

ISO/IEC 15438:2006-06 (E)

Information technology - Automatic identification and data capture techniques - PDF417 bar code symbology specification

Contents		Page
Foreword		vi
Introduction		vii
1	Scope	1
2	Normative references	1
3	Terms and definitions	2
4	Symbols, operations and abbreviated terms	3
4.1	Symbols	3
4.2	Mathematical operations	4
4.3	Abbreviated terms	4
5	Requirements	5
5.1	Symbology characteristics	5
5.1.1	Basic characteristics	5
5.1.2	Summary of additional features	6
5.2	Symbol structure	7
5.2.1	PDF417 symbol parameters	7
5.2.2	Row parameters	7
5.2.3	Codeword sequence	7
5.3	Basic encodation	8
5.3.1	Symbol character structure	8
5.3.2	Start and stop characters	9
5.4	High level (data) encodation	10
5.4.1	Function codewords	10
5.4.2	Text Compaction mode	13
5.4.3	Byte Compaction mode	17
5.4.4	Numeric Compaction mode	19
5.4.5	Advice to select the appropriate compaction mode	21
5.4.6	Treatment of PDF417 reserved codewords	21
5.5	Extended Channel Interpretation	21
5.5.1	Encoding the ECI assignment number	22
5.5.2	Pre-assigned and default Extended Channel Interpretations	23
5.5.3	Encoding ECI sequences within compaction modes	23
5.5.4	Post-decode protocol	25
5.6	Determining the codeword sequence	25
5.7	Error detection and correction	26
5.7.1	Error correction level	26
5.7.2	Error correction capacity	26
5.7.3	Defining the error correction codewords	27
5.8	Dimensions	27
5.8.1	Minimum width of a module (X)	27
5.8.2	Row height (Y)	28
5.8.3	Quiet zones	28
5.9	Defining the symbol format	28
5.9.1	Defining the aspect ratio of the module	28
5.9.2	Defining the symbol matrix of rows and columns	28
5.10	Generating the error correction codewords	30

5.11	Low level encodation	31
5.11.1	Clusters	32
5.11.2	Determining the symbol matrix	32
5.11.3	Determining the values of the left and right row indicators	32
5.11.4	Row encoding	33
5.12	Compact PDF417	33
5.13	Macro PDF417	33
5.13.1	Compaction modes and Macro PDF417	34
5.13.2	ECIs and Macro PDF417	34
5.14	User guidelines	34
5.14.1	Human readable interpretation	34
5.14.2	Autodiscrimination capability	34
5.14.3	User-defined application parameters	34
5.14.4	PDF417 symbol quality	35
5.15	Reference decode algorithm	35
5.16	Error detection and error correction procedure	35
5.17	Transmitted data	35
5.17.1	Transmitted data in the basic (default) interpretation	35
5.17.2	Transmission protocol for Extended Channel Interpretation (ECI)	36
5.17.3	Transmitted data for Macro PDF417	37
5.17.4	Transmission of reserved codewords using the ECI protocol	37
5.17.5	Symbology identifier	37
5.17.6	Transmission using older protocols	37
Annex A (normative) Encoding/decoding table of PDF417 symbol character bar-space sequences .		39
Annex B (normative) The default character set for Byte Compaction mode		55
Annex C (normative) Byte Compaction mode encoding algorithm		56
Annex D (normative) Numeric Compaction mode encoding algorithm		58
Annex E (normative) User selection of error correction level		60
E.1	Recommended minimum error correction level	60
E.2	Other user consideration of the error correction level	60
Annex F (normative) Tables of coefficients for calculating PDF417 error correction codewords		61
Annex G (normative) Compact PDF417		66
G.1	Description	66
G.2	Print quality	66
Annex H (normative) Macro PDF417		67
H.1	Macro PDF417 overview	67
H.2	Macro PDF417 syntax	67
H.3	High level encoding considerations	70
H.4	Encodation example	70
H.5	Macro PDF417 and the Extended Channel Interpretation protocol	71
H.6	Macro PDF417 data transmission	72
Annex I (normative) Testing PDF417 symbol quality		75
Annex J (normative) Reference decode algorithm for PDF417		76
J.1	Initialisation	76
J.2	Reference decode algorithm for line decoding	76
J.3	Filling the matrix	78
J.4	Interpretation	79

Annex K (normative) Error correction procedures	80
Annex L (normative) Symbology identifier	82
Annex M (normative) Transmission protocol for decoders conforming with original PDF417 standards	83
M.1 Basic Channel mode	83
M.2 GLI encoded symbols	83
M.3 Macro PDF417 symbols	85
M.4 Transmission of reserved codewords using the original PDF417 protocol	86
M.5 Achieving compatibility between old and new PDF417 equipment	86
Annex N (informative) Algorithm to minimise the number of codewords	89
Annex O (informative) Guidelines to determine the symbol matrix	91
O.1 Parameters affecting the determination of the matrix	91
O.2 Guidelines should any parameters not be achieved	94
Annex P (informative) Calculating the coefficients for generating the error correction codewords - worked example	95
Annex Q (informative) Generating the error correction codewords - worked example	96
Annex R (informative) Division circuit procedure for generating error correction codewords	99
Annex S (informative) Additional guidelines for the use of PDF417	100
S.1 Autodiscrimination compatibility	100
S.2 Pixel-based printing	100
Bibliography	102