INTERNATIONAL STANDARD

ISO
22742

First edition
2005-01-15

Packaging — Linear bar code and two-dimensional symbols for product packaging

Emballages — Code-barres linéaire et symboles bidimensionnels pour l'emballage de produits

Reference number
ISO 22742:2005(E)

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ISO 22742:2005
https://standards.iteh.ai/catalog/standards/sist/e5d3c71e-7b6c-4ad3-9468-
794f1e3d88ad/iso-22742-2005

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member 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 shall not be held responsible for identifying any or all such patent rights.

ISO 22742 was prepared by Technical Committee ISO/TC 122, *Packaging*.

It is based on ANSI MH10.8.6, *General EAN.UCC Specifications*, and standards on product packaging (e.g. IEC 62090).

Introduction

Bar code marked product package labels are in widespread use in global industries. A number of different standards exist, each designed to meet the requirements of the specific industry sector. For effective and economic use within and between industry sectors, one common multi-industry standard is a necessity.

A bar code marked product package label is designed to facilitate the automation of inventory, distribution, repair and point of purchase operations. The bar code information on the product package label may be used as a key to access the appropriate database, which contains detailed information about the product including information transmitted via EDI. In addition, a product package label may contain other information as agreed between the trading partners.

Two-dimensional symbols may be included to assist moving greater amounts of product data from sender to recipient.

Whereas ISO 15394 is intended to support the transportation function within the supply chain (e.g. from the shipping dock, through the transportation processes, and to the receiving dock), this International Standard is intended to support the logistic functions preceding and following transportation. At the origin point, this International Standard is designed for use from manufacture to storage, to picking and packing, to delivery to the shipping dock, and all associated inventory processes. At the destination point, it is designed for use from the receiving dock to order checking, to storage, to consumption, and to all associated inventory processes and reverse logistic processes.

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Packaging — Linear bar code and two-dimensional symbols for product packaging

1 Scope

This International Standard

a) specifies the minimum requirements for the design of labels containing a linear bar code and two-dimensional symbols on product packages to convey data between trading partners,

b) provides guidance for the formatting on the label of data presented in a linear bar code, two-dimensional symbols or human-readable form,

c) provides specific recommendations regarding the choice of linear bar code and 2D symbologies, specifies quality requirements and classes of bar code density,

d) provides specific recommendations regarding 2D symbologies, which allow a broad choice for general use of scanning hardware (e.g. area imagers, linear imagers, single-line laser scanners, and rastering laser scanners), and

e) makes recommendations as to label placement, size and the inclusion of free text and any appropriate graphics.

This International Standard supports item identification and supply chain processes, at the product package level, such as inventory control, picking, and point of use.

NOTE   ISO 15394 supports the distribution and transportation business processes, so aiding the tracing and tracking of unique shipments.

The purpose of this International Standard is to establish the machine-readable (e.g. bar code) and human-readable data content of labels applied to product packages.

Intended applications include, but are not limited to, inventory, warehouse management, maintenance and point of purchase.

While guidance is provided, specific label dimensions or marking areas, and the location of the information are not defined in this International Standard. Before implementing this specification, suppliers and manufacturers are advised to review and mutually agree on these details with their trading partners.

This International Standard does not supersede or replace any applicable safety or regulatory marking or labelling requirements. It is intended to satisfy the minimum product package requirements of numerous applications and industry groups. As such, its applicability is to a wide range of industries, each of which may have specific implementation guidelines. This International Standard is applicable in addition to any other mandated labelling requirements.

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 3166-1, *Codes for the representation of names of countries and their subdivisions — Part 1: Country codes*

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

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 15434, *Information technology — Automatic Identification and Data Capture Techniques — Syntax for High Capacity ADC Media*

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

ISO/IEC 15459-1, *Information technology — Unique identification of transport units — Part 1: General*

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

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

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 — Bar code symbology — QR Code*

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

ANSI/MH10.8.2, *Data Application Identifiers*

ANSI/HIBC 2, *Health Industry Supplier Labeler Standard*

General EAN.UCC Specifications

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
Code 39
3 of 9 Code (deprecated)
discrete, variable length, bar code symbology encoding the characters 0 to 9, A to Z, and the additional characters "-" (dash), "." (period), space, "$" (dollar sign), "/" (slash), "+" (plus sign), and "%" (percent sign), as well as a special symbology character to denote the start and stop character, conventionally represented as an "*" (asterisk)

NOTE   Each Code 39 symbol consists of a leading quiet zone, a start symbol pattern, symbol characters representing data, a stop pattern, and a trailing quiet zone. Each Code 39 character has three wide elements out of a total of nine elements. Each symbol consists of a series of symbol characters, each represented by five bars and four intervening spaces. Characters are separated by an intercharacter gap. Each element (bar or space) is one of two widths. The values of the X dimension (3.13) and wide-to-narrow ratio remain constant throughout the symbol. The particular pattern of wide and narrow elements determines the character being encoded. The intercharacter gaps are spaces with a minimum nominal width of 1X. See ISO/IEC 16388 for the Code 39 symbology specification.

