

Information technology — Automatic identification and data capture techniques — Bar code scanner and decoder performance testing

The European Standard EN ISO/IEC 15423:2005 has the status of a British Standard

ICS 35.040

National foreword

This British Standard is the official English language version of EN ISO/IEC 15423:2005. It is identical with ISO/IEC 15423:2004. It supersedes DD ENV 12646:1997 and BS ISO/IEC 15423:2004 which are withdrawn.

The UK participation in its preparation was entrusted to Technical Committee IST/34, Automatic identification and data capture techniques, which has the responsibility to:

- aid enquirers to understand the text;
- present to the responsible international/European committee any enquiries on the interpretation, or proposals for change, and keep UK interests informed;
- monitor related international and European developments and promulgate them in the UK.

A list of organizations represented on this committee can be obtained on request to its secretary.

Cross-references

The British Standards which implement international or European publications referred to in this document may be found in the *BSI Catalogue* under the section entitled “International Standards Correspondence Index”, or by using the “Search” facility of the *BSI Electronic Catalogue* or of British Standards Online.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Summary of pages

This document comprises a front cover, an inside front cover, the EN title page, the EN foreword page, the ISO/IEC title page, pages ii to vi, pages 1 to 39, and a back cover.

The BSI copyright notice displayed in this document indicates when the document was last issued.

Amendments issued since publication

Amd. No.	Date	Comments
16174 Corrigendum No. 1	March 2006	Revision of supersession details

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 19 December 2005

© BSI 15 March 2006

English Version

Information technology - Automatic identification and data
capture techniques - Bar code scanner and decoder
performance testing (ISO/IEC 15423:2004)

Technologies de l'information - Techniques d'identification
automatique et de capture des données - Contrôle de
scanner de code à barres et de performance du décodeur
(ISO/IEC 15423:2004)

Informationstechnik - Automatische Identifikation und
Datenerfassungsverfahren - Leistungsanforderungen an
Strichcode-Scanner und -Decoder (ISO/IEC 15423:2004)

This European Standard was approved by CEN on 7 July 2005.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Central Secretariat has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.



EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

Management Centre: rue de Stassart, 36 B-1050 Brussels

Foreword

The text of ISO/IEC 15423:2004 has been prepared by Technical Committee ISO/IEC/JTC 1 "Information technology" of the International Organization for Standardization (ISO) and is planned to be taken over as EN ISO/IEC 15423:2005 by Technical Committee CEN/TC 225 "AIDC technologies", the secretariat of which is held by NEN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by January 2006, and conflicting national standards shall be withdrawn at the latest by January 2006.

This document supersedes ENV 12646:1997.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

Endorsement notice

The text of ISO/IEC 15423:2004 has been approved by CEN as EN ISO/IEC 15423:2005 without any modifications.

NOTE Normative references to International Standards are listed in Annex ZA (normative).

INTERNATIONAL
STANDARD

ISO/IEC
15423

First edition
2004-06-15

**Information technology — Automatic
identification and data capture
techniques — Bar code scanner and
decoder performance testing**

*Technologies de l'information — Techniques d'identification
automatique et de capture des données — Contrôle de scanner de
code à barres et de performance du décodeur*



Reference number
ISO/IEC 15423:2004(E)

AVA Documents
Document Sharing Hub

Contents

Page

Foreword.....	v
Introduction	vi
1 Scope.....	1
2 Normative references	1
3 Terms and definitions.....	2
4 Abbreviated terms.....	5
5 Categories of scanning equipment.....	5
5.1 Scanners with single-axis reading diagram	6
5.2 Scanners with two-axis reading diagram	6
5.3 Scanners with three-axis reading diagram.....	6
5.3.1 Multi-line Scanners	6
5.3.2 Image Scanners.....	6
6 Test requirements	6
6.1 Test methods.....	6
6.2 Selection of equipment for testing	7
6.3 Test conditions.....	7
6.3.1 Environment	7
6.3.2 Equipment configuration.....	7
6.4 Test Charts.....	7
6.4.1 Test Charts for linear symbologies.....	8
6.4.2 Test charts for multi-row and composite symbols.....	10
6.4.3 Test charts – 2D matrix symbols – Data Matrix	13
6.5 Test equipment.....	15
6.5.1 Test equipment for scanners with single axis reading diagram.....	15
6.5.2 Test equipment for scanners with two axis reading diagram	15
6.5.3 Test equipment for scanners with three axis reading diagram.....	15
6.5.4 Additional test equipment.....	15
6.5.5 Test equipment for complete reading systems	15
6.6 Test criteria.....	15
6.6.1 Test criterion for complete reading systems and decoders.....	16
6.6.2 Test criterion for scanners.....	16
6.7 Parameters to be tested and test methods	16
6.7.1 Scanners with single axis reading diagram	17
6.7.2 Scanners with two axis reading diagram	20
6.7.3 Scanners with three axis reading diagram – Multi-line scanners	23
6.7.4 Scanners with three axis reading diagram – Image scanners	24
6.7.5 Decoder	24
6.7.6 Complete Reading Systems.....	26
6.8 Test report.....	26
7 Certification and labelling	26
8 Equipment specification.....	27
8.1 General	27
8.2 Scanner/decoder interface	28
8.3 Human interface	28
8.4 Computer interface	28
8.5 Digital input and output (I/O).....	29
8.6 Programming and configuration	29

