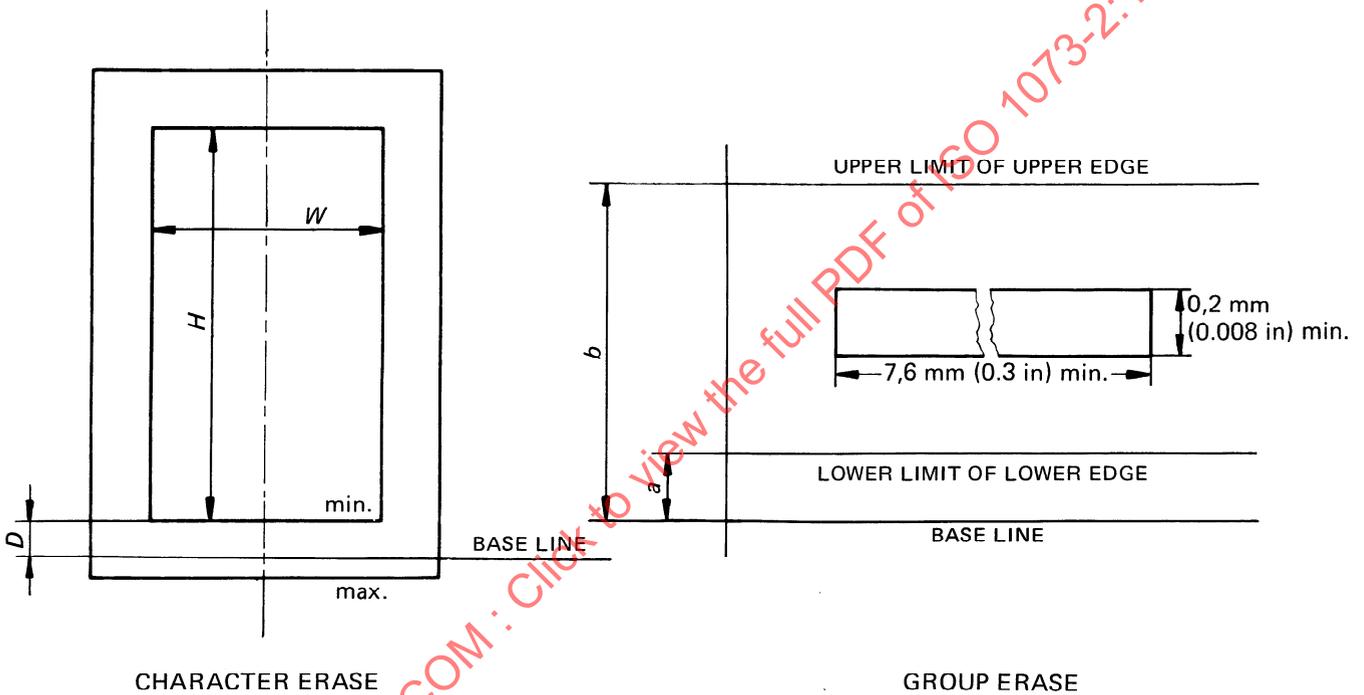


FIGURE 2 – Erase characters

TABLE 2 – Dimensions of erase characters

	millimetres			inches		
	Size I	Size III	Size IV	Size I	Size III	Size IV
CHARACTER ERASE :						
min. <i>H</i>	2,4		3,8	0.094		0.149
max. <i>H</i>	2,9		4,6	0.115		0.181
min. <i>W</i>	1,4		2,0	0.055		0.079
max. <i>W</i>	1,9		2,8	0.075		0.110
<i>D</i>	0,13		0,20	0.005		0.008
GROUP ERASE :						
minimum length	7,6	7,6	10,9	0.300	0.300	0.430
minimum width	0,2	0,2	0,2	0.008	0.008	0.008
<i>a</i>	0,4	0,5	0,6	0.016	0.020	0.024
<i>b</i>	2,0	2,7	3,0	0.077	0.106	0.118

## 6 INDEX TABLE

6.1 All characters are available in size I as constant-strokewidth font and as letterpress font.

Only the characters of the numeric sub-set (sub-set 1) and the character GROUP ERASE are available in size III as constant-strokewidth font.

All characters are available in size IV as constant-strokewidth font, with the exception of VERTICAL LINE.

6.2 In the following index table each character is given with the indication of the reference drawing or drawings and the sub-set or sub-sets in which it is comprised.

The drawings are identified as follows :

L : for letterpress font, size I

C : for the constant-strokewidth font, size I

III : for the constant-strokewidth font, size III.

6.3 As stated in 11.6, the character shapes for size IV are derived from those of size I for the constant-strokewidth font (designated by C).

6.4 Application advice is given in the column "Remarks", where it is indicated, *inter alia*, which characters are included for general-purpose use only and should not be used for OCR purposes.

It is recommended that prospective users of this standard consult manufacturers before deciding on a particular character set.

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## INDEX TABLE

Ref. No.	Shape	Drawing(s) No.	Name	Sets	Remarks
1	1	1 L, C, III	DIGIT ONE	1 2 3	
2	2	2 L, C III	DIGIT TWO	1 2 3	
3	3	3 L, C, III	DIGIT THREE	1 2 3	
4	4	4 L, C, III	DIGIT FOUR	1 2 3	
5	5	5 L, C, III	DIGIT FIVE	1 2 3	
6	6	6 L, C, III	DIGIT SIX	1 2 3	
7	7	7 L, C, III	DIGIT SEVEN	1 2 3	
8	8	8 L, C, III	DIGIT EIGHT	1 2 3	
9	9	9 L, C, III	DIGIT NINE	1 2 3	
10	0	10 L, C, III	DIGIT ZERO	1 2 3	The character ZERO is the only digit which had to be modified in this revision of ISO/R 1073-1969. The use of the original design is tolerated in numeric applications implemented before 1976. OCR reading of both old and revised design is subject to special agreement between OCR equipment supplier and user. For any application implemented after 1976, only the new design is standard.
11	A	11 L, C	CAPITAL LETTER A	2 3	

## INDEX TABLE (continued)

Ref. No.	Shape	Drawing(s) No.	Name	Sets	Remarks
12	<b>B</b>	12 L, C	CAPITAL LETTER B	2 3	
13	<b>C</b>	13 L, C, III	CAPITAL LETTER C	1 2 3	
14	<b>D</b>	14 L, C	CAPITAL LETTER D	2 3	
15	<b>E</b>	15 L, C, III	CAPITAL LETTER E	1 2 3	
16	<b>F</b>	16 L, C	CAPITAL LETTER F	2 3	
17	<b>G</b>	17 L, C	CAPITAL LETTER G	2 3	
18	<b>H</b>	18 L, C	CAPITAL LETTER H	2 3	
19	<b>I</b>	19 L, C	CAPITAL LETTER I	2 3	
20	<b>J</b>	20 L, C	CAPITAL LETTER J	2 3	
21	<b>K</b>	21 L, C	CAPITAL LETTER K	2 3	
22	<b>L</b>	22 L, C	CAPITAL LETTER L	2 3	