3.2
Code 128
continuous, variable length, bar code symbology capable of encoding the full ASCII-128 character set, the 128 extended ASCII character set, and four non-data function characters

NOTE   Code 128 allows numeric data to be represented in a compact double-density mode, with two data digits for every symbol character. Each Code 128 symbol uses two independent self-checking features, character self-checking via parity and a modulo 103 check character. Each Code 128 symbol consists of a leading quiet zone, a start pattern, characters representing data, a check character, a stop pattern, and a trailing quiet zone. Each Code 128 character consists of eleven 1X wide modules. Each symbol character is comprised of three bars alternating with three spaces, starting with a bar. Each element (bar or space) can consist of one to four modules. Code 128 has three unique character sets designated as Code Set A, B and C. Code set A includes all of the standard upper-case alphanumeric keyboard characters, the ASCII control characters having an ASCII value of 0 to 95, and seven special characters. Code set B includes all of the standard upper-case alphanumeric keyboard characters, lower-case alphabetic characters (specifically ASCII character values 32 to 127), and seven special characters. Code set C includes the set of 100 digit pairs from 00 through 99, inclusive, as well as three special characters. The FNC1 character in the first character position after the start code of Code 128 designates that the data that follows complies with the UCC/EAN-128 standards. See ISO/IEC 15417 for the Code 128 symbology specification.

3.3
component
part, assembly or raw material that is a constituent of a higher level assembly

3.4
component packaging
commercial unit of **components** (3.3) defined by the supplier, including, if applicable, their means for protection, structured alignment or for automated assembly

NOTE   Component packaging may include: a) leaded components taped on reels or in ammo boxes according to IEC 60286-1 and IEC 60286-2; b) surface mount devices (surface mount components), taped on reels according to IEC 60286-3 and in bulk case IEC 60286-6; c) integrated circuits (ICs) in stick magazines according to IEC 60286-4, or in matrix trays according to IEC 60286-5. Compare **product package** (3.32).

3.5
country of origin
manufacturing country wherein the product obtained its present identity as a part, subassembly or finished product

3.6
data element separator
specified character used to delimit discrete fields of data

3.7
data element title
part of the data area title for linear code that gives a brief description of the data element

EXAMPLES　　Part number and customer number.

NOTE　　The data element may contain abbreviations.

3.8
data matrix
error correcting two-dimensional matrix symbology, capable of encoding various character sets including strictly numeric data, alphanumeric data and all ISO/IEC 646 (ASCII) characters, as well as special character sets

NOTE 1　　It was developed by International Data Matrix in 1989 with finalized design in 1995.

NOTE 2　　The symbology has **error detection** (3.16) and **error correction** (3.15) features. Each data matrix symbol consists of data regions that contain nominally square modules set out in a regular array. A dark module is a binary 1 and a light module is a binary 0. There is no specified minimum or maximum for the X or Y dimension. The data region is surrounded by a finder pattern that is surrounded by a quiet zone on all four sides of the symbol. The finder pattern is a perimeter to the data region and is one module wide. Two adjacent sides are solid dark lines used primarily to define physical size, orientation and symbol distortion. The two opposite sides are made up of alternating dark and light modules. These are used primarily to define the cell structure but can also assist in determining physical size and distortion. The intellectual property rights associated with data matrix have been committed to the public domain. See ISO/IEC 16022 for the data matrix symbology specification.

3.9
dot
localized region with a reflectance that differs from that of the surrounding surface

3.10
dot misalignment within a cell
distance between the physical centre point of a **dot** (3.9) and the cell centre point

3.11
EAN.UCC system
specifications, standards and guidelines co-administered by EAN International and the UCC

3.12
EAN/UPC
fixed-length, numeric 13-digit bar code symbol adopted by industries, composed of a company prefix assigned by EAN International, a product code assigned by the manufacturer, and a modulo 10 check digit as the right-most digit

NOTE　　See ISO/IEC 15420 for the EAN/UPC symbology specification. See also **U.P.C.** (3.43).

3.13
element width
"X" dimension
thickness of an element, measured from the leading edge of an element to the trailing edge of the same element

3.14
erasure correction
use of the **error correction** (3.15) characters to correct data errors that have known locations

NOTE　　These locations can have insufficient contrast in the image, can fall outside of the image field, or can have incorrect parity for symbologies with symbol character parity. Only one error correction character is required to correct each erasure.

3.15
error correction
mathematical procedure that allows the detection and rectification of errors to take place

3.16
error detection
use of the **error correction** (3.15) characters to detect the fact that the number of errors in the symbol exceeds the error correction capacity

NOTE   Error detection will keep the symbol from being decoded as erroneous data. The error correction algorithm can also provide error detection by detecting invalid error correction calculation results.