Annex A (normative) **General operational requirements** 30

A.1 **Installation, operation and maintenance – general**..... 30

A.2 **Power supply** 30

A.3 **Temperature**..... 30

A.3.1 **Operating temperature range**..... 30

A.3.2 **Storage temperature range** 30

A.4 **Humidity** 30

Annex B (informative) **Classification of scanners** 31

B.1 **Types of scanner** 31

B.1.1 **Scanners with single axis reading diagram** 31

B.1.2 **Scanners with two axis reading diagram**..... 32

B.1.3 **Scanners with three axis reading diagram**..... 33

B.2 **Additional methods of categorization** 36

Annex C (informative) **Example of decodability calculation**..... 37

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 15423 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 31, *Automatic identification and data capture techniques*.

This first edition cancels and replaces ISO/IEC 15423-1:2001, which has been technically revised.

Introduction

The technology of bar coding is based on the recognition of patterns encoded in bars and spaces of defined dimensions or arrangements of marks in matrix patterns both of which are constructed according to rules defining the translation of characters into such patterns, known as the symbology specification.

Bar code symbols can be produced with a wide variety of printing and other techniques, and the overall symbol dimensions can be uniformly scaled to suit particular requirements.

There is a wide range of bar code reading equipment using various scanning techniques, which enable bar code symbols to be read under many different conditions.

Bar code symbols may be a) “linear” i.e. read in a single dimension, where the height of the bars provides redundancy of information, or b) “two dimensional”, either in stacked rows to be read unidimensionally with multiple scans, or as a matrix of elements requiring two dimensional reading.

Bar code reading equipment must be capable of reliably converting the information represented as a bar code symbol into a form meaningful to the host computer system or otherwise to the user.

Manufacturers of bar code equipment, the producers of bar code symbols and the users of bar code technology require publicly available standard test specifications for bar code reading equipment to ensure the accuracy and consistency of performance of this equipment.

Information technology — Automatic identification and data capture techniques — Bar code scanner and decoder performance testing

1 Scope

This International Standard defines the test equipment and procedures to be used to determine the performance of bar code scanning and decoding equipment. It deals with bar code scanning and decoding equipment both as integrated reading systems and as discrete units. It defines performance of the equipment in a particular configuration (e.g. a specific model) irrespective of the individual components used. It also defines in a normative annex operational parameters for the test equipment, and describes, in an informative annex, a means of classifying scanners.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 9001, *Quality management systems — Requirements*

ISO/IEC 15415, *Information technology — Automatic identification and data capture techniques — Bar code print quality test specification — Two-dimensional symbols*

ISO/IEC 15416, *Information technology — Automatic identification and data capture techniques — Bar code print quality test specification — Linear symbols*

ISO/IEC 15417, *Information technology — Automatic identification and data capture techniques — Bar code symbology specification — Code 128*

ISO/IEC 15424, *Information technology — Automatic identification and data capture techniques — Data Carrier Identifiers (including Symbology Identifiers)*

ISO/IEC 15426-1, *Information technology — Automatic identification and data capture techniques — Bar code verifier conformance specifications — Part 1: Linear symbols*

ISO/IEC 15426-2, *Information technology — Automatic identification and data capture techniques — Bar code verifier conformance specifications — Part 2: Two-dimensional verifiers*

ISO/IEC 15438, *Information technology — Automatic identification and data capture techniques — Bar code symbology specifications — PDF417*

ISO/IEC 16022, *Information technology — International symbology specification — Data matrix*

ISO/IEC 16388, *Information technology — Automatic identification and data capture techniques — Bar code symbology specification — Code 39*

ISO/IEC 19762 (all parts), *Information technology — Automatic identification and data capture techniques — Harmonized vocabulary*

ITS/99-001, *International Symbology Specification — Reduced Space Symbology (RSS)* (AIM Inc.)

ITS/99-002, *International Symbology Specification — EAN.UCC Composite Symbology* (AIM Inc.)