INDEX TABLE (continued)

Ref. No.	Shape	Drawing(s) No.	Name	Sets	Remarks
23	<b>M</b>	23 L, C	CAPITAL LETTER M	2 3	
24	<b>N</b>	24 L, C, III	CAPITAL LETTER N	1 2 3	
25	<b>O</b>	25 L, C	CAPITAL LETTER O	2 3	
26	<b>P</b>	26 L, C	CAPITAL LETTER P	2 3	
27	<b>Q</b>	27 L, C	CAPITAL LETTER Q	2 3	
28	<b>R</b>	28 L, C	CAPITAL LETTER R	2 3	
29	<b>S</b>	29 L, C, III	CAPITAL LETTER S	1 2 3	
30	<b>T</b>	30 L, C, III	CAPITAL LETTER T	1 2 3	
31	<b>U</b>	31 L, C	CAPITAL LETTER U	2 3	
32	<b>V</b>	32 L, C	CAPITAL LETTER V	2 3	
33	<b>W</b>	33 L, C	CAPITAL LETTER W	2 3	

## INDEX TABLE (continued)

Ref. No.	Shape	Drawing(s) No.	Name	Sets	Remarks
34	X	34 L, C, III	CAPITAL LETTER X	1 2 3	
35	Y	35 L, C	CAPITAL LETTER Y	2 3	
36	Z	36 L, C, III	CAPITAL LETTER Z	1 2 3	
37	a	37 L, C	SMALL LETTER a	3	Smaller strokewidth, see clause 11.
38	b	38 L, C	SMALL LETTER b	3	Smaller strokewidth, see clause 11.
39	c	39 L, C	SMALL LETTER c	3	Smaller strokewidth, see clause 11.
40	d	40 L, C	SMALL LETTER d	3	Smaller strokewidth, see clause 11.
41	e	41 L, C	SMALL LETTER e	3	Smaller strokewidth, see clause 11.
42	f	42 L, C	SMALL LETTER f	3	Smaller strokewidth, see clause 11.
43	g	43 L, C	SMALL LETTER g	3	Smaller strokewidth, see clause 11.
44	h	44 L, C	SMALL LETTER h	3	Smaller strokewidth, see clause 11.

INDEX TABLE (continued)

Ref. No.	Shape	Drawing(s) No.	Name	Sets	Remarks
45	i	45 L, C	SMALL LETTER i	3	Smaller strokewidth, see clause 11.
46	j	46 L, C	SMALL LETTER j	3	Smaller strokewidth, see clause 11.
47	k	47 L, C	SMALL LETTER k	3	Smaller strokewidth, see clause 11.
48	l	48 L, C	SMALL LETTER l	3	Smaller strokewidth, see clause 11.
49	m	49 L, C	SMALL LETTER m	3	Smaller strokewidth, see clause 11.
50	n	50 L, C	SMALL LETTER n	3	Smaller strokewidth, see clause 11.
51	o	51 L, C	SMALL LETTER o	3	Smaller strokewidth, see clause 11.
52	p	52 L, C	SMALL LETTER p	3	Smaller strokewidth, see clause 11.
53	q	53 L, C	SMALL LETTER q	3	Smaller strokewidth, see clause 11.
54	r	54 L, C	SMALL LETTER r	3	Smaller strokewidth, see clause 11.
55	s	55 L, C	SMALL LETTER s	3	Smaller strokewidth, see clause 11.

INDEX TABLE (continued)

Ref. No.	Shape	Drawing(s) No.	Name	Sets	Remarks
56	t	56 L, C	SMALL LETTER t	3	Smaller strokewidth, see clause 11.
57	u	57 L, C	SMALL LETTER u	3	Smaller strokewidth, see clause 11.
58	v	58 L, C	SMALL LETTER v	3	Smaller strokewidth, see clause 11.
59	w	59 L, C	SMALL LETTER w	3	Smaller strokewidth, see clause 11.
60	x	60 L, C	SMALL LETTER x	3	Smaller strokewidth, see clause 11.
61	y	61 L, C	SMALL LETTER y	3	Smaller strokewidth, see clause 11.
62	z	62 L, C	SMALL LETTER z	3	Smaller strokewidth, see clause 11.
63	*	63 L, C	ASTERISK	2 3	
64	+	64 L, C, III	PLUS SIGN	1 2 3	
65	-	65 L, C	HYPHEN (MINUS SIGN)	2 3	
66	=	66 L, C	EQUALS SIGN	2 3	

INDEX TABLE (continued)

Ref. No.	Shape	Drawing(s) No.	Name	Sets	Remarks
67		67 L, C	SOLIDUS	2 3	
68		68 L, C	FULL STOP (PERIOD)	2 3	
69		69 L, C	COMMA	2 3	Two vertical locations are specified, one of which projects below the base line for capital letters (see 11.4 and 11.7).
70		70 L, C	COLON	3	
71		71 L, C	SEMI-COLON	3	Two vertical locations are specified, one of which projects below the base line for capital letters (see 11.4 and 11.7).
72		72 L, C	QUOTATION MARK	3	Can be replaced by DIAERESIS (Ref. 107) in non-OCR applications, if it is required to print QUOTATION MARK and DIAERESIS with the same type-face (see 7.2).
73		73 L, C	APOSTROPHE	3	Can be replaced by ACUTE ACCENT (Ref. 108) in non-OCR applications, if it is required to print APOSTROPHE and ACUTE ACCENT with the same type-face (see 7.2).
74		74 L, C	DISCONTINUOUS UNDERLINE	3	For OCR this character shall be used as stand alone character only, and shall not be printed under another character (see clause 8).
75		75 L, C	QUESTION MARK	3	
76		76 L, C	EXCLAMATION MARK	3	
77		77 L, C	LEFT PARENTHESIS	3	

## INDEX TABLE (continued)

Ref. No.	Shape	Drawing(s) No.	Name	Sets	Remarks
78	)	78 L, C	RIGHT PARENTHESIS	3	
79	<	79 L, C, III	LESS THAN SIGN	1 2 3	
80	>	80 L, C, III	GREATER THAN SIGN	1 2 3	
81	[	81 L, C	LEFT SQUARE BRACKET	3	
82	]	82 L, C	RIGHT SQUARE BRACKET	3	
83	%	83 L, C	PERCENT SIGN	3	Smaller strokewidth, see clause 11.
84	#	84 L, C	NUMBER SIGN	3	Smaller strokewidth, see clause 11.
85	&	85 L, C	AMPERSAND	3	
86	@	86 L, C	COMMERCIAL AT	3	Smaller strokewidth, see clause 11.
87	^	87 L, C	UPWARD ARROW HEAD	3	Can be replaced by CIRCUMFLEX ACCENT (Ref. 110) in non-OCR applications, if it is required to print UPWARD ARROW HEAD and CIRCUMFLEX ACCENT with the same type-face (see 7.2).
88	¤	88 L, C	CURRENCY SIGN	3	

