
**Information technology — International
symbology specification — MaxiCode**

*Technologies de l'information — Spécification internationale des
symboles — MaxiCode*

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.

This document is a preview generated by EVS

© ISO/IEC 2000

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 22 734 10 79
E-mail copyright@iso.ch
Web www.iso.ch

Printed in Switzerland

Contents

Introduction	1
1 Scope	1
2 Normative References	1
3 Definitions and Mathematical Symbols	1
3.1 Definitions	1
3.1.1 Codeword	1
3.1.2 Extended Channel Interpretation (ECI)	1
3.1.3 Mode Indicator	1
3.1.4 Module	2
3.2 Mathematical Symbols and Operations	2
4 Requirements	2
4.1 Symbology Characteristics	2
4.1.1 Basic Characteristics	2
4.1.2 Summary of Additional Features	3
4.2 Symbol Description	4
4.2.1 Symbol Structure	4
4.2.2 Symbol Character and Module Sequence	5
4.3 General Encodation Procedures	6
4.4 Character Assignments	7
4.4.1 Codeword Representation	7
4.4.2 Default Character Interpretation	7
4.4.3 Code Sets	7
4.4.4 Symbology Control Characters	8
4.5 User Considerations for Encoding Data in a MaxiCode Symbol	9
4.5.1 User Selection of Error Correction Level	9
4.5.2 User Selection of Mode	9
4.5.3 User Selection of Extended Channel Interpretation	10
4.5.4 User Selection of Structured Append	10
4.5.5 User Assessment of Encodation Capacity	10
4.6 Extended Channel Interpretation	10
4.6.1 ECI and Modes 2 and 3	10
4.6.2 Encodation Modes and ECIs	10
4.6.3 Encoding ECIs in MaxiCode	11
4.6.4 ECIs and Structured Append	11
4.6.5 Post-Decode Protocol	11
4.7 Message Structure	11
4.7.1 Primary Message	11
4.7.2 Secondary Message	11
4.7.3 Structuring the Data	12
4.8 Modes	12
4.8.1 Mode 0: Obsolete	12
4.8.2 Mode 1: Obsolete	12
4.8.3 Modes 2 and 3: Structured Carrier Message	12
4.8.4 Mode 4: Standard Symbol	13
4.8.5 Mode 5: Full EEC	13
4.8.6 Mode 6: Reader Programming	13
4.8.7 Mode Indicators	13

4.9	Structured Append	13
4.9.1	Basic Principles	13
4.9.2	Structured Append and Modes 2 and 3	13
4.9.3	Structured Append in Modes 4 to 6	14
4.9.4	Buffered and Unbuffered Operation	14
4.10	Error Detection and Correction	14
4.10.1	Enhanced Error Correction (EEC) in the Primary Message	14
4.10.2	Error Correction in the Secondary Message	14
4.10.3	Generating the Error Correction Codewords	14
4.10.4	Error Correction Capacity	15
4.11	Dimensions	15
4.11.1	Symbol Dimensions	15
4.11.2	Hexagonal Module Dimensions	15
4.11.3	Dark Hexagon Dimensions and Tolerances	16
4.11.4	Finder Pattern Dimensions	16
4.11.5	Quiet Zones	17
4.11.6	Overall Symbol Size	17
4.11.7	Practical Printing Guidance	17
4.12	User Guidelines	17
4.12.1	Human Readable Interpretation	17
4.12.2	Autodiscrimination Capability	17
4.13	Symbol Quality	17
4.13.1	Obtaining the Test Image	17
4.13.2	Symbol Quality Parameters	17
4.13.3	Overall Symbol Grade	19
4.13.4	Process Control Measurements	19
4.14	Reference Decode Algorithm	19
4.15	Transmitted Data	22
4.15.1	Basic Interpretation	22
4.15.2	Protocol for Extended Channel Interpretation	22
4.15.3	Symbology Identifier	22
4.15.4	Transmitted Data Example	23
Annexe A	(Normative)	24
	MaxiCode Basic Character Encodation: Default Character Set	24
Annexe B	(Normative)	26
	Mode 2 and Mode 3: Structured Carrier Message	26
B.1	The Structure of the Primary Message	26
B.2	Modes 2 and 3 Messages Beginning with "[>RS01GS"	27
B.2.1	Encoding	27
B.2.2	Decoding	27
B.3	Modes 2 and 3 Messages Not Beginning with "[>RS01GS"	28
B.3.1	Encoding	28
B.3.2	Decoding	28
B.4	Modes 2 and 3 and Structured Append	28
B.4.1	Encoding Considerations	28
B.4.2	Decoding Considerations	28
Annexe C	(Normative)	29