NOTE The specification referenced ITS/99-001 will be superseded by ISO/IEC 24724, which is under development, and that referenced ITS/99-002 will be superseded by ISO/IEC 24723, which is also under development, on publication of the International Standards in question.

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO/IEC 19762 and the following apply.

3.1

contact scanner

particular type of scanner in which the scanning action takes place with the scanner in actual or near contact with the symbol, e.g. wand or light pen

3.2

composite symbology

bar code symbol composed of both a linear bar code symbol and a two-dimensional bar code symbol

3.3

decode redundancy

acquisition of a predetermined number of identical decodes before acceptance by a decoder of a valid decode

EXAMPLE Decode redundancy of 2 requires two identical decodes.

3.4

exit window

datum point from which the reading diagram is measured, positioned on the beam midpoint and closest to the reading end of the scanner

3.5

maximum reading distance

distance from the exit window to the end of the depth of field

NOTE See R in Figure 2.

3.6

minimum reading distance

distance from the exit window to the beginning of the depth of field

NOTE See A in Figure 2.

3.7

raster

projection of a laser beam to create multiple, nearly parallel scan lines instead of a single line

3.8

raster distance

distance between the two most widely spaced adjacent scan lines projected on a plane at a defined distance from the scanner exit window

NOTE See E in Figure B.3.

3.9**raster width**

distance between the two outermost scan lines projected on a plane at a defined distance from the scanner exit window

NOTE This covers a reading field which depends on the construction of the scanner and on the reading distance. See D in Figure B.3.

3.10**reading angle**

angular rotation of a symbol in an axis relative to a scan line

NOTE Three different reading angles, tilt, skew and pitch are illustrated in Figure 1. Tilt refers to rotation around the z axis, skew to rotation around the x axis and pitch to rotation around the y axis.

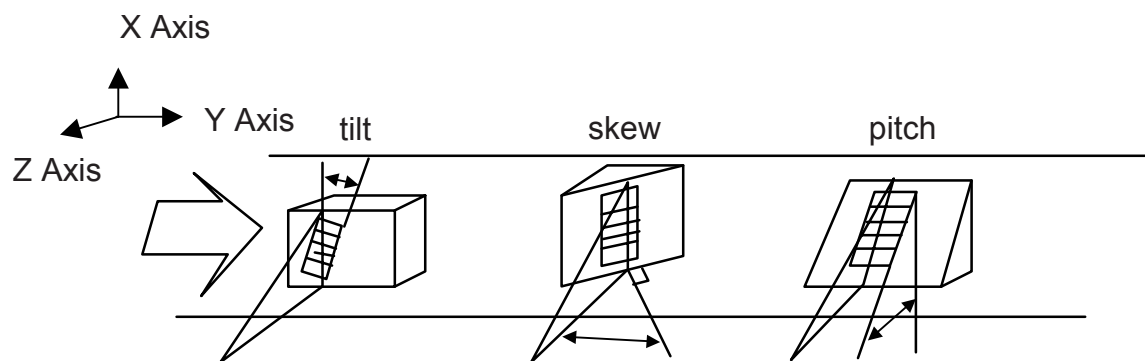


Figure 1 — Reading angles

3.11**reading diagram**

graphical representation of the reading zone for a specific X dimension (or other parameters) of the bar code symbol

NOTE The parameters of the reading diagram are:

- measurements made from the exit window of the reader;
- reading distance, measured on the z axis;
- X dimension (in mm);
- skew, tilt and pitch angles;
- symbol contrast value;
- ambient light level; and
- symbology.

See Annex B.

3.12**reading zone**

whole region (line, area or volume) in front of the exit window of a non-contact scanner in which defined symbols can be read

NOTE See zone MNOP in Figure 2.