3.17
European Norm
EN
standard from the European Union

3.18
first level assembly
manufactured item or a mechanical assembly of an item comprised of **components** (3.3)

3.19
format
high-capacity ADC medium comprising one or more **segments** (3.34)

NOTE   A format contains one **format type** (3.24)

3.20
format envelope
that which delimits the start and end of data in a given **format** (3.19), consisting of a **format header** (3.21) and a **format trailer** (3.23)

3.21
format header
string of characters, including the **format indicator** (3.22), used to identify the start of a format **envelope** (3.20)

3.22
format indicator
two-digit numeric code used to identify the specific **format type** (3.24) of the application data

3.23
format trailer
character used to identify the end of a **format envelope** (3.20)

3.24
format type
rules under which a specific **format** (3.19) is encoded

3.25
GTIN
Global Trade Item Number
term for all valid EAN.UCC Trade Item numbers (products or services)

3.26
Interleaved Two of Five
ITF
bar code symbology where two characters are paired, using bars to represent the first character and the interleaved spaces to represent the second character, encoding the ten digits 0 through 9

NOTE   Each character has two wide elements and three narrow elements for a total of five elements. This is most commonly represented in the U.P.C. Shipping Container Symbol (SCC-14). See ISO/IEC 16390 for the Interleaved Two of Five symbology specification.

3.27
ITF-14
14-digit implementation of the EAN.UCC Global Trade Item Number (3.25) when encoded in the **Interleaved Two of Five** (3.26) symbology

NOTE   The 14-digit version of the GTIN was formerly known as the U.P.C. Shipping Container Symbol (SCC-14).

3.28
message envelope
that which delimits the start and end of a data stream in a given message, consisting of **message header** (3.29) data and a **message trailer character** (3.30)

3.29
message header
string of characters used to identify the start of a **message envelope** (3.28)

3.30
message trailer character
End of Transmission character, "EOT", ", (ASCII/ISO646 Decimal "04") (ASCII/ISO646 Hex "04") which serves to define the end of a message

3.31
PDF417
error correcting two-dimensional multi-row symbol

NOTE 1   This was developed in 1992 by Symbol Technologies; PDF417 symbols are constructed from 4 bars and 4 spaces over 17 modules.

NOTE 2   The symbol size is from 3 to 90 rows. There is no specified minimum or maximum for X or Y dimension. With at least the recommended minimum level of **error correction** (3.15), the recommended Y dimension is 3X. With less than the minimum recommended level of error correction, the recommended Y dimension is 4X. A quiet zone of 2X is specified on each side of a symbol. Because of delta decode techniques, the symbology is immune from uniform bar width growth. PDF417 supports cross-row scanning. The intellectual property rights associated with PDF417 have been committed to the public domain. See ISO/IEC 15438 for the PDF417 symbology specification.

3.32
product package
first tie, wrap or container of a single item or quantity thereof that constitutes a complete identifiable pack

NOTE   A product package may be an item packaged singularly, multiple quantities of the same item packaged together, or a group of parts packaged together. For the purposes of this International Standard, the term "product package" includes component packages and packaging intended for storage and transport.

3.33
QR Code
error correcting matrix symbology, consisting of an array of nominally square modules arranged in an overall square pattern, including a unique finder pattern located at three corners of the symbol and intended to assist in easy location of its position, size and inclination

NOTE 1   It was introduced in 1994 by Denso Corporation.

NOTE 2   A wide range of sizes of symbol is provided for together with four levels of **error correction** (3.15). Module dimensions are user-specified to enable symbol production by a wide variety of techniques. The symbol size (not including the quiet zone) is 21 by 21 modules to 177 by 177 modules. The symbology efficiently encodes Kanji and Kana as well as encoding numeric, alphanumeric, and 8-bit byte data. See ISO/IEC 18004 for the QR Code symbology specification.

3.34
segment
logical group of data elements, specifically, a logical portion of an EDI or high capacity ADC message

3.35
segment terminator
single character used to separate **segments** (3.34)

3.36
semantics
means by which the purpose of a field of data is identified

NOTE   Semantic examples used in automatic data capture include ISO 15418/ANSI MH10.8.2 Data Identifiers, EAN.UCC Applications Identifiers, EDI (X12/EDIFACT/CII) Data Element Qualifiers, DoD Data Element Identifiers (DEIs) - Structured Free Text.

3.37
serial number
code assigned by the **supplier** (3.39) to an entity for its lifetime

EXAMPLES   Computer serial number, traceability number and contract tool identification.

3.38
structure
order of data elements in a message

3.39
supplier
⟨transaction⟩ party that produces, provides or furnishes an item or service

3.40
syntax
way in which data are put together to form messages

NOTE   Syntax also includes rules governing the use of appropriate identifiers, delimiters, separator character(s), and other non-data characters within the message. Syntax is the equivalent to grammar in spoken language. The syntactic example used in automatic data capture includes ISO 15434/ANSI MH10.8.3.

3.41
traceability identification
code assigned to identify or trace a unique group of entities (e.g. lot, batch, item, revision/version or serial number)

3.42
traceability number
code assigned by the **supplier** (3.39) to identify/trace a unique group of entities (e.g. lot, batch)

3.43
U.P.C.
Universal Product Code
fixed-length, numeric 13-digit bar code symbol adopted by the retail industries, composed of a company prefix assigned by the UCC, a product code assigned by the manufacturer, and a modulo 10 check digit as the right-most digit

NOTE   For international compatibility with EAN-13, the 13th digit is a derived 0 in the left-most position. See ISO/IEC 15420 for the U.P.C. symbology specification.