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

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

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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).

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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.

4 Label data content and requirements

4.1 General

Before implementing this specification, suppliers and manufacturers should review and mutually agree on specific labelling details with their trading partners. The labelling requirements of this International Standard and other standards may be combined into one label or appear as separate labels.

The label format accommodates both mandatory and optional data elements.

The number included in the character count is exclusive of overhead characters such as start and stop characters, data identifiers or application identifiers and any other characters required by a standard symbology specification to properly encode data.

All data elements encoded in a machine-readable medium shall be preceded by the appropriate Data Identifier (DI) defined in ISO/IEC 15418 and ANSI/MH10.8.2 Data Identifier, or the appropriate Application Identifier (AI) defined in ISO/IEC 15418 and the General EAN.UCC Specifications.

The choice between EAN.UCC Applications Identifiers or Data Identifiers for any user will normally be defined in the applicable industry convention being followed.

Other industries developing product or shipment identification conventions should consider business practices, information requirements and systems capabilities of the trading partners in choosing between Data Identifiers and EAN.UCC Applications Identifiers. The user may also consider the following guidelines.

a) EAN.UCC Applications Identifiers (AIs)

The definitions of the EAN.UCC Applications Identifiers (AIs) are supported by application guidelines. The EAN.UCC AIs, and associated guidelines, have been designed for international and multi-sectorial trading purposes.

The EAN/UCC item identification system and related encodation standard are complemented by the EAN/UCC-maintained Application Identifiers, hereafter referred to as "EAN.UCC Applications Identifiers" (EAN.UCC AIs). This standard comprises two principal elements that are the key to any encoding system: the data content and the data carrier.

The use of EAN.UCC AIs is subject to the rules established by EAN and UCC.

EAN.UCC AIs identify generic and simple data fields for use in cross-sectorial and international supply chain applications. The General EAN.UCC Specifications provide rules for the definition, format and structure of the data fields.

Each EAN/UCC AI consists of two or more characters. The first two digits determine the length of the AI. A list of two digit codes indicating the predefined length of existing and future AIs and their data fields are contained within the General EAN.UCC Specifications.

b) Data Identifiers (DIs)

The descriptions in the Data Identifier list are general in nature and are used in industrial and international applications. Specific application guidelines provide the detailed definition used amongst trading partners.

The full list of registered Data Identifiers (DIs) and the full specification for their use are found in ANSI MH10.8.2.

DIs may be used with any alphanumeric data carrier and are designed to ensure cross-industry commonality of data identifiers used in automatic identification technologies.

DIs have a format of one alphabetic character alone, or one alphabetic character prefixed by one, two or three numeric characters.

It is recommended that data structures used to identify products or the traceability of products include identification of the organization providing the coding as well as the specific coding structure.

In the General EAN.UCC Specifications, this coding structure is the company prefix portion of the GTIN (Global Trade Item Number) or GLN (Global Location Number).

When using Data Identifiers, this coding structure uses the Issuing Agency Code (IAC) established in ISO/IEC 15459-1 (Unique Transport Unit Identification) and the Company Identification Number (CIN) assigned by the issuing agency.

4.2 Rules for encoding of mandatory and optional data elements in machine-readable symbols and human-readable information

4.2.1 General rules

The choice to encode in linear bar code, 2D symbol, or both shall be agreed between trading partners.

All machine-readable data elements shall be preceded by the appropriate Data Identifier or Application Identifier. The Data or Application Identifier should be selected from the options given in 4.1 and shall be in accordance with ISO/IEC 15418.

4.2.2 Rules for mandatory data elements

4.2.2.1 Encoding mandatory elements in machine-readable symbols

Mandatory data elements shall be encoded in a machine-readable symbol, as follows.

- a) If only a linear bar code is used, the mandatory data shall be in the linear bar code.
- b) If both a linear bar code and 2D symbol are used on the label, the mandatory data shall be in the linear bar code and the 2D symbol.
- c) If only a 2D symbol is used, the mandatory data shall be in the 2D symbol.

4.2.2.2 Human-readable information for encoded data elements

Human-readable information for mandatory data elements shall be on the label in all cases, as follows.

- a) For linear symbols, the human-readable shall be human-readable interpretation.
- b) For 2D symbols, the human-readable shall be human translation.

When mandatory data are only in the 2D symbol, the mandatory human-readable shall be human translation.

4.2.3 Rules for additional data elements¹⁾

4.2.3.1 Encoding in machine readable symbols

Additional data elements should be encoded in a machine-readable symbol, as follows.

- a) If only linear bar codes are used, the data should be in the linear bar code.
- b) If both linear bar codes and the 2D symbol are used:

1) "Additional" data elements are defined in 4.3.

- data should be in the linear bar code and should be included in 2D;
 - if the data are included in the linear bar code, the data shall also be included in the 2D symbol.
- c) If only a 2D symbol is used, the data should be in the 2D symbol. The use of a 2D symbol shall be accompanied by the linear bar code of the mandatory data fields unless mutually agreed upon between trading partners.

4.2.3.2 Human-readable information for encoded data elements

Human-readable information for optional data elements encoded in a linear symbol shall be on the label in all cases. In this case, human-readable interpretation shall be present and human translation may be added.

For data elements encoded in 2D symbols, the human-readable information should be on the label and it shall be human translation.

4.2.3.3 Human-readable information for data elements not encoded

Human-readable information for additional data elements that are not encoded in machine-readable symbols may be shown in human-readable information only.