INDEX TABLE (continued)

Ref. No.	Shape	Drawing(s) No.	Name	Sets	Remarks
89	£	89 L, C	POUND SIGN	3	
90	\$	90 L, C	DOLLAR SIGN	3	
91		91 L, C	VERTICAL LINE	3	See clause 10.
92	!	92 L, C, III	LONG VERTICAL MARK	1 2 3	See clause 10.
93	\	93 L, C	REVERSE SOLIDUS	3	
94	Ä	94 L, C	CAPITAL LETTER Ä	4	Where possible, substitution by the two capital letters A (Ref. 11) and E (Ref. 15) is recommended for OCR.
95	Å	95 L, C	CAPITAL LETTER Å	4	
96	Æ	96 L, C	CAPITAL LETTER Æ	4	
97	Ö	97 L, C	CAPITAL LETTER Ö	4	Where possible, substitution by the two capital letters O (Ref. 25) and E (Ref. 15) is recommended for OCR.
98	Ø	98 L, C	CAPITAL LETTER Ø	4	
99	Ü	99 L, C	CAPITAL LETTER Ü	4	Where possible, substitution by the two capital letters U (Ref. 31) and E (Ref. 15) is recommended for OCR.

INDEX TABLE (continued)

Ref. No.	Shape	Drawing(s) No.	Name	Sets	Remarks
100	I J	100 L, C	CAPITAL LETTER DUTCH IJ	4	For OCR purpose, separate capital letters I (Ref. 19) and J (Ref. 20) should be used.
101	Ń	101 L, C	CAPITAL LETTER Ń	4	
102	ǣ	102 L, C	SMALL LETTER ǣ	4	Smaller strokewidth, see clause 11.
103	æ	103 L, C	SMALL LETTER æ	4	Smaller strokewidth, see clause 11.
104	ø	104 L, C	SMALL LETTER ø	4	Smaller strokewidth, see clause 11.
105	ij	105 L, C	SMALL LETTER DUTCH ij	4	Smaller strokewidth, see clause 11.
106	ß	106 L, C	SMALL LETTER GERMAN DOUBLE s	4	Smaller strokewidth, see clause 11.
107	¨	107 L, C	DIAERESIS	4	For use see clause 7.
108	´	108 L, C	ACUTE ACCENT	4	For use see clause 7.
109	ˋ	109 L, C	GRAVE ACCENT	3	For use see clause 7.
110	ˆ	110 L, C	CIRCUMFLEX ACCENT	4	For use see clause 7.

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## INDEX TABLE (concluded)

Ref. No.	Shape	Drawing(s) No.	Name	Sets	Remarks
111	~	111 L, C	TILDE	4	For use see clause 7.
112	,	112 L, C	CEDILLA	4	For use see clause 7.
113	{	113 L, C	LEFT CURLY BRACKET	3	Use is not recommended for OCR.
114	}	114 L, C	RIGHT CURLY BRACKET	3	Use is not recommended for OCR.
115	m	115 L, C	ALTERNATIVE SMALL LETTER m	4	May be used in variable-pitch printing as a substitute for Ref. 49.
116		116 L, C	CONTINUOUS UNDERLINE	4	CONTINUOUS UNDERLINE is not intended for use. Its width must be such that adjacent CONTINUOUS OCR UNDERLINES have no gap between them. See clause 8.
117		No drawing	SPACE	1 2 3	SPACE is a non-printing character. For definition, see clause 9. Not all readers will necessarily recognize SPACE.
118	§	118 L, C	PARAGRAPH	4	
119	¥	119 L, C	YEN SIGN	4	
120	■	No drawing L, C	CHARACTER ERASE	5	
121	▬	No drawing L, C, III	GROUP ERASE	5	

7 USE OF DIACRITICAL SIGNS

7.1 Besides the specially designed national letters (subset 4) a number of diacritical marks are provided which have been designed and positioned in such a way that they can be combined with small letters in order to modify or stress their meaning. These are :

CIRCUMFLEX ACCENT	(ref. 110)	ˆ
GRAVE ACCENT	(ref. 109)	˘
ACUTE ACCENT	(ref. 108)	´
DIAERESIS	(ref. 107)	¨
TILDE	(ref. 111)	˜
CEDILLA	(ref. 112)	¸

The relative position of the accent and of the letter is obtained by superimposing the horizontal and vertical axes of the two graphics concerned. Accented letters can be obtained as shown in figure 3. For OCR purposes, the superposition of an accent on a character shape must be done very accurately. Composite characters may be printed in a single operation or in two operations. Prospective users should consult manufacturers before planning inclusion of accented letters in OCR character sets.

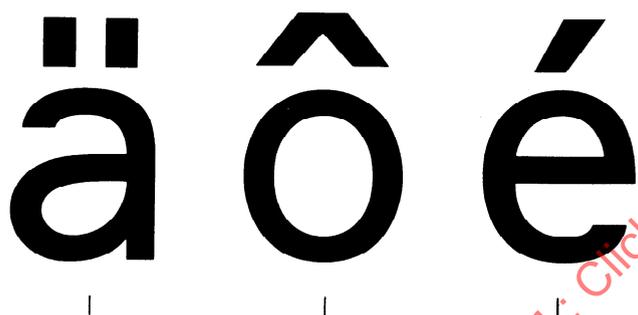


FIGURE 3 – Examples of accented letters

7.2 In non-OCR applications the DIAERESIS, ACUTE ACCENT and CIRCUMFLEX ACCENT may be used as free-standing characters, to mean QUOTATION MARKS,

APOSTROPHE and UPWARD ARROW HEAD respectively, thereby reducing the total number of characters required. For OCR, however, this practice is not recommended and the proper designs must be used (ref. 72, 73 and 87) for these three characters.

8 USE OF THE TWO UNDERLINE CHARACTERS

Two characters are provided for underlining :

DISCONTINUOUS UNDERLINE	(ref. 74)	_
CONTINUOUS UNDERLINE	(ref. 116)	—

The latter, CONTINUOUS UNDERLINE, is not intended for use in OCR applications. The character DISCONTINUOUS UNDERLINE shall be used in OCR applications as a free-standing character only, and shall not be printed under another character.



FIGURE 4 – Example of use of DISCONTINUOUS UNDERLINE

9 SPACE (no reference drawing)

The character SPACE is an intentionally blank position in a line of printing. With constant-pitch printing, its nominal width is equal to the printing pitch (for example, 2,54 mm if the characters are printed 10 per 25,4 mm). With variable-pitch printing, its nominal width is equal to the largest character pitch available.

