

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 |