4.2.4 Rules for data elements not specified in this International Standard

4.2.4.1 Encoding additional data elements in machine-readable symbols

- a) If only linear bar codes are used, the data may be in the linear bar code.
- b) If both linear bar codes and 2D symbol are used:
- data may be in linear bar code and should be included in 2D;
 - if the data are included in the linear bar code, the data shall also be included in the 2D symbol.
- c) If only a 2D symbol is used, the data should be in the 2D symbol. The use of a 2D symbol shall be accompanied by the linear bar code of the mandatory data fields unless mutually agreed upon between trading partners.

4.2.4.2 Human-readable information for encoded data elements

For data elements encoded in a linear symbol, the human-readable information shall be on the label in all cases. In this case, human-readable interpretation shall be present and human-readable translation may be added.

For data elements encoded in 2D symbols, the human-readable information may be on the label and it shall be printed as human translation.

4.2.4.3 Human-readable information for data elements not encoded

Other data elements may be shown in free text only.

EXAMPLES Product description and parametric values.

Table 1 — Machine-readable symbols and human-readable information

Data element status	Machine-readable symbols on label	Requirement for encoding		Requirement for human-readable information
		Bar code	2D	
Mandatory	Bar code	shall		shall
	Bar Code + 2D	shall	shall	shall
	2D		shall	shall
Optional Specified (See Note)	Bar code	should		shall if encoded
	Bar Code + 2D	should ^a	should	shall if encoded in bar code
	2D		should	should if encoded
	None			may
Optional Not specified (See Note)	Bar code	may		shall if encoded
	Bar Code + 2D	may	may	shall if encoded in bar code
	2D		should	may if encoded
	None			may
NOTE In this International Standard, "Specified Optional Data Elements" are Supplier Item Identification, Country of Origin, and Date. All others belong to the category "Optional Data Elements Not Specified".				
^a If the data element is encoded in linear bar code, it shall also be included in the 2D symbol.				

4.3 Basic data elements

4.3.1 General

Whether a data element is mandatory or optional is dependent on industry, market, or individual trading partner requirements. These data elements may be human-readable, machine-readable, or both. If machine-readable, the data elements shall be in accordance with ISO/IEC 15418.

Certain data elements are mandatory to a broad range of product package applications. These are

- item identification code,
- quantity without or quantity with unit of measure,
- traceability identification, and
- serial number or traceability number.

Table 2 — Data element usage

Data element	Requirement
Item identification code	Mandatory.
Quantity	Mandatory, if the package contains more than one of an item. Note that some manufacturers may change the product code to represent a change in quantity.
Traceability identification	Mandatory (unless otherwise agreed upon between trading partners).

4.3.2 Item identification

Item identification may be assigned by either the supplier or the customer. Either the customer item identification, or the supplier item identification, or both may be shown on the label as agreed to between the trading partners. If both are shown on the label, at least one of the two item identifiers shall be encoded in a machine-readable symbol.

The supplier's part number shall be used for item identification in the absence of a different agreement between trading partners.

The maximum length of this data element is 25 alphanumeric characters, not including the appropriate identifier (AI or DI).

The item identification data field should be in one of the formats shown in Tables 3 and 4. These identifiers represent the most frequently used formats for product package. The complete list of possible item identification codes can be found in ANSI MH10.8.2 or the General EAN.UCC Specifications.

Table 3 — DIs used in item identification

Data Identifier	Data field	Data characteristics Type/length	Description
P	Product number	an1 + an...25	Customer assigned part number.
1P	Product number	an2 + an...25	Supplier assigned part number.
3P	Product number	an2 + n12..13 + n2..5	Combined manufacturer identification code/item code under the 12/13-digit UCC/EAN formats, plus supplemental codes, if any.
8P	Product number	an2 + n14	UCC/EAN GTIN
11P	Product number	an3 + an10	CLEI code for telecommunications equipment.
19P	Product number	an3 + an...32	Component of an item (one product contained in multiple packages).
25P	Product number	an3 + an...32	Combined IAC/CIN and item code assigned by the supplier.
+	Product number	a1 + an...19	HIBCC

Table 4 — AIs used in item identification

Application Identifier	Data field	Data characteristics Type/length	Description
Not applicable when used in UPC-12, EAN-13, or EAN-8	Global Trade Identification Number (GTIN)	n8...14	Global Trade Item Number: Shorthand term for the EAN-UCC Global Trade Item Number. A GTIN may use the EAN/UCC-8, UCC-12, EAN/UCC-13 or EAN/UCC-14 standard numbering structure.
01	GTIN	n2 + n14	GTIN identification of trade items.
02	GTIN	n2 + n14	GTIN identification of trade items contained in a logistic unit.
241	Part number	n3 + an...30	Customer assigned part number.
8001	Roll products	n4 + n14	Roll products - width, length, core diameter, direction and splices.
8006	Identification of the components of a trade item	n4 + n14 + n2 + n2	EAN.UCC identification of a fixed measure trade item (GTIN) packed in separate parcels. (n of x)
8018	Global Service Relation Number (GSRN)	n4 + n18	EAN.UCC identification number of a service relation (GSRN) to be assigned by the service provider.
8020	Payment slip reference number	n4 + an...25	Payment slip reference number.

4.3.3 Quantity

Unless otherwise specified, the implied quantity of the product identified on the outside of the product package is one.

Two primary methods exist of identifying the quantity inside a product package.

- a) The first situation is where the product package identifies the product code and the quantity contained therein on the product package label. This may be analogous to a raw material being received where ten of an item are received in the same box and the product package identifies ten products having the same product code. In this situation, the quantity would be considered to be ten.
- b) The second situation is where a quantity of product and its packaging are identified by a product code different from the product code assigned to the product inside. This may be analogous to a consumable unit (e.g. batteries) where the combination of the items, quantity and packaging constitute a unique product code. In this situation, the quantity would be considered to be one.