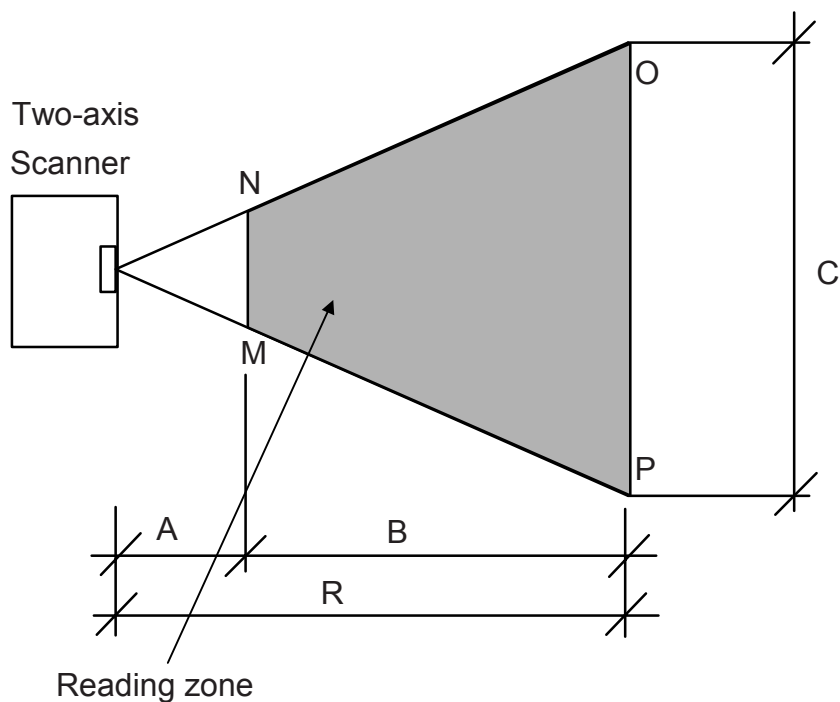


Figure 2 — Example of reading zone (MNOP)

NOTE Certain application requirements, for example in automated conveyor scanning systems, may restrict the effective reading zone to that shown in Figure 3 (MNO'P').

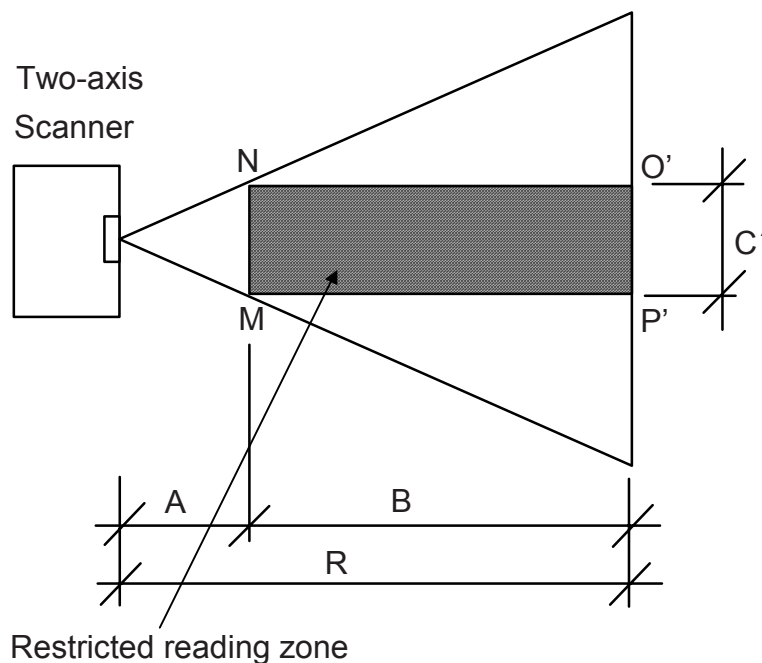


Figure 3 — Example of restricted reading zone (MNO'P')

3.13

read rate

percentage representing the number of good reads per 100 attempts to read a particular symbol

3.14**resolution**

width of the narrowest element capable of being read by the equipment under test

3.15**scan**, noun

single pass of the scanning beam over the symbol or a portion of the symbol, or a single image capture with an image capture device

scan, verb

to pass the scanning beam over the symbol or a portion of the symbol, or to capture a single image with an image capture device

3.16**scan attempt**

single pass of the scanner relative to the symbol (or vice versa), or a single activation of the scanner, e.g. triggering, for a period not exceeding two seconds or a time period specified by the manufacturer

3.17**scanning rate**

number of times the bar code symbol is scanned per second, expressed in scans per second, or scan lines per second

3.18**scanning speed**

speed at which the scanning spot of a scanner with a single axis reading diagram is passed across a bar code symbol

3.19**X axis**

direction parallel to the motion of the scan beam, nominally perpendicular to the bars of a linear symbol

3.20**Y axis**

direction perpendicular to the motion of the scan beam, nominally parallel to the bars of a linear symbol

3.21**Z axis**

direction from the exit window to the symbol, nominally normal to the plane of the symbol

4 Abbreviations

Abbreviations:

CCD Charge Coupled Device.

CMOS Complementary Metal Oxide Semiconductor.

LED Light Emitting Diode.

5 Categories of scanning equipment

In order to enable the most appropriate set of tests for a given scanning device or unit to be selected, scanners are grouped for the purposes of this International Standard into three categories. The basis for this categorisation is the nature of the reading diagram applicable. Examples of various types of scanners are given in Annex B. Each category may be further subdivided into 'continuously operating' scanners, in which the scanning operation is already in progress when the symbol enters the reading zone, and 'triggered' scanners, where the symbol is already in the reading zone when the scanning operation is initiated.