Bar Codes and Two-Dimensional (2D) Symbols for Product Packaging

Approved: 28 August 2003

Abstract

This standard is an application standard for the marking of product packages with linear bar code and two-dimensional symbols. It defines minimum requirements for identifying product packages that are distributed outside the originating location. It specifies label data content and requirements, including data element requirements; data representation; rules for encoding of mandatory and optional elements in machine-readable symbols; and human readable information.

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Bar Codes and Two-Dimensional (2D) Symbols for Product Packaging

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This standard, which was developed under the ANSI Committee method and approved by ANSI on 28 August 2003, represents suggested design practices and guidance for the marking of product packaging with linear bar code and two-dimensional symbols. It was developed with the sole intent of offering information to parties engaged in the manufacture, marketing, purchase, or use of automatic identification equipment software and services. This standard is advisory only and acceptance is voluntary and the standard should be regarded as a guide that the user may or may not choose to adopt, modify, or reject. The information does not constitute a comprehensive safety program and should not be relied upon as such. Such a program should be developed and an independent safety adviser consulted to do so.

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Foreword   (This foreword is not part of American National Standard MH10.8.6-2003)

This standard is an application standard for the marking of product packages with linear bar code and two-dimensional symbols. It defines minimum requirements for identifying product packages that are distributed outside the originating location. It specifies label data content and requirements, including data element requirements; data representation; rules for encoding of mandatory and optional data elements in machine-readable symbols; and human readable information.

Bar codes and Two-Dimensional (2D) Symbols for Product Packaging provides the option of one of four different linear bar code symbols and one of three different two-dimensional symbols. It relies upon the technology standards and data semantic and syntax standards developed within ASC MH10. These standards have in turn been published internationally through the work of ISO/IEC JTC 1/SC 31.

The international equivalent of this standard is the international standard ISO 22389, developed by ISO Technical Committee 122/Working Group 7. ANSI MH10.8.6 and ISO 22389 were developed concurrently and differ primarily with a recommended/preferred two-dimensional symbol in the ANS while the ISO standard provides no such recommendation or preference.

At the time of approval, the MH10/SC 8 committee consisted of the following members:

Automotive Industry Action Group	Morris Brown
Boeing	Frank Goodell
Bruno Associates	Thomas Bruno
Canada Post	Ken Cavanagh
CEA	Brian Markwalter
DoD AIT Project Office	Maurice Stewart; Dan Kimball (Alternate); Eugene Bransfield (Alternate)
Federal Express	Mark Thomas
General Motors	Larry Graham
Handheld Products	Robert Hussey
HighTech Aid	Steve Halliday
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RVSI	Luis Flgarella
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Telcordia Technologies	Robert Fox
Texas Instruments	Dan Wikander
United Parcel Service	Mark Lewis
United States Air Force	Mark Reboulet; Howard English (Alternate)
United States Postal Service	Himesh Patel

At the date of approval of this standard, the MH10 Committee, Unit-Loads and Transport-Packages, consisted of the following members:

AIM, USA	International Cargo Handling Coordination Assoc.
American Trucking Associations	International Safe Transit Association
American Wood Packaging Association	Material Handling Industry
APA – The Engineered Wood Association	Material Handling Management Society
Assoc. of Professional Material Handling Consultants	National Wholesale Grocer's Association
ASTM	National Wooden Pallet & Container Association
Automotive Industry Action Group	Plastic Drum Institute
Comp TIA	Q.E.D. Systems
Containerization & Intermodal Institute	Rack Manufacturers Institute
Electronics Industries Association	Reusable Industrial Packaging Association
Fibre Box Association	Steel Shipping Container Institute
Flexible Intermediate Bulk Containers Association	Textile Bag Manufacturers Association
Food Marketing Institute	The Soap & Detergent Association
Glass Packaging Institute	U.S. Dept. of Agriculture
Graphic Communications Association	U.S. Dept. of Defense Logistics
IMC & WD, Product Section - Material Handing Industry	U.S. Forest Products Laboratory
Institute of Packaging Professionals	Uniform Code Council
Integrated Business Communications Alliance	United Fresh Fruit & Vegetable Association

Suggestions for improvement, and questions regarding interpretation of this standard will be welcome. They should be sent to: MH 10 Committee (MHIA), Material Handling Industry of America, 8720 Red Oak Blvd., Suite 201, Charlotte, NC, 28217-3992 or mhstandards@mhia.org.

BAR CODES AND TWO-DIMENSIONAL (2D) SYMBOLS FOR PRODUCT PACKAGING

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BAR CODES AND TWO-DIMENSIONAL (2D) SYMBOLS FOR PRODUCT PACKAGING

1 SCOPE

This standard:

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

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

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

- provides specific recommendations regarding 2D symbologies that allows a broad choice for general use of scanning hardware, specifically, area imagers, single line laser scanners, and rastering laser scanners, and

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

In this document, the word "shall" indicates a requirement and the word "should" indicates a recommendation. Both labels and direct marking methods are referred to in this standard under the term "label".

This standard does not supersede or replace any applicable safety or regulatory marking or labeling requirements. This standard is meant 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 for this standard. This standard is to be applied in addition to any other mandated labeling requirements.