If used, the quantity shall be the quantity in the package or container to which the label is affixed. The default unit of measure for Data Identifier Q is EACH or PIECES. The default unit of measure for Application Identifier 30 is EACH or PIECES.

When Data Identifiers are used and when a different unit of measure is required, as agreed between trading partners, the Data Identifier 7Q shall be used with the quantity followed by two alphanumeric characters representing the ANSI X.12.3 unit of measurement code. In the special case where multiple containers comprise a single product (the contents of each container shall be combined with the content of the other containers to constitute a single product), the Data Identifier 6Q or Application Identifier 8006 shall be used to link the various containers.

When Application Identifiers are used and when a different unit of measure is required, as agreed to between trading partners, one of the Application Identifiers in the 3nn series, as specified in the General EAN.UCC Specifications, shall be used with a decimal point indicator and the quantity.

When the EAN.UCC system is used, the identification always relates to the complete package (packaging + contents). Fixed measure trade items are those that are always produced in the same version and composition (type, size, mass, quantity of contents, design, etc.). Like a **fixed** measure trade item, a **variable** measure trade item is an entity with pre-defined characteristics (e.g. the nature of the product or its contents). Unlike a **fixed** measure trade item, a **variable** measure trade item has at least one characteristic which varies whilst other characteristics of the trade item remain the same. The variable characteristic may be mass, dimension, number of items contained or volume information. The complete identification of a variable measure trade item consists of both an identification number and information about the variable data.

The quantity data field should be in one of the formats shown in Tables 5 and 6. These identifiers represent the most frequently used formats for product package applications.

Table 5 — DIs used to identify quantity

Data Identifier	Data field	Data characteristics Type/length	Description ^a
Q	Quantity in package	an1 + n...14	The number of products (pcs) in the shipment container. EXAMPLE Q2000
2Q	Actual mass	an2 + n...14	The actual mass of package (kilograms implied by convention). (This includes an encoded decimal point, if necessary.) EXAMPLE 2Q200.1
6Q	One package over multiple containers	an2 + n...2/n...2	Where multiple containers comprise a single product (the contents of each container shall be combined with the content of the other containers to constitute a single product) to link the various containers. The format # of # ("this is the nth piece of x pieces to define the product"). Presented in the format "n/x", where the "/" (slash) is used as a delimiter between two values.
7Q	Quantity with unit of measure	an2 + n...14 + an2	The quantity with ANSI X12.3 Data Element Dictionary qualifier of products in the shipment container. (CR = cubic metre) EXAMPLE 7Q1CR (This includes an encoded decimal point, if necessary.)
NOTE Print only the significant digits for the human-readable quantity. Do not print leading zero.			
^a Examples show encoded characters. Spaces are shown for clarity but are not encoded.			

Table 6 — AIs used to identify quantity

Application Identifier	Data field	Data characteristics Type/length	Description
30	Quantity in package	n2 + n...8	Count of items contained in a variable measure trade item. EXAMPLE 302 000
3nn ^b	Quantity with specific unit of measure (with decimal point indication)	n4 + n6	Defined quantity and unit measure of the package (mass, sqm, volume, length, etc.) in a metric and non-metric system. Possible combinations of AIs: about 50. EXAMPLE 310 100 002 5 equals 2,5 kg net mass
37	Quantity in package	n2 + n...8	Count of trade items contained in a logistic unit.
NOTE For AI 30 and 37 print only the significant digits for the human-readable quantity. Do not print leading zeros.			
^a Examples show encoded characters. Spaces are shown for clarity but are not encoded. ^b Plus one digit for decimal point indication.			

4.3.4 Traceability identification

4.3.4.1 General

The traceability identification shall be assigned by the supplier. This category of identification includes serial numbers and lot/batch numbers.

When Data Identifiers are used, traceability identification should be either a serial number (using the Data Identifier S) or a lot/batch number (using the Data Identifier 1T).

When Application Identifiers are used, traceability identification should be either a serial number (using the Application Identifier 21) or a lot/batch number (using the Application Identifier 10).

In certain circumstances, both the serial number and the lot/batch number may be shown on the label. In this case at least one of the two should be encoded in a machine-readable symbol.

The maximum length of this data element is 32 alphanumeric characters.

The product traceability data field should be in one of the formats shown in Tables 7 and 8. These identifiers represent the most frequently used formats for product package applications.

Table 7 — DIs used for traceability information

Data Identifier	Data field	Data characteristics Type/length	Description
S	Serial No.	an1 + an...25	Serial number or code assigned by the supplier to an entity for its lifetime.
22S	Electronic serial number	an3 + an...25	Electronic serial number for cellular mobile telephones.
25S	Serial number	an3 + an...32	Combined IAC/CIN and the serial number assigned by the supplier.
1T	Lot/batch number	an2 + an...25	Lot/batch number defined by the manufacturer.
25T	Lot/batch number	an3 + an...32	Combined IAC/CIN and entity identification and lot/batch number assigned by the supplier.
+\$	Lot/batch number	a2 + an..15	Options of concatenated lot/batch combinations with product data are specified in ANSI/HIBC 2.

