SLOVENSKI STANDARD
SIST EN 1649:2005

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SIST ENV 1649:2003

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AIDC technologies - Operational aspects affecting the reading of bar code symbols

AutoID-Technologien - Einflussgrößen auf die Lesung von Strichcodes

Techniques d'identification automatique et de saisie des données - Aspects de mise en oeuvre affectant la lecture des symboles en codes à barres

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Ta slovenski standard je istoveten z: **EN 1649:2004**

ICS:

35.040	Nabori znakov in kodiranje informacij	Character sets and information coding

SIST EN 1649:2005 **en**

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EUROPEAN STANDARD

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English version

AIDC technologies - Operational aspects affecting the reading of bar code symbols

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This European Standard was approved by CEN on 14 July 2004.

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.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
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EN 1649:2004 (E)

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Foreword

This document (EN 1649:2004) has been prepared by Technical Committee CEN/TC 225, "Bar coding", 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of an identical text or by endorsement, at the latest by February 2005, and conflicting national standards shall be withdrawn at the latest by February 2005.

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.

This document supersedes ENV 1649:1995

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Introduction

Implementation of the technology of bar coding requires the originators of the bar code marking, and those wishing to make use of the bar codes to capture data relating to the marked entity automatically, to work to a common application standard. The application standard may make reference to publicly available specifications for the underlying technical aspects of the bar code symbol and of the equipment for its production and reading.

By means of such publicly available standards, the producers of symbols and those wishing to read the symbols can be aware of the requirements which must be met by any symbol production and symbol reading equipment which they specify for their respective systems.

This document also provides the manufacturers of both bar code marking and bar code reading equipment with the requirements to which that equipment must comply, for that application.

This document provides the means by which bodies which are making application standards for industries can ensure that all relevant technical requirements are addressed during the standards making process.

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1 Scope

This document specifies the operational aspects affecting the reading of bar code symbols which must be considered in the preparation of application standards. It defines the subjects which must be addressed by application standards if they are to provide practical guidance to the user industries for whose use they are developed.

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.

EN 1556:1998, *Bar Coding — Terminology.*

EN 1573, *Bar Coding — Multi-industry transport label.*

EN 12323, *Bar coding — Symbology specification — "Code 16k".*

EN ISO/IEC 15416, *Information technology - Automatic identification and data capture techniques - Bar code print quality test specification - Linear symbols (ISO/IEC 15416:2000).*

EN ISO/IEC15438 *Information technology - Automatic identification and data capture techniques - Bar code symbology specifications - PDF417 (ISO/IEC 15438:2001).*

ISO/IEC 646:1991, *Information technology — ISO 7-bit coded character set for information interchange.*

ISO/IEC 8859–1:1998 *Information technology — 8-bit single-byte coded graphic character sets — Part 1: Latin alphabet No. 1.*

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

ISO/IEC 15418 *Information technology -- EAN/UCC Application Identifiers and Fact Data Identifiers and Maintenance.*

ISO/IEC 15420 *Information technology — Automatic identification and data capture techniques — Bar code symbology specification — EAN/UPC.*

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

ISO/IEC 16022, Information technology -- International symbology specification -- Data matrix.

ISO/IEC 16023, *Information technology -- International symbology specification – MaxiCode.*

ISO/IEC 16390 *Information technology — Automatic identification and data capture techniques — Bar code symbology specifications — Interleaved 2 of 5.*

ISO/IEC 18004 *Information technology-Automatic identification and data capture techniques — Barcode symbology — QR Code.*

General EAN·UCC Specifications (EAN International, Brussels, 2004).

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3   Terms and definitions

For the purposes of this document, the terms and definitions given in EN 1556:1998 and the following apply.

3.1
closed system
application which is intended for use by a closed group of users, typically within a single organisation or subject to a specific agreement.

NOTE   Existing closed systems are used subject to bilateral agreement between the participants.

3.2
open system
application in which independent parties may freely participate and in which bilateral agreements are not necessary

3.3
application standard
specification defining the method by which and conditions under which automatic identification and data capture technology may be applied to a particular purpose, prescribing, for example, data formats, optical requirements and symbology related parameters as subsets of the total range defined by relevant technical standards

4   Requirements

4.1 Closed or open system

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The developer of a standard shall determine if the system to which the application standard applies is a closed or an open system.

4.2 Pre-existing standards

Before commencing the making of a new application standard, careful consideration should be given to the potential of adopting an existing standard. Many currently used application standards are readily adaptable to specific industry uses whilst remaining totally compatible with their existing uses. Broadening the scope of existing international, multi industry standards, provides for the ready trading of bar code marked items internationally and between industry sectors and is, therefore, the preferred option. It should be noted that the proliferation of standards is a waste of resources and is contrary to the principles of standardisation**.**

4.3 Data to be encoded

4.3.1 Type of Data to be Encoded

The choice of symbology will be influenced by the type of data to be encoded; which can be:

— numeric

— alphanumeric

— ASCII

other character sets which, particularly in high capacity two dimensional symbologies, may be accessed by the use of the AIM : ECI — Part 1. Annex A includes details of those symbologies which support this standard.

The character set required to encode the data content shall be a subset of the encodable character set of the symbology. There are symbologies covered by European and International Standards, the encodable character set of which meet all these requirements. For a given application, the character set used may be a limited part of the total character set available.