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

2 PURPOSE

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

3 NORMATIVE REFERENCES

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

ISO 8601	Data elements interchange formats-information interchange-Representation of data and time
ISO/IEC 2382	Information Technology – Vocabulary
ISO/IEC 15415	Bar Code Print Quality Test Specification – Two Dimensional Symbols
ISO/IEC 15416	Bar Code Print Quality Test Specification – Linear symbols
ISO/IEC 15417	Bar Code Symbology – Specification Code 128
ISO/IEC 15418	EAN/UCC Application Identifiers and FACT Data Identifiers
ISO/IEC 15424	Information technology – Automatic identification and data capture techniques – Data Carrier Identifiers (including Symbology Identifiers)
ISO/IEC 16388	Bar Code Symbology – Specification Code 39
ISO/IEC 15434	Syntax for High Capacity ADC Media
ISO/IEC 15438	Bar Code Symbology Specification – PDF417
ISO/IEC 16022	Bar Code Symbology Specification – Data Matrix
ISO/IEC 15459	Automatic Identification and Data Capture Techniques – International Specification – unique identifier for transport units
ANS MH10.8.2	Data Application Identifiers
ANS HIBC 2	Health Industry Supplier Labeler Standard

General EAN.UCC Specifications

4 DEFINITIONS

A complete glossary of terms used in this document is given in Annex B.

5 LABEL DATA CONTENT AND REQUIREMENTS

The label format accommodates both mandatory and optional data elements.

The number included in 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 15418 ISO/IEC 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)   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 the American National Standard 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.

b)   EAN.UCC Applications Identifier (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 which 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 EAC/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 is contained within the General EAN.UCC Specifications.

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.

5.1   Rules for Encoding of Mandatory and Optional Data Elements in Machine Readable Symbols and Human Readable Information.

5.1.1 General Rules

The choice to encode in linear bar code, 2D symbol or both is to 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 clause 5.1 and shall be in accordance with ISO/IEC 15418.

5.1.2 Rules for Fundamental Data Elements.

5.1.2.1 Encoding Fundamental Elements in Machine Readable Symbols.

Fundamental data elements <u>shall be</u> encoded in a machine-readable symbol:

- If only a linear bar code is used, the mandatory data shall be in the linear bar code.

- If both a linear bar code and 2D symbol are used on the label, the fundamental data shall be in the linear bar code <u>and</u> the 2D symbol.

- If only a 2D symbol is used, the mandatory data shall be in the 2D symbol.

5.1.2.2 Human Readable Information for Encoded Data Elements.

Human readable information for fundamental data elements <u>shall be</u> on the label in all cases.

- For linear symbols the human readable shall be human readable interpretation.

- For 2D symbols the human readable shall be human translation.

When mandatory data is only in the 2D symbol the fundamental human readable shall be human translation.

5.1.3 Rules for Additional Data Elements Specified in 5.3

5.1.3.1 Encoding in Machine Readable Symbols.

Additional data elements <u>should be</u> encoded in a machine-readable symbol.

- If only linear bar codes are used, the data <u>should be</u> in the linear bar code.

- If both linear bar codes and 2D symbol are used: Data <u>should be</u> in linear bar code and <u>should be</u> included in 2D. If the data are included in the linear bar code the data <u>shall also be</u> included in the 2D symbol.

- If only a 2D symbol is used, the data should be in the 2D symbol. The use of a 2D symbol must be accompanied by the linear bar code of the mandatory data fields unless mutually agreed upon between trading partners.

5.1.3.2 Human Readable Information for Encoded Data Elements

Human Readable Information for Optional Data Elements encoded in a linear symbol <u>shall be</u> on the label in all cases. In this case Human Readable Interpretation <u>shall be</u> present and Human Translation may be added.

For Data Elements encoded in 2D symbols the Human Readable Information <u>should be</u> on the label and it <u>shall be</u> Human Translation.

5.1.3.3 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.

5.1.4   Rules for Additional Data Elements Not Specified in 5.1

For these other data elements the following rules shall be applied:

5.1.4.1 Encoding Additional Data Elements in Machine Readable Symbols.

- If only linear bar codes are used, the data may be in the linear bar code.

- 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.

- If only a 2D symbol is used, the data should be in the 2D symbol. The use of a 2D symbol must be accompanied by the linear bar code of the mandatory data fields unless mutually agreed upon between trading partners.

5.1.4.2 Human Readable Information for Encoded Data Elements.

For data elements encoded in the 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.

5.1.4.3 Human Readable Information for Data Elements Not Encoded.

Other data elements may be shown in free text only. For example: Product Description and Parametric values.

5.2   Fundamental Data Elements

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

- Item Identification code

- Quantity without or Quantity with unit of measure

- Traceability Identification

Serial Number or Traceability Number

Note: Certain Item Identification codes imply a quantity other than one.

Whether a data element is mandatory or optional may be 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.

Table 1 – Machine Readable Symbols and Human Readable Information.

Data Element Status	Machine Readable Symbols On Label	Requirement for Encoding		Requirement forHuman Readable Information
		Bar	2D	
Mandatory	Bar	shall		shall
	Bar + 2D	shall	Shall	shall
	2D		Shall	shall
Optional **Specified** *Note 1*	Bar	should		shall if encoded
	Bar + 2D	should *Note 2*	Should	shall if encoded in Bar
	2D		Should	should if encoded
	No			may
Optional **Not specified** *Note 1*	Bar	may		shall if encoded
	Bar + 2D	may	May	shall if encoded in