Table 8 — AIs used for traceability information

Application Identifier	Data field	Data characteristics Type/length	Description
10	Batch or lot number	n2 + an...20	Traceability code defined by the manufacturer.
21	Serial number	n2 + an...20	Serial number or code assigned by the supplier to an entity for its lifetime.
250	Secondary serial number	n3 + an...30	Secondary serial number of a component of a trade item. ^a
251	Reference to source entity	n2 + an...30	An attribute of a trade item, used to refer back to the original item the trade item was derived from.
7002	UN/ECE meat carcasses and cuts classification	n4 + an..30	United Nations (UN/ECE) meat carcasses and cuts classification.
8002	Electronic serial number	n4 + an...20	Electronic serial number for cellular mobile telephones.
^a If this AI 250 is being used, a trade item shall be a symbol marked with the following element strings: AI 01 representing the identification number (GTIN) of the trade item AI 21 representing the serial number of the trade item AI 250 representing the serial number of a component of the trade item.			

4.3.4.2 Serial number

A serial number is a unique code assigned by the supplier to an entity for its lifetime. The format for the serial number shall be defined by the manufacturer.

4.3.4.3 Traceability number

A traceability number is a code assigned by the supplier to identify or trace a unique group of entities (e.g. lot, batch).

4.4 Additional data elements

4.4.1 General

Whether a data element is mandatory or optional may be dependent on industry, market, or individual trading partner requirements. Beyond those identified in Table 2, the following data elements may find common usage. These data elements may be human-readable, machine-readable, or both. If machine-readable, the data elements shall be in accordance with ISO/IEC 15418:

- supplier identification,
- country of origin,
- date element, and
- others.

4.4.2 Supplier identification

The supplier identification shall uniquely identify the supplier to which the component is traceable. The supplier identification should be assigned by the supplier or recognized body assigning supplier identification and in mutual agreement between trading partners; it may be assigned by the customer.

It is recommended that the supplier identification shown on the label be the supplier identification assigned by the supplier or recognized body assigning supplier identification.

The maximum length of this data element is 18 alphanumeric characters.

The supplier identification field should be in one of the formats shown in Tables 9 and 10.

Table 9 — DIs used for supplier identification

Data Identifier	Data field	Data characteristics Type/length	Description
V	Vendor code	an1 + an9	Supplier code assigned by a customer.
12V	DUNS number identifying manufacturer	an3 + n9	Entity (manufacturer) identification assigned by Dun and Bradstreet.
17V	Department of Defense (DoD) CAGE code or NATO NCAGE code	an3 + an5 (CAGE) an3 + an6 (NCAGE)	Company identification assigned by the US Department of Defense or NATO.
20V	Company identification	an3 + an1..3 + an3..13 + "+" + an3	Combined IAC/CIN and party qualifier code (EDIFACT DE 3035).
18V	Company identification	an3 + an1..3 + an3..13	Combined IAC/CIN.

Table 10 — AIs used for supplier identification

Application Identifier	Data field	Data characteristics Type/length	Description
412	Supplier GLN	n3 + n13	Global Location Number: a 13-digit non-significant reference number used to identify legal entities (e.g. registered companies), functional entities (e.g. specific department within a legal entity) or physical entities (e.g. a door of a warehouse).
7030	Approval number of a slaughterhouse	n4 + n3 + an..27	Identification of the slaughterhouse including ISO country code.
7031-39	Approval number of de-boning and cutting halls	n4 + n3 + an..27	Identification of de-boning and cutting halls including ISO country code.

4.4.3 Country of origin

Human-readable marking requirements may be different and may be dependent on special country and/or industry requirements. Refer to the respective rules to apply the country of origin marking correctly. The definition of country of origin shall be in line with local jurisdictions.

If encoded in a machine-readable symbol, the ISO 3166-1 code list shall be used as shown in Tables 11 and 12.

When using Data Identifiers, the fixed length of this data element is two alphabetic characters.

When using Application Identifiers, the fixed length of this data element is three numeric characters.

The country of origin code field should be in the format shown in Tables 11 and 12.

Table 11 — Country of origin DI

Data Identifier	Data field	Data characteristics Type/length	Description ^a
4L	Country code	an2 + a2	2 character country code assigned by ISO. The country of origin is defined as the manufacturing country wherein the product obtained its present identity as a part, sub-assembly, or finished product. With the agreement of the trading partners and when the country of origin is mixed, country code "AA" shall be used. The alpha-2 country code is found in ISO 3166-1. EXAMPLE 4L US.

^a Examples show encoded characters. Spaces are shown for clarity but are not encoded.

Table 12 — Country of origin AIs

Application Identifier	Data field	Data characteristics Type/length	Description ^a
422	Country of origin of a trade item (with ISO country code)	n3 + n3	3 digit country code assigned by ISO. The country of origin is defined as the manufacturing country wherein the product obtained its present identity as a part, sub-assembly, or finished product. With the agreement of the trading partners and when the country of origin is mixed, country code "000" shall be used. The numeric-3 country code is found in ISO 3166-1. EXAMPLE 422 840.
423	Country (or countries) of initial processing (with ISO country code)	n3 + n...15	ISO country codes stating the countries of initial processing of a trade item.
424	Country of processing (with ISO country code)	n3 + n3	ISO country code stating the country of processing of a trade item.
425	Country of disassembly (with ISO country code)	n3 + n3	ISO country code stating the country of disassembly of a trade item.
426	Country covering full process chain (with ISO country code)	n3 + n3	ISO country code stating the [single] country of full processing of a trade item.

^a Examples show encoded characters. Spaces are shown for clarity but are not encoded.

4.4.4 Date elements

When used, date elements should be as defined by the supplier.

If encoded in a machine-readable symbol, date element fields should be in one or more of the formats given in Tables 13 and 14.

Table 13 — Date elements using DIs

Data Identifier	Data field	Data characteristics Type/length	Description ^a
6D	Defined date	n2 + n8 + an3	ISO format YYYYMMDD immediately followed by an ANSI X12.3 Data Element Number 374 qualifier providing a code specifying type of date (e.g. ship date, manufacture date).
14D	Expiration date	n2 + n8	Expiration date (YYYYMMDD).
16D	Production date	n2 + n8	Production date (YYYYMMDD).