10 VERTICAL LINE AND LONG VERTICAL MARK

Both the VERTICAL LINE (ref. 91) and the LONG VERTICAL MARK (ref. 92) are vertical lines but they differ in minimum height, as given in table 3.

TABLE 3 – Dimensions of VERTICAL LINE and LONG VERTICAL MARK

	millimetres			inches		
	Size I	Size III	Size IV	Size I	Size III	Size IV
Height of VERTICAL LINE	3,2			0.126		
Minimum height of LONG VERTICAL MARK	3,7	5,0	5,6	0.146	0.196	0.220
Nominal strokewidth of VERTICAL LINE and LONG VERTICAL MARK	0,35	0,38	0,50	0.014	0.015	0.019

NOTE – The character VERTICAL LINE is available in size I only.

The character VERTICAL LINE has been introduced specifically for high-speed or other printers, to allow them to print the character allocated to the position 7/12 of the ISO 7-bit coded character set (ISO 646-1973).

When required by a reading application, the LONG VERTICAL MARK can be allocated the same code combination (7/12) as VERTICAL LINE. For the purpose of character spacing, both characters shall be considered as a full-width character.

## 11 CHARACTER SHAPE DEFINITION

### 11.1 Reference drawings

The shapes and dimensions of the OCR-B characters for both the letterpress and the constant-strokewidth fonts are specified by original drawings for size I and III.

The characters are drawn at scale 100 : 1 on a 2 mm square grid. The total grid measures 280 mm × 380 mm. For the purpose of illustration in this standard, some of these original drawings have been reduced to approximately 70 × full size. Grid readings should be made only from drawings on stable material. Photographic reproductions of drawings printed on paper are not satisfactory for this purpose – the dimensional stability of paper is not sufficient.

Points on the reference drawing can certainly be determined with an accuracy of half a square (10 μm at full size), and if desired one-quarter of a square (5 μm at full size) should be possible. The number of readings taken on a character further determines the accuracy of the work drawing.

### 11.2 Availability of duplicates

Duplicates of the original drawings on a stable base at exact 100 : 1 scale with the 280 mm × 380 mm grid can be obtained upon request. Reproduction and mailing costs only will be charged.

Requests with precise indication of the set(s) desired should be addressed to :

The Secretary General  
ECMA  
114, rue du Rhône  
CH-1204 GENEVA  
Switzerland

or

Office of Standard Reference Materials  
Room B311, Chemistry Building  
National Bureau of Standards  
Washington (D.C. 20234)  
U.S.A.

The following sets of drawings are available :

- OD 1. Letterpress font, size I. (Only from ECMA.)
- OD 2. Letterpress font, size I with the grid removed over approximately 2 mm around the character outline. This set is particularly suitable for photographic reduction. (Only from ECMA.)
- OD 3. Constant-strokewidth font, size I.
- OD 4. Constant-strokewidth font, size III.

### 11.3 Type dimensions

Attention is called to the fact that since this standard specifies the nominal printed images, the type should not necessarily be cut to these dimensions. Type dimensions should be deduced from the nominal printed images after due correction for the systematic effects occurring in the printing process.

### 11.4 Constant-strokewidth font, size I

11.4.1 The nominal printed image of each character is defined by its centreline and by its nominal strokewidth. The nominal strokewidth is :

0,35 mm (0.014 in) for most of the characters,

0,31 mm (0.012 in) for all small letters and the three characters #, % and @.

The centreline and preferred line endings and corners are given in drawings marked "C". Pointers establish the vertical position (base line) and the orientation. Another pointer establishes the horizontal position for fixed-pitch printing. Reference drawings 69 C and 71 C contain also pointers, to indicate alternative positions.

11.4.2 A special effort should be made in type design and manufacturing to arrive at actual print that conforms as closely as possible to the given line endings and corners. This is especially important for the square corners of capital letters B and D.

11.4.3 A pointer is provided to produce the most aesthetic spacing of characters in a line of printing. However, on printers having a significant horizontal spacing tolerance it is recommended to use the geometric character centreline instead of the line defined by the pointer where necessary to achieve an acceptable character separation.

### 11.5 Constant-strokewidth font, size III

The nominal printed image of each character is given by its centreline and by its nominal strokewidth. The nominal strokewidth is 0,38 mm (0.015 in). The 22 reference drawings for 0 1 2 3 4 5 6 7 8 9 < + > LONG VERTICAL MARK C EN ST X Z and GROUP ERASE are marked "III" and include pointers. Sub-clauses 11.4.2 and 11.4.3 also apply.

### 11.6 Constant-strokewidth font, size IV

The nominal printed image of each character is given by its centreline and by its nominal strokewidth. The size IV centreline is derived from the corresponding size I centreline (see 11.4 and reference drawings marked "C") by a linear magnification of exactly 1,5. For example, a character centreline width of 2,40 mm becomes  $1,5 \times 2,40 \text{ mm} = 3,60 \text{ mm}$  in size IV, and so on. The nominal strokewidth is :

0,50 mm (0.020 in) for most of the characters

0,44 mm (0.017 in) for all small letters and the three characters #, % and @.

Preferred line endings and corners cannot be accurately arrived at by a 1,5 magnification since the ratio of nominal strokewidths for size IV and I is not exactly 1,5. However, given a 1,5 magnification of the size I drawing, the nominal size IV constant-strokewidth image can easily be constructed.

### 11.7 Letterpress font, size I

The nominal printed image of each character is drawn on a reference grid (see 11.1) to allow readings with any desired accuracy from drawings marked "L". Pointers establish the vertical position (base line), the orientation and for letterpress type the body width. A pointer establishes the horizontal position for fixed-pitch printing. Reference drawings 69 L and 71 L contain also pointers, to indicate alternative positions.

The characters of the letterpress font are designed with minor strokewidth variations. However, strokewidths are always close to the nominal value of 0,35 mm (0.014 in) for digits and capital letters, and of 0,31 mm (0.012 in) for small letters and the three characters #, % and @.

## 12 PRINTING THE LETTERPRESS AND CONSTANT-STROKEWIDTH FONTS

In order to print the letterpress font and to achieve the most satisfactory appearance, the printing device should be able to print sharp corners and to keep the strokewidth variations under close control. These features are not required for printing the constant-strokewidth fonts, although a special effort should be made to produce sharp corners in the capital letters B and D. There may well be printing equipment in which the accuracy of strokewidth control is intermediate between that required in letterpress quality and that provided by, for example, high-speed printers. It is at the discretion of the manufacturers of such printing equipment to design their type so that the printed images incorporate as many as practicable of the strokewidth variations which contribute to the aesthetically satisfactory appearance of the letterpress character shapes.

Care should be taken that the printed image strokes are symmetrically distributed around the centrelines as specified in this document.

## 13 ILLUSTRATION OF OCR-B

The following drawings show :

- the complete character set in size I at scales 4 : 1 and 1 : 1;
- digit ONE, capital letter E, PARAGRAPH and YEN in size I as letterpress font and as constant-strokewidth font;
- digit ONE and capital letter E in size III as constant-strokewidth font.