2D Matrix Bar Code Print Quality - Guideline	29
C.1 Obtaining the Test Image	29
C.2 Assessing Symbol Parameters	29
C.2.1 Decode	29
C.2.2 Symbol Contrast	30
C.2.3 "Print" Growth	30
C.2.4 Grid Nonuniformity	30
C.2.5 Unused Error Correction	31
C.3 Overall Symbol Grade	31
Annexe D (Normative)	31
Error Correction Algorithm	31
Annexe E (Normative)	32
Symbology Identifiers	32
Annexe F (Informative)	32
Use of Numeric Shift, Shift, Latch, and Lock-In Characters	32
F.1 Numeric Shift	32
F.2 Switching from Code Set A to Code Set B	33
F.3 Switching from Code Set B to Code Set A	33
F.4 Using Lock-In to Latch to Code Sets C, D or E	33
F.5 Illustrative Example	33
Annexe G (Informative)	34
User Assessment of Encodation Capacity	34
Annexe H (Informative)	35
A MaxiCode Encoding Example	35
Annexe J (Informative)	38
Practical Printing Considerations	38
J.1 12 dots per Millimeter	38
J.2 8 dots per Millimeter	39
J.3 Generic Rules for Other Pixel Sizes	40
J.4 Determining the Hexagon Font for a Given Dot Pitch	40
Annexe K (Informative)	41
Autodiscrimination Compatibility	41
Annexe L (Informative)	42
Useful Process Control Techniques	42
L.1 Symbol Contrast	42
L.2 Symbol Size	42
L.2.1 Checking Print Growth	42
L.2.2 Checking Finder Position and Orientation Patterns	42
L.2.3 Checking Overall Symbol Size	42
L.3 Symbol Distortion	43
L.4 Print Growth and Defects	43

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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 3.

In the field of information technology, ISO and IEC have established a joint technical committee, ISO/IEC JTC 1. 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 International Standard may be the subject of patent rights. ISO and IEC shall not be held responsible for identifying any or all such patent rights.

International Standard ISO/IEC 16023 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 31, *Automatic identification and data capture techniques*.

International Standard ISO/IEC 16023 was prepared by AIM International (as ANSI/AIM BC10) and was adopted, under a special "fast-track procedure", by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, in parallel with its approval by national bodies of ISO and IEC.

Annexes A to E form a normative part of this International Standard. Annexes F to L are for information only.

Information technology — International symbology specification — MaxiCode

Introduction

MaxiCode is a fixed-size matrix symbology which is made up of offset rows of hexagonal modules arranged around a unique finder pattern.

Manufacturers of bar code equipment and users of the technology require publicly available standard symbology specifications to which they can refer when developing equipment and application standards. The publication of Symbology Specifications is designed to achieve this.

1 Scope

This specification defines the requirements for the symbology known as MaxiCode. It specifies the MaxiCode symbology characteristics, data character encodation, symbol formats, dimensions and print quality requirements, error correction rules, decoding algorithm, and user-selectable application parameters.

2 Normative References

This specification incorporates provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed below. The latest edition of the publication referred to applies.

EN796	Bar Coding : Symbology Identifiers
EN1556	Bar Coding : Terminology
ANSI X3.182	Bar Code Print Quality - Guideline (Same as EN1635 - Bar Coding : Test Specifications for Bar Code Symbols)
ANSI X3.4	Coded Character Sets - 7-bit American National Standard Code for Information Interchange (7-bit ASCII) (equivalent to the US national version of ISO 646)
ISO 3166	Codes for the Representation on Names of Countries

ISO/IEC

8859-1

Information Processing - 8-bit Single-byte Coded Graphic Character Sets - Part 1 (Latin Alphabet Number 1)

Guideline on Mode 0 for MaxiCode - AIM USA
ECI Assignments Document - AIM International.

3 Definitions and Mathematical Symbols

3.1 Definitions

For the purposes of this Standard the following definitions in EN1556 (Terminology) shall apply:

algorithm, application standard, ASCII, autodiscrimination, binary, bit, CCD, code page, code set, data character, data codeword, data region, data separator character, decode algorithm, decoder, error correction, finder pattern, human readable character, latch character, leading zeros, matrix symbology, modulo, numeric, omnidirectional, orientation pattern, overhead, pad character, pixel, quiet zone, reference decode algorithm, Reed-Solomon error correction, scanner, shift characters, structured append, symbol character, symbology, symbology identifier, X-dimension

The following definitions also apply to this specification. Although some of the terms below are defined in EN1556, the definitions which follow below are more appropriate for this specification.

3.1.1 Codeword

A symbol character value. An intermediate level of coding between source data and the graphical encodation in the symbol.

3.1.2 Extended Channel Interpretation (ECI)

A protocol used by some symbologies that allows the output data stream to have interpretations other than that of the default character set.

3.1.3 Mode Indicator

A group of modules, in MaxiCode, used to define the symbol structure, for example to specify the level of error correction employed in the symbol.