^a Examples show encoded characters. Spaces are shown for clarity but are not encoded.

Table 14 — Date elements using AIs

Application Identifier	Data field	Data characteristics Type/length	Description ^a
11	Production date	n2 + n6	<p>The production or assembly date determined by the manufacturer. The date may refer to the trade item itself or to items contained.</p> <p>The structure is:</p> <p><i>Year</i> The tens and units of the year (e.g. 2002 = 02), which is mandatory.</p> <p><i>Month</i> The number of the month (e.g. January = 01), which is mandatory.</p> <p><i>Day</i> The number of the day of the relevant month (e.g. 23rd day = 23). If it is not necessary to specify the day, the field shall be filled in with two zeros.</p> <p>EXAMPLE 11 020 123.</p>
13	Packaging date	n2 + n6	<p>The date when the goods were packed as determined by the packager. The date may refer to the trade item itself or to items contained.</p> <p>The structure is:</p> <p><i>Year</i> The tens and units of the year (e.g. 2002 = 02), which is mandatory.</p> <p><i>Month</i> The number of the month (e.g. January = 01), which is mandatory.</p> <p><i>Day</i> The number of the day of the relevant month (e.g. 23rd day = 23). If it is not necessary to specify the day, the field shall be filled in with two zeros.</p> <p>EXAMPLE 13 020 123.</p>
15	Minimum durability date (quality)	n2 + n6	<p>The <i>minimum durability date</i> indicates the ideal consumption or best effective use date of a product. It is a statement about <i>quality</i>. It is often referred to as a “sell by date” or a “best before date”.</p> <p>The structure is:</p> <p><i>Year</i> The tens and units of the year (e.g. 2002 = 02), which is mandatory.</p> <p><i>Month</i> The number of the month (e.g. January = 01), which is mandatory.</p> <p><i>Day</i> The number of the day of the relevant month (e.g. 23rd day = 23). If it is not necessary to specify the day, the field shall be filled in with two zeros.</p> <p>EXAMPLE 15 020 123.</p>
17	Packaging maximum durability date (safety)	n2 + n6	<p>The <i>maximum durability date</i> is the date that determines the limit of consumption or use of a product. It is a statement about <i>safety</i>. It is often referred to as “use by date” or “expiry date”.</p> <p>The structure is:</p> <p><i>Year</i> The tens and units of the year (e.g. 2002 = 02), which is mandatory.</p> <p><i>Month</i> The number of the month (e.g. January = 01), which is mandatory.</p> <p><i>Day</i> The number of the day of the relevant month (e.g. 23rd day = 23). If it is not necessary to specify the day, the field shall be filled in with two zeros.</p> <p>EXAMPLE 17 020 123.</p>

^a Examples show encoded characters. Spaces are shown for clarity but are not encoded.

4.4.5 Others not specified in this International Standard

Examples of this category of data elements are product description and parametric values.

4.5 Data representation

4.5.1 General formatting

Data elements can be represented on the label as human-readable information, or encoded in machine-readable symbols, or both.

The label shall consist of machine-readable data elements and human-readable data elements.

It is important that the appropriate Data Identifiers/Application Identifiers, data separators and start and stop characters are utilized in accordance with their associated industry, country, or region and symbology standards. For the purposes of this International Standard, the Data Identifiers/Application Identifiers for each data element should be selected from the options given in 4.2 and 4.3 (preferred), but in any case shall be selected from ISO/IEC 15418/ANSI MH10.8.2. When long messages are created through the concatenation of multiple data fields, the syntax described in ISO/IEC 15434 shall be used.

4.5.2 General formatting for machine-readable symbols

4.5.2.1 Linear bar code syntax

Generally, it is recommended that each data element be encoded in a separate bar code symbol.

If mutually agreed between trading partners, data elements may be concatenated into one bar code symbol to facilitate capture of more than one data element with a single scanning operation. Concatenation shall be in accordance to ANSI/MH10.8.2.

Two common techniques are used to concatenate data with bar code symbols. The first technique is the use of a combination of fixed length fields. The second technique employs a special concatenation character between variable length fields or, in some cases, between fixed and variable length fields. This International Standard recommends the use of the plus “+” character (ASCII Decimal 43) to delimit variable length fields when using Data Identifiers with either the Code 39 or Code 128 bar code symbologies. When using the UCC/EAN-128 bar code symbology, the function one (FNC1) character (transmitted as “GS” ASCII Decimal 29) shall be used to terminate variable length fields that are followed by another field.

4.5.2.2 2D symbol syntax

4.5.2.2.1 General

The encoding shall be as described in ISO/IEC 15434. When Data Identifiers are used, the first seven characters shall be “[>R_S06G_S”. When Application Identifiers are used, the first seven characters shall be “[>R_S05G_S”. For both Data Identifier and Application Identifier messages the last 2 characters, “R_SE_{OT}”, are fixed (format trailer) for this application. When data elements are combined within a two-dimensional symbol, the “G_S” (ASCII/ISO 646 Decimal “29”, Hex “1D”) character and the appropriate Data Identifier shall be used to identify each of the combined fields.

