DIN EN ISO/IEC 15438:2009-12 (E)

Information technology –Automatic identification and data capture techniques –PDF417 bar code symbology specification (ISO/IEC 15438:2006);English version EN ISO/IEC 15438:2010

Contents

Page

Foreword **5**

Introduction **6**

1 Scope **7**

2 Normative references **7**

3 Terms and definitions **7**

4 Symbols, operations and abbreviated terms **9**
4.1 Symbols **9**
4.2 Mathematical operations **10**
4.3 Abbreviated terms **10**

5 Requirements **10**
5.1 Symbology characteristics **10**
5.1.1 Basic characteristics **10**
5.1.2 Summary of additional features **11**
5.2 Symbol structure **12**
5.2.1 PDF417 symbol parameters **12**
5.2.2 Row parameters **13**
5.2.3 Codeword sequence **13**
5.3 Basic encodation **14**
5.3.1 Symbol character structure **14**
5.3.2 Start and stop characters **15**
5.4 High level (data) encodation **16**
5.4.1 Function codewords **16**
5.4.2 Text Compaction mode **19**
5.4.3 Byte Compaction mode **23**
5.4.4 Numeric Compaction mode **25**
5.4.5 Advice to select the appropriate compaction mode **27**
5.4.6 Treatment of PDF417 reserved codewords **27**
5.5 Extended Channel Interpretation **28**
5.5.1 Encoding the ECI assignment number **28**
5.5.2 Pre-assigned and default Extended Channel Interpretations **29**
5.5.3 Encoding ECI sequences within compaction modes **30**
5.5.4 Post-decode protocol **32**
5.6 Determining the codeword sequence **32**
5.7 Error detection and correction **32**
5.7.1 Error correction level **32**
5.7.2 Error correction capacity **33**
5.7.3 Defining the error correction codewords **34**
5.8 Dimensions **34**
5.8.1 Minimum width of a module (X) **34**
5.8.2 Row height (Y) **34**
5.8.3 Quiet zones **35**
5.9 Defining the symbol format **35**
5.9.1 Defining the aspect ratio of the module **35**
5.9.2 Defining the symbol matrix of rows and columns **35**
5.10 Generating the error correction codewords **36**
5.11 Low level encodation **38**
5.11.1 Clusters **39**
5.11.2 Determining the symbol matrix **39**

5.11.3 Determining the values of the left and right row indicators **39**
5.11.4 Row encoding **40**
5.12 Compact PDF417 ..... **40**
5.13 Macro PDF417 ..... **40**
5.13.1 Compaction modes and Macro PDF417 ..... **41**
5.13.2 ECIs and Macro PDF417 ..... **41**
5.14 User guidelines **41**
5.14.1 Human readable interpretation **41**
5.14.2 Autodiscrimination capability **41**
5.14.3 User-defined application parameters **41**
5.14.4 PDF417 symbol quality **42**
5.15 Reference decode algorithm **42**
5.16 Error detection and error correction procedure **42**
5.17 Transmitted data **43**
5.17.1 Transmitted data in the basic (default) interpretation **43**
5.17.2 Transmission protocol for Extended Channel Interpretation (ECI) **43**
5.17.3 Transmitted data for Macro PDF417 ..... **44**
5.17.4 Transmission of reserved codewords using the ECI protocol **44**
5.17.5 Symbology identifier **44**
5.17.6 Transmission using older protocols **44**

Annex A (normative) **Encoding/decoding table of PDF417 symbol character bar-space sequences** **45**

Annex B (normative) **The default character set for Byte Compaction mode** **57**

Annex C (normative) **Byte Compaction mode encoding algorithm** **58**

Annex D (normative) **Numeric Compaction mode encoding algorithm** **59**

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.2.1 The segment index **68**
H.2.2 File ID field **68**
H.2.3 Optional fields **69**
H.2.4 Macro PDF417 terminator **70**
H.3 High level encoding considerations **70**
H.4 Encodation example **70**
H.5 Macro PDF417 and the Extended Channel Interpretation protocol **71**
H.5.1 Macro PDF417 with ECI 000000 and 000001 (GLI 0 and 1) **72**
H.5.2 Macro PDF417 and other ECIs **72**
H.6 Macro PDF417 data transmission **72**
H.6.1 Operating in buffered mode **73**
H.6.2 Operating in unbuffered mode **74**
H.6.3 Reset-to-Zero transmissions **74**

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**

Page

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 **84**
M.3.1 Transmission in buffered mode **84**
M.3.2 Transmission in unbuffered mode **85**
M.4 Transmission of reserved codewords using the original PDF417 protocol **86**
M.5 Achieving compatibility between old and new PDF417 equipment **86**
M.5.1 Encoders **86**
M.5.2 Decoders **86**

Annex N (informative) **Algorithm to minimise the number of codewords** **89**

Annex O (informative) **Guidelines to determine the symbol matrix** **90**
O.1 Parameters affecting the determination of the matrix **90**
O.2 Guidelines should any parameters not be achieved **93**

Annex P (informative) **Calculating the coefficients for generating the error correction codewords — Worked example** **94**

Annex Q (informative) **Generating the error correction codewords — Worked example** **95**

Annex R (informative) **Division circuit procedure for generating error correction codewords** **98**

Annex S (informative) **Additional guidelines for the use of PDF417** **99**
S.1 Autodiscrimination compatibility **99**
S.2 Pixel-based printing **99**
S.2.1 General principles **99**
S.2.2 Programmer's Example **99**

Bibliography **101**