NOTE   The character sets encodable by symbologies covered by European or International Standards are described in annex A.

4.3.2 Data string length

4.3.2.1 Linear symbols

The data string length to be encoded will influence the length of linear bar code symbols. The specification of long data strings, and the resultant long symbols, may be the cause of symbols being difficult to scan with a high degree of reliability and ease. It will also limit the choice of bar code printing and reading systems which may be used for a particular application. In particular some types of bar code readers may have limitations in the data string length which may be decoded and transmitted to the host system.

4.3.2.2 Two dimensional symbols

For some applications the data string length to be encoded may exceed that which can be encoded in a linear symbol. In such cases high capacity two dimensional multi-row bar code or matrix symbols can be used. In their largest sizes these may permit up to two thousand characters of data to be encode in a symbol. Some two dimensional symbologies permit the decoded data from more than one symbol to be concatenated into a single data string, thus enabling very large amounts of data to be encoded in a set of symbols.

4.3.3 Data check characters

For applications where key entry is used, or where data security is critical, data check characters as distinct from symbol check characters should be used. The system of data check characters used will depend upon the application, a suitable algorithm may be selected from those described in ISO/IEC 7064.

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4.4 Symbology selection

4.4.1 General

When selecting a symbology or symbologies for any particular application every aspect of the application should be considered. The symbology which is specified for use in an application standard, should be one of those symbologies covered by European or International Standards.

NOTE Annex B compares the features of two dimensional symbologies standardised by CEN and ISO/IEC.

4.4.1.1 Linear symbols

The following exceptional factors shall be taken into consideration during the selection of a symbology for an application.

a) "**EAN/UPC" Symbology (ISO/IEC 15420)**

This symbology shall be used only in accordance with the EAN▪UCC General Specifications.

b) "**Interleaved 2 of 5" Symbology (ISO/IEC 16390)**

In Interleaved 2 of 5 symbols, the bar patterns of the start and stop patterns may be found as the respective end and beginning of certain encoded symbol characters within the symbol. There is therefore no guarantee that a partial scan of the symbol will not produce a valid read for an embedded symbol having fewer characters. Two additional measures should be applied to minimise the risk of such partial reads, fixing the symbol length and applying bearer bars:

1) Fixed length symbols

In any application standard the number of characters encoded in an Interleaved 2 of 5 symbol should be fixed, and reading or data processing equipment for that application should be programmed to accept only messages of that defined length.

2) Bearer bars

The purpose of bearer bars is to reduce the probability of a valid but erroneous short read of the symbol where a scanning beam enters and/or leaves the symbol at the top or bottom. Bearer bars should be added unless technical constraints prevent it or unless the reading or data processing equipment is programmed for fixed length symbols. In open system applications where a wide range of reading environments will be encountered, bearer bars should be applied as a default measure to prevent short reads.

Bearer bars when used should be placed perpendicular to the bars in the symbol, abutting the top and the bottom of the symbol bars over the full length of the symbol. They may extend over the quiet zones and may also be extended to form a frame around the symbol inclusive of the minimum quiet zones.

The use of a data check digit can also reduce (by a factor of ten) the risk of data from a short read being accepted by the host system.

4.4.1.2 Two dimensional symbols

The following two dimensional symbologies are European and International Standards:

a) "Code 16k" Symbology (EN 12323)

b) "PDF 417" Symbology (EN ISO/IEC 15438)

c) "Datamatrix" Symbology (ISO/IEC 16022)

d) "QR Code" Symbology (ISO/IEC 18004)

e) "Maxicode" Symbology (ISO/IEC 16023)

Where large sized high capacity two dimensional symbols are used in an application, the impact on the data processing system of sorting the large amount of data which is decoded from a single symbol should be taken into consideration in the development of the application

NOTE   Annex B compares the features of two dimensional symbologies standardised by CEN and ISO/IEC.

4.4.2 Number of symbologies to be used

The number of symbologies to be specified for use by an application standard shall be carefully considered. The use of autodiscrimination in an application where a number of different symbologies are in use can increase the risk of reading errors with resultant corruption of the database. The number of symbologies employed in an application and enabled in the reading equipment should therefore be limited to the minimum required to operate that application efficiently.

If the use of more than one symbology is unavoidable, then the following recommendations should be applied:

a) segregate the use of the different symbologies to different parts of the application, and set decoders to decode only the symbology specified for that part of the application.

b) use symbology identifiers in accordance with ISO/IEC 15424 to ensure that the system can be programmed to recognise the symbology from which the data originated.

c) apply other checks to the data decoded such as format, string length, data check character and symbol check character validations, to ensure that the integrity of the data decoded is maximised.

NOTE   Large capacity 2D symbols have a number of security features which are incorporated into every symbol, the points mentioned in c) are principally intended for use in applications where linear symbols are used.

4.4.3 Symbol security

4.4.3.1 Linear symbols

In order to ensure the integrity of data decoded from symbols, provision should be made for the use of a symbol check character in symbologies where these are an optional feature of the symbology, or, in the absence of a symbol check character, for the use of a data check character (using for example one of the types described in ISO/IEC 7064).

Systems considerations set out in the relevant symbology standards shall be applied where appropriate, to maximise the security of the reading and decoding of symbols.