4.5.2.2.2 2D symbol syntax when using Data Identifiers

The example in Figure 1 is comprised of Data Identifiers, other overhead characters, and mandatory fields (an item identification, quantity, and a traceability identification [e.g. lot/batch number]. Thus, the character string (without blank spaces) is represented as follows:

$$[] > R_S 06 G_S 1P \text{Item-Ident } G_S Q \text{Quant. } G_S 1T \text{Trace-Ident } R_S E_{OT}$$

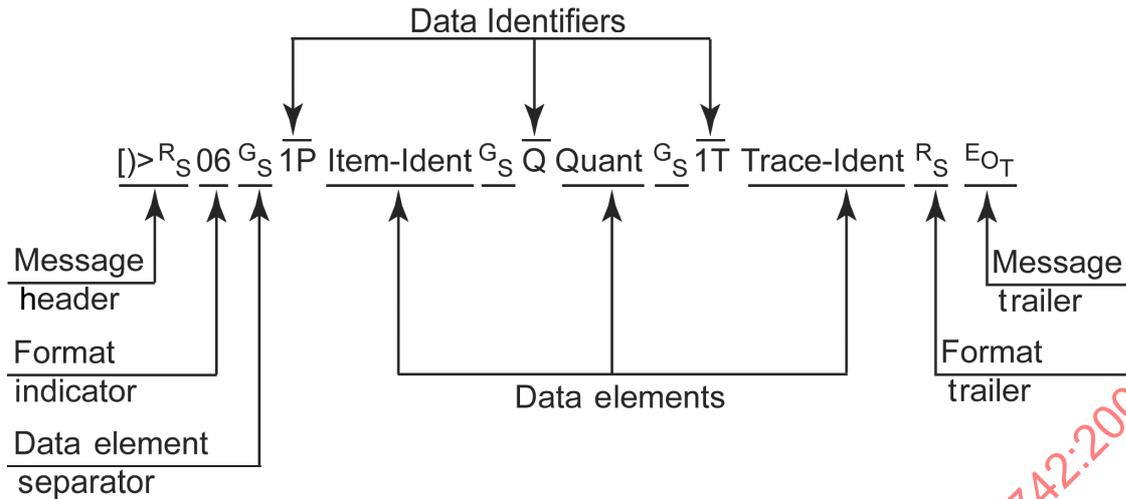


Figure 1 — Example of encoding Data Identifier data in a 2D symbol

4.5.2.2.3 2D symbol syntax when using Application Identifiers

The example in Figure 2 is comprised of Application Identifiers, other overhead characters, and mandatory fields (an item identification, quantity, and a traceability identification [e.g. lot/batch number]). Thus, the character string (without blank spaces) is represented as follows:

[] > R_S 05 G_S 01 Item-Ident G_S 30 Quant R_S E_O_T

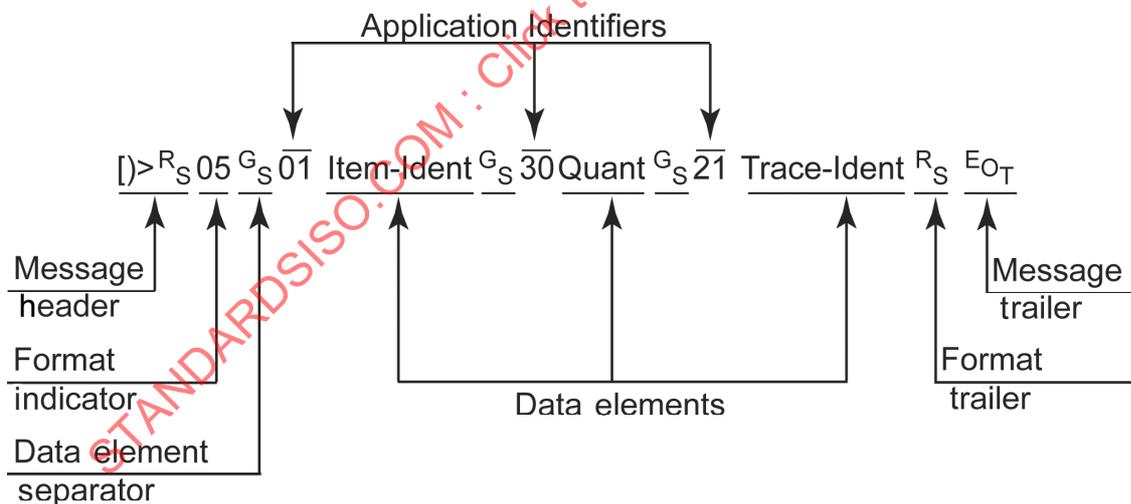


Figure 2 — Example of encoding Application Identifier data in a 2D symbol

4.5.3 General formatting for human-readable information

4.5.3.1 Common issues

Human-readable information can be human interpretation, human translation, data titles or free text and data. Human-readable information within a single country should be in the national language of that country.

Products for export should have human-readable information in the language(s) mutually agreed upon between trading partners.

Regulations may require multiple languages on the product.

Choice of language is applicable to human translation, data area titles and free text.

4.5.3.2 Human-readable interpretation (HRI)

A human-readable interpretation (HRI) of each linear bar code symbol shall be provided adjacent to the bar code. Such human-readable interpretation shall represent the encoded data (see Figures 3 and 4).

The human-readable interpretation of the linear bar code symbol shall be printed above or below the bar code symbol.

For Data Identifier data, the human-readable interpretation shall represent the encoded data, exclusive of the Data Identifier. The Data Identifier appears in parentheses as part of the data area title, e.g. "(S) Serial #."

When using Application Identifiers the AI appears in parentheses immediately preceding the human-readable interpretation.

For 2D symbols, human translation (see below) should be used.

4.5.3.3 Human translation

In addition to the human-readable interpretation, human translation of linear bar code information may be provided in a separate section of the label. See Figures 3 and 4.

Human translation of 2D symbols may be provided in a separate section of the label.