These reproductions of the original drawings are approximately at scale 70 : 1.

ILLUSTRATION OF SIZE I

SCALE 4 : 1

0 1 2 3 4 5 6 7 8 9  
 A B C D E F G H I J K L M  
 N O P Q R S T U V W X Y Z  
 a b c d e f g h i j k l m  
 n o p q r s t u v w x y z  
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 ? ! ( ) < > [ ] % # & @ ^  
 ¤ £ \$ | \  
 Ä Å Æ IJ Ñ Ö Ø Û

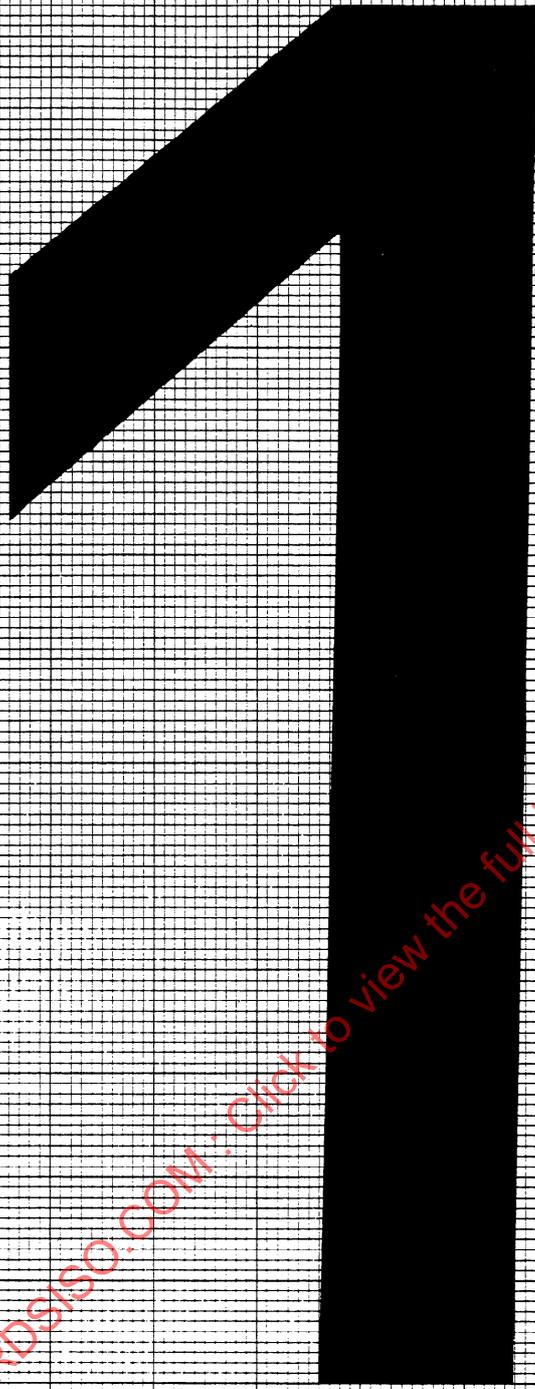
ä æ ij ø ß Ÿ  
 " ' \ ^ ~  
 { } m \_  
 ■ — SPACE

