

Second edition
2006-06-01

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

*Technologies de l'information — Techniques d'identification
automatique et de capture des données — Spécifications pour la
symbologie de code à barres PDF417*

Reference number
ISO/IEC 15438:2006(E)



This is a preview of "ISO/IEC 15438:2006". [Click here to purchase the full version from the ANSI store.](#)

PDF disclaimer

This PDF file may contain embedded typefaces. In accordance with Adobe's licensing policy, this file may be printed or viewed but shall not be edited unless the typefaces which are embedded are licensed to and installed on the computer performing the editing. In downloading this file, parties accept therein the responsibility of not infringing Adobe's licensing policy. The ISO Central Secretariat accepts no liability in this area.

Adobe is a trademark of Adobe Systems Incorporated.

Details of the software products used to create this PDF file can be found in the General Info relative to the file; the PDF-creation parameters were optimized for printing. Every care has been taken to ensure that the file is suitable for use by ISO member bodies. In the unlikely event that a problem relating to it is found, please inform the Central Secretariat at the address given below.

© ISO/IEC 2006

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

Published in Switzerland

This is a preview of "ISO/IEC 15438:2006". Click here to purchase the full version from the ANSI store.

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

This is a preview of "ISO/IEC 15438:2006". [Click here to purchase the full version from the ANSI store.](#)

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

This is a preview of "ISO/IEC 15438:2006". [Click here to purchase the full version from the ANSI store.](#)

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

Foreword

ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) form the specialized system for worldwide standardization. National bodies that are members of ISO or IEC participate in the development of International Standards through technical committees established by the respective organization to deal with particular fields of technical activity. ISO and IEC technical committees collaborate in fields of mutual interest. Other international organizations, governmental and non-governmental, in liaison with ISO and IEC, also take part in the work. In the field of information technology, ISO and IEC have established a joint technical committee, ISO/IEC JTC 1.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of the joint technical committee is to prepare International Standards. Draft International Standards adopted by the joint technical committee are circulated to national bodies for voting. Publication as an International Standard requires approval by at least 75 % of the national bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO and IEC shall not be held responsible for identifying any or all such patent rights.

ISO/IEC 15438 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 31, *Automatic identification and data capture techniques*.

This second edition cancels and replaces the first edition (ISO/IEC 15438:2001), which has been technically revised.

This is a preview of "ISO/IEC 15438:2006". [Click here to purchase the full version from the ANSI store.](#)

Introduction

The technology of bar coding is based on the recognition of patterns of bars and spaces of defined dimensions. There are various methods of encoding information in bar code form, known as symbologies, and the rules defining the translation of characters into bars and space patterns and other essential features are known as the symbology specification.

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. It is the intent and understanding of ISO/IEC that the symbology presented in this International Standard is entirely in the public domain and free of all user restrictions, licences and fees.