4.5.3.4 Data area titles

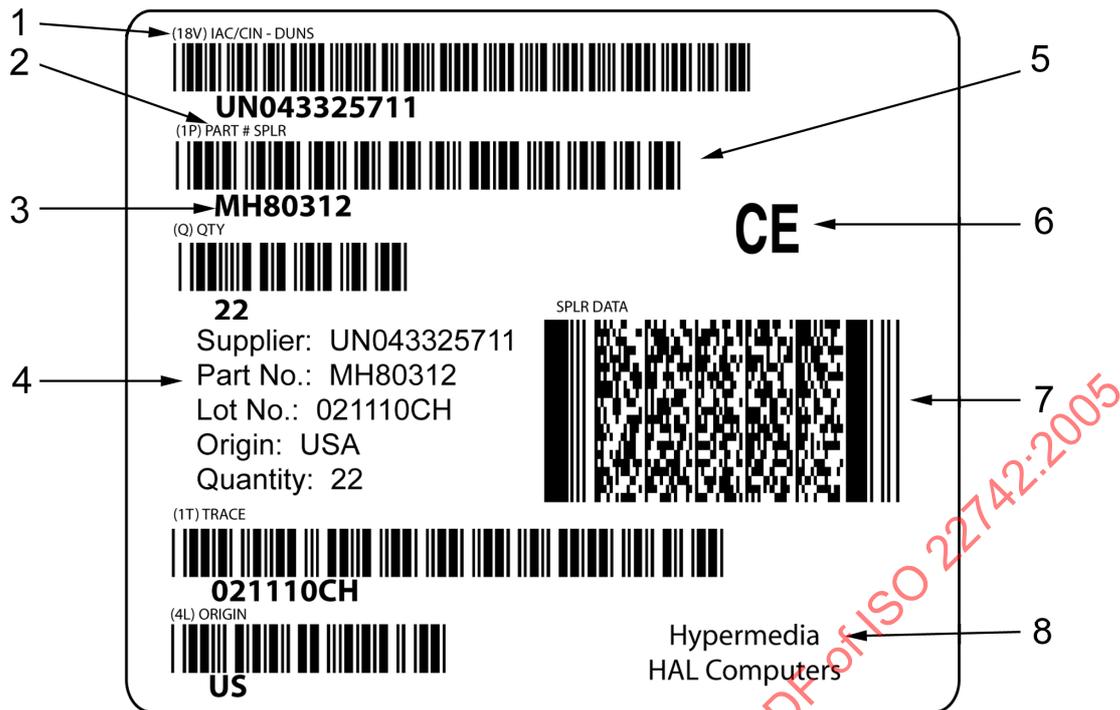
4.5.3.4.1 Linear symbols

Data areas comprise information in bar code or human-readable form. Data areas shall be identified with the corresponding data area title in human-readable text. A data area title is not required when a data area contains

- a single linear bar code symbol concatenating multiple data elements, or
- a data area containing multiple linear bar code symbols that are intended to be scanned in a single data capture operation.

Data area titles for linear bar code symbols may be presented with a full data element title, e.g. (S) Serial Number 123456, or an abbreviated data element title, e.g. (S) Ser. No. 123456. The data element title is placed directly after the Data Identifier.

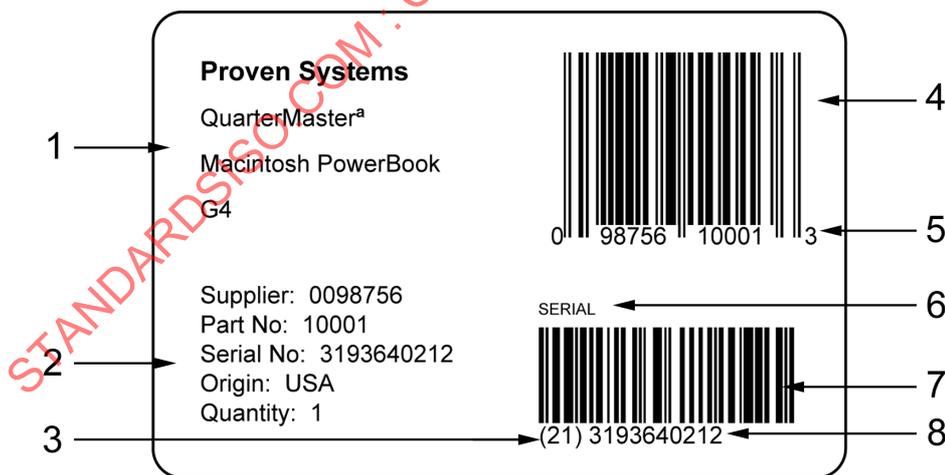
If the real estate available for marking is insufficient to support the marking of the data element title and the Data/Application Identifier, the data area title may be abbreviated to only include the Data/Application Identifier enclosed in parentheses [e.g. (S) 123456].



Key

- | | |
|---------------------------------|--------------------------|
| 1 Data Identifier | 5 linear bar code symbol |
| 2 data element title | 6 graphic |
| 3 human-readable interpretation | 7 two-dimensional symbol |
| 4 human translation | 8 free text |

Figure 3 — Examples of terminology for Data Identifiers (not to scale)



Key

- | | |
|--------------------------|---------------------------------|
| 1 free text | 5 human-readable interpretation |
| 2 human translation | 6 data element title |
| 3 Application Identifier | 7 linear bar code symbol |
| 4 linear bar code symbol | 8 human-readable interpretation |

Figure 4 — Examples of terminology for Application Identifiers (not to scale)

4.5.3.4.2 Two-dimensional symbols

When two-dimensional symbols are used each 2D symbol should be identified by the following data area titles, displayed above the 2D symbol:

A 2D symbol containing data meant for

- the supplier only shall be identified by the title 'SPLR',
- the customer only shall be identified with the title 'CUST',
- both the supplier and the customer shall be identified with the title 'SPLR/CUST'.