SCALE 1 : 1

0 1 2 3 4 5 6 7 8 9  
 A B C D E F G H I J K L M  
 N O P Q R S T U V W X Y Z  
 a b c d e f g h i j k l m  
 n o p q r s t u v w x y z  
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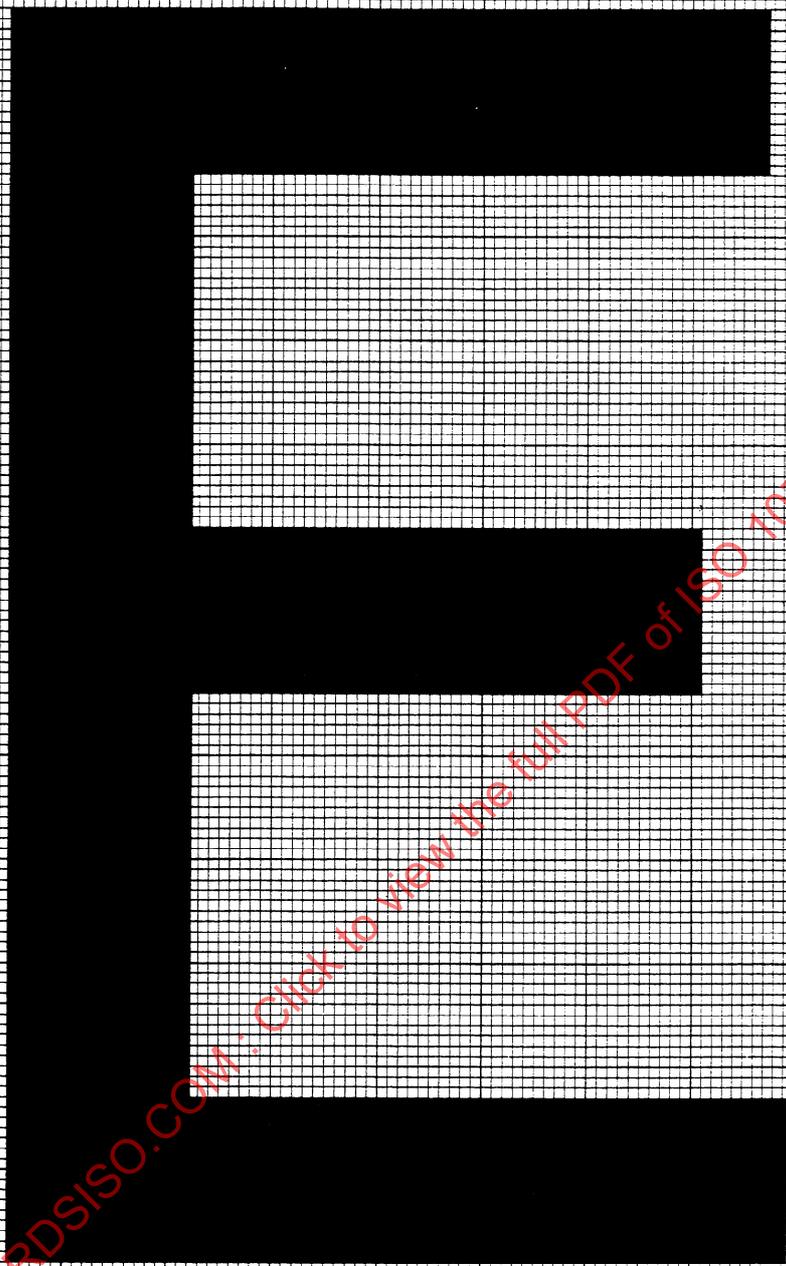
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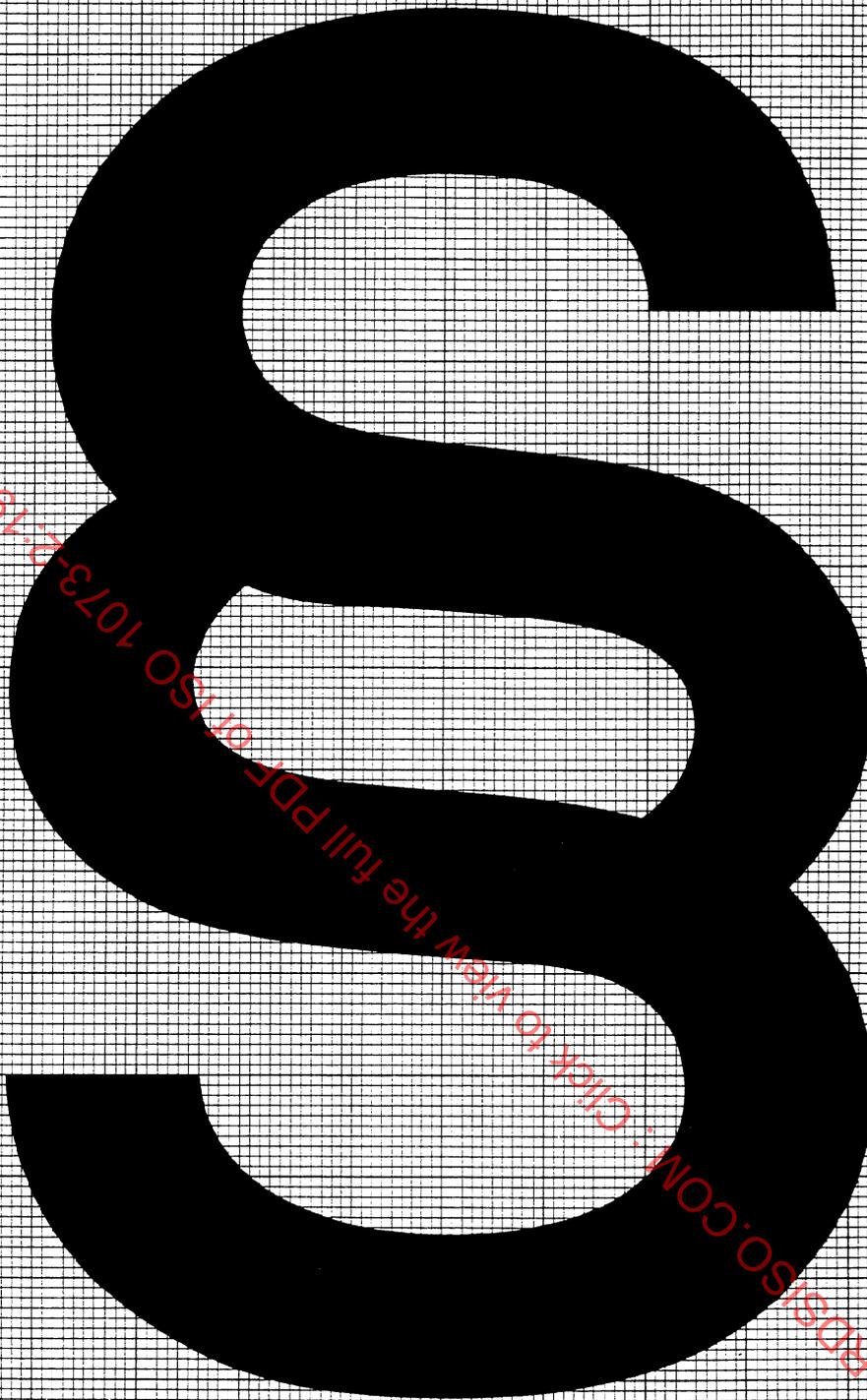
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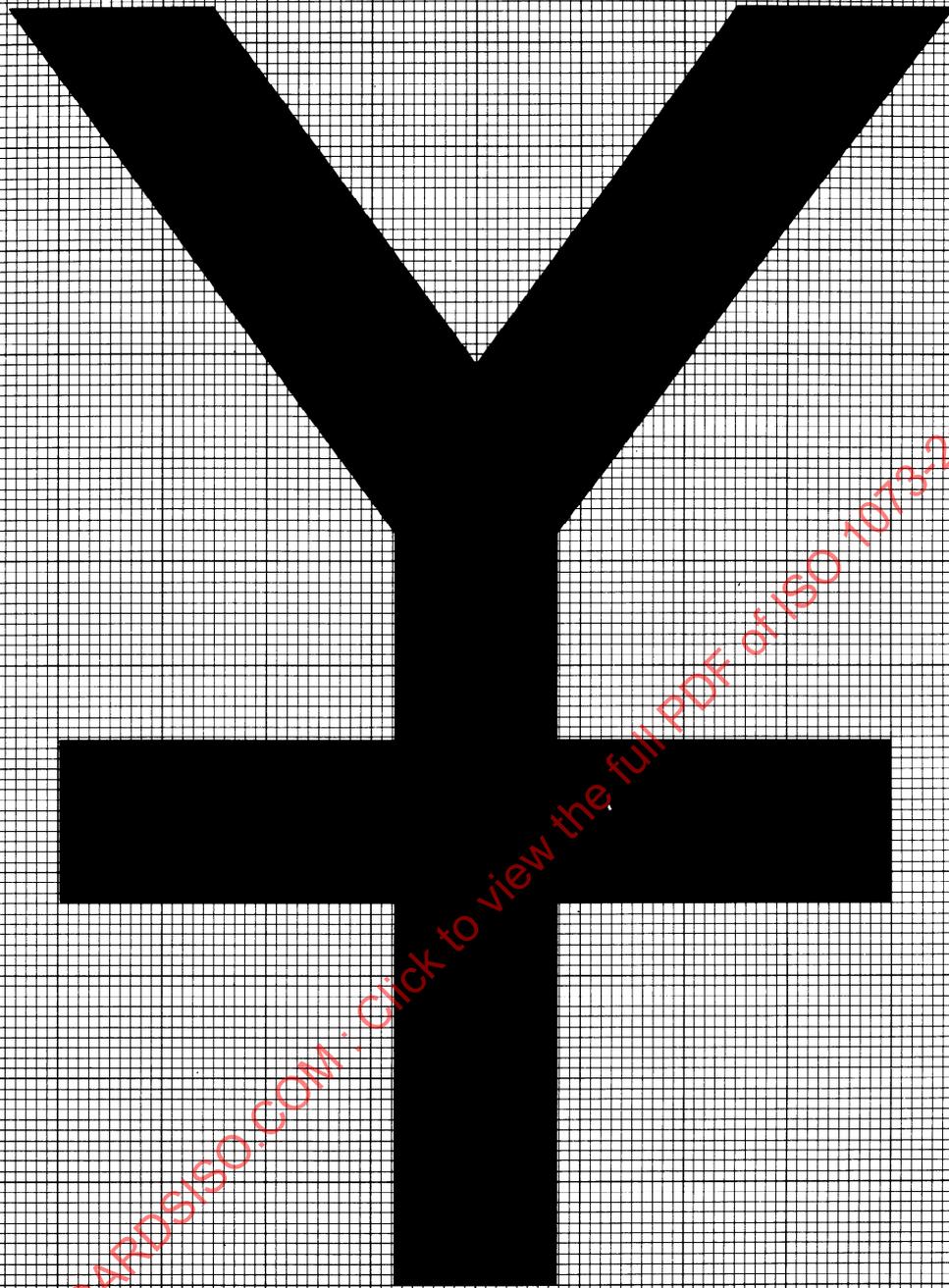


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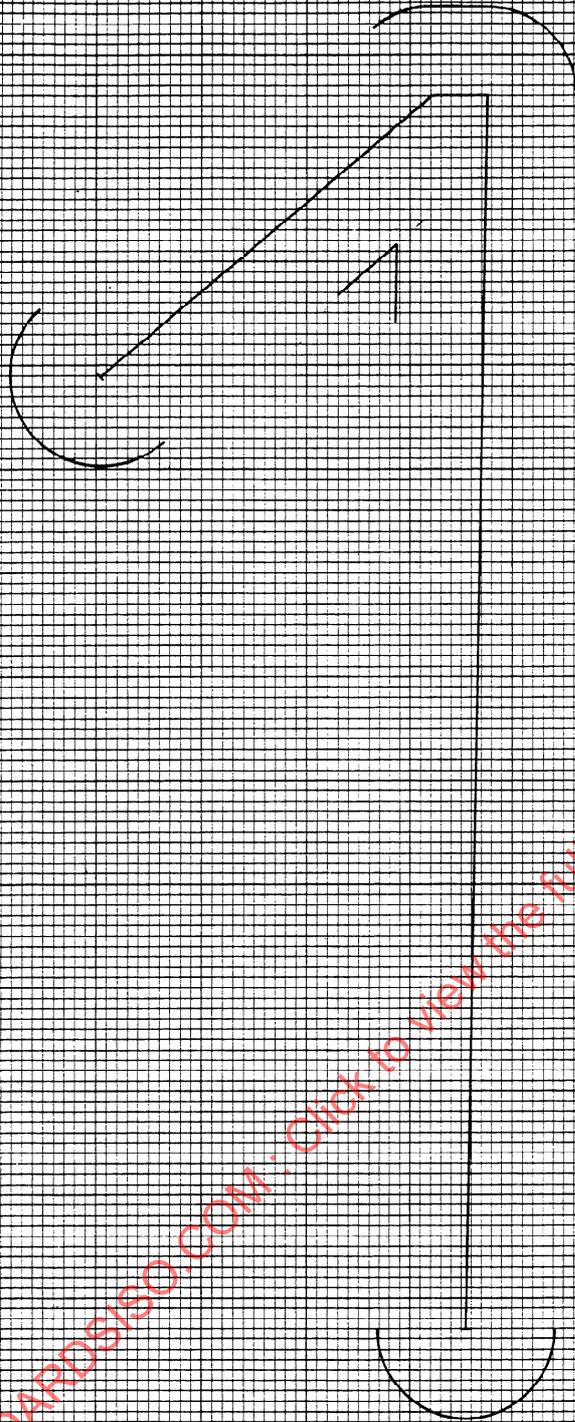
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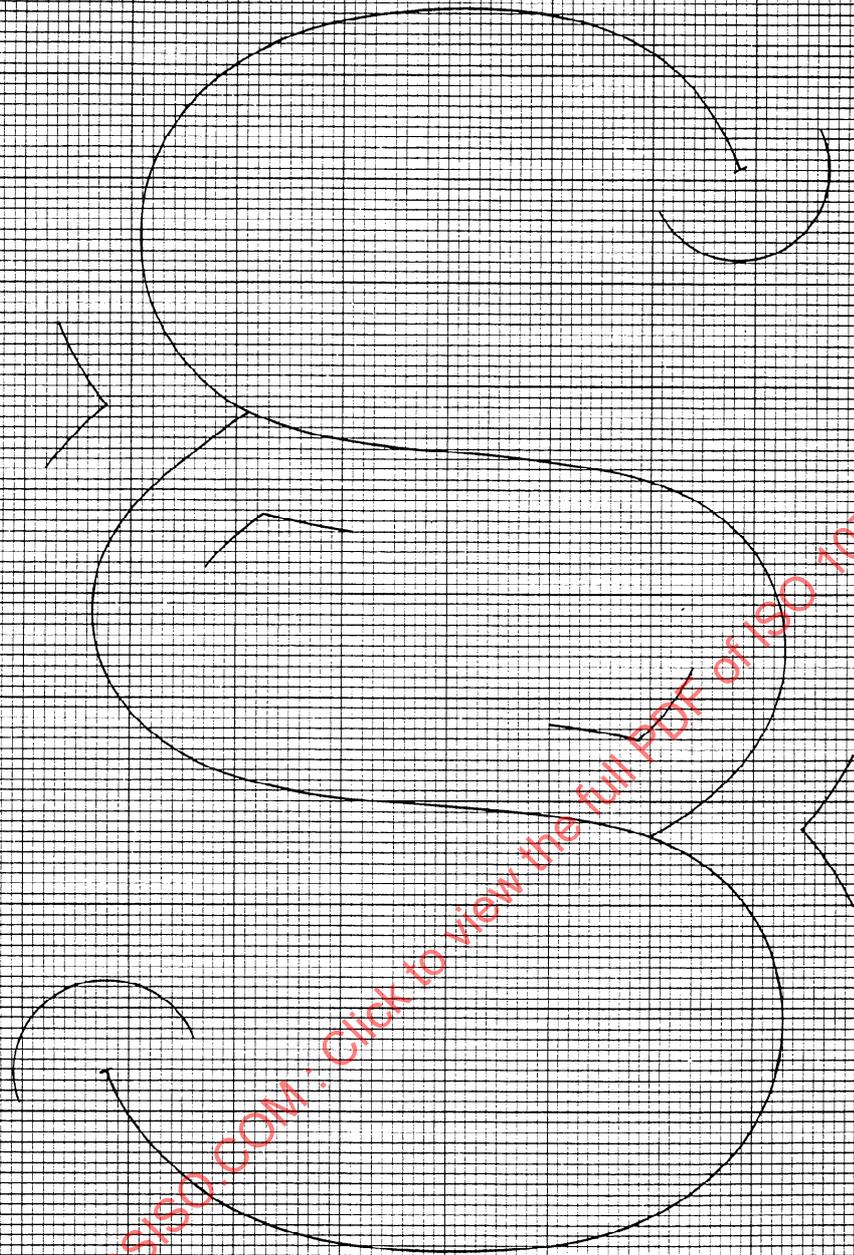
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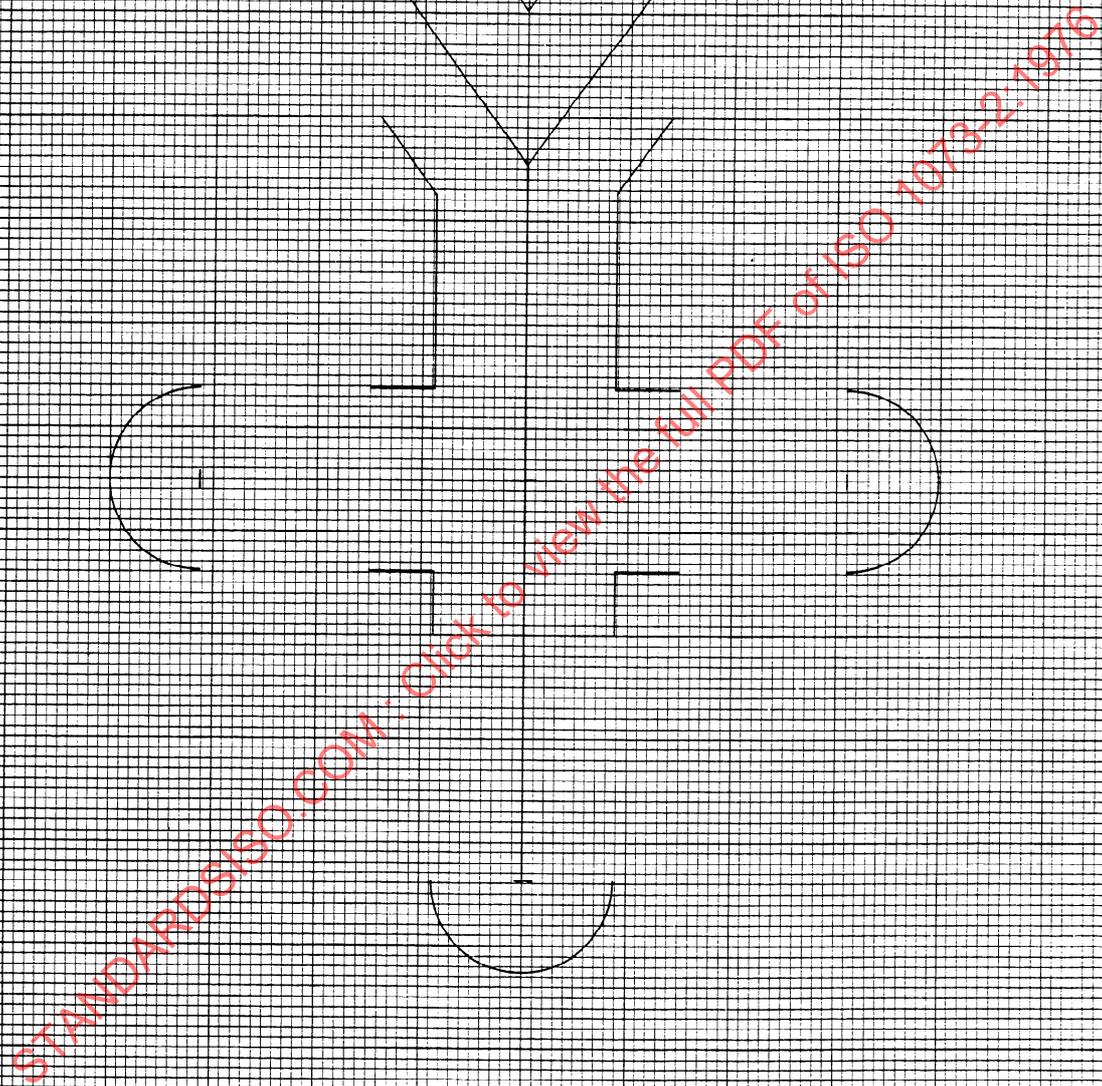