4.5.3.5 Free text and data

Human-readable information that is not a translation of the bar code information may be provided according to the requirements of the trading partners.

4.6 Data carriers

4.6.1 Data carrier selection

The choice of use of linear bar code, or 2D symbols, or both, as data carriers shall be agreed between trading partners.

4.6.2 General symbology requirements

Bar code and 2D symbologies used to meet the requirements of 4.6.4 shall be in accordance with the appropriate ISO/IEC JTC 1/SC 31 standard.

When implementing this International Standard, the reader output string should include the appropriate data carrier identifier as set forth in ISO/IEC 15424.

4.6.3 Linear symbols used on product packaging

The linear bar code symbologies permitted by this standard are

- Code 39 (reference: ISO/IEC 16388),
- Code 128 (reference: ISO/IEC 15417) for UCC/EAN-128 and Code 128 with Data Identifiers,
- Interleaved Two of Five (reference: ISO/IEC 16390) for ITF-14 symbols,
- EAN/UPC (reference: ISO/IEC 15420).

The specific linear symbology or symbologies to be used shall be mutually agreed upon between trading partners.

Recommended symbol parameters of the bar code symbols are shown in Tables 13 to 17. Deviations from the parameters recommended in this International Standard shall be mutually agreed between trading partners.

This International Standard recommends a minimum narrow element width of 0,17 mm. Regardless of the narrow element width; the linear symbol shall meet the minimum print quality requirements of 1,5/05/660 (± 10 nm).

Table 15 — Product package label symbol requirements Code 39

Code 39	Recommended minimum	Recommended maximum
Ratio of wide to narrow	2,5	3,0
Height of bar code	5 mm or greater	5 mm or greater
Narrow element width "X"	0,17 mm ± 10 % ^a	0,43 mm ± 10 %
Intercharacter gap	1 ×	3 ×
Minimum print quality	1,5 / 05 / 660 (± 10 nm)	

^a Narrow element width definition is to satisfy the needs of laser based and imager based scanning. While the minimum is recommended for open systems, agreement between trading partners can specify a narrower element width.

Table 16 — Product package label symbol requirements Code 128

Code 128		Recommended minimum
Dimensions (nominal)	Module/element width	0,17 mm (0,25 mm for EAN-128)
Height of bar code	5 mm or greater	
Minimum print quality	1,5 / 05 / 660 (± 10 nm) / (1,5 / 10 / 660 [± 10 nm] for EAN-128)	

Table 17 — Product package label symbol requirements Interleaved Two of Five (ITF-14 symbols)

ITF-14	Recommended minimum	Recommended maximum
Ratio of wide to narrow	2,5	3,0
Height of bar code	32 mm or greater	32 mm or greater
Narrow element width "X"	0,495 mm	1,016 mm
Minimum print quality	1,5 / 10 / 660 (± 10 nm)	

ITF-14 Symbols with X-dimensions below 0,635 mm (0,025 in) should not be printed directly on corrugate with conventional (plate-based) processes. Packages and/or containers marked with ITF-14 Symbols with X-dimensions between 1,016 mm (0,040 in) and 1,219 mm (0,048 in) are acceptable based on historical specifications, but a migration to the 1,016 mm (0,040 in) maximum X-dimension should be made on new artwork. The ITF-14 symbol's bar length ratio target is 2,5:1, and the acceptable range is 2,25:1 to 3:1.

For any appreciable degree of data security, the application in which the symbol is to be read should define a fixed length for the symbol (in this case 14 digits) and the symbol should employ bearer bars.

Table 18 — Product package label symbol requirements EAN/UPC

Code EAN/UPC		Recommended minimum
Dimensions(nominal)	Module/element width 0,33 mm	See Table 19
Height of bar code	See Table 19	
Minimum print quality	1,5 / 06 / 660 (± 10 nm)	

Table 19 — EAN/UPC dimensions

Magnification factor	Module width (nominal) mm	EAN-13/UPC-A dimensions, mm	
		Width	Height
0,80	0,264 0	29,83	20,73
0,85	0,281 0	31,70	22,02
0,90	0,297 0	33,56	23,32
0,95	0,313 0	35,43	24,61
1,00	0,330 0	37,29	25,91
1,05	0,346 0	39,15	27,21
1,10	0,363 0	41,02	28,50
1,15	0,379 0	42,88	29,80
1,20	0,396 0	44,75	31,09
1,25	0,412 0	46,61	32,39
1,30	0,429 0	48,48	33,68
1,35	0,445 0	50,34	34,98
1,40	0,462 0	52,21	36,27
1,45	0,478 0	54,07	37,57
1,50	0,495 0	55,94	38,87
1,55	0,511 0	57,80	40,16
1,60	0,528 0	59,66	41,46
1,65	0,544 0	61,53	42,75
1,70	0,561 0	63,39	44,05
1,75	0,577 0	65,26	45,34
1,80	0,594 0	67,12	46,64
1,85	0,610 0	68,99	47,93
1,90	0,627 0	70,85	49,23
1,95	0,643 0	72,72	50,52
2,00	0,660 0	74,58	51,82

4.6.4 Two-dimensional (2D) symbols used on product packages

4.6.4.1 General

The two-dimensional symbologies permitted by this International Standard are

- PDF417 (reference: ISO/IEC 15438),
- data matrix ECC 200 (reference: ISO/IEC 16022), and
- QR Code (reference: ISO/IEC 18004).