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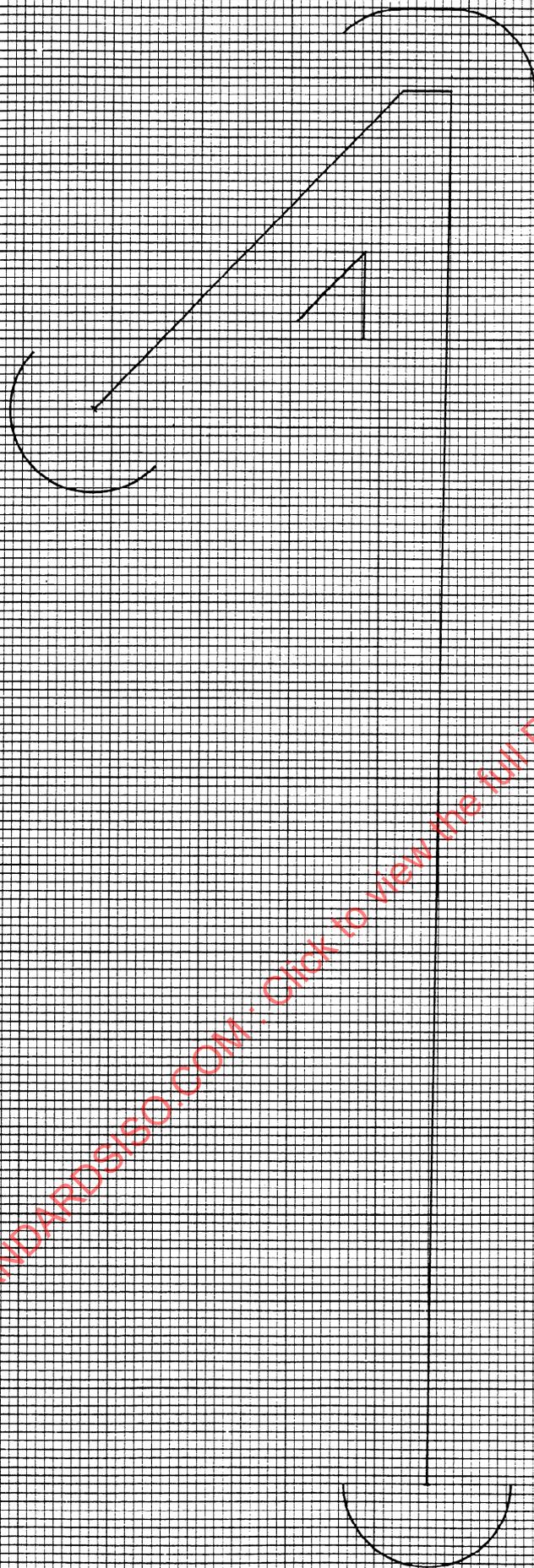


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REF. DRAWING NR. I

SIZE III

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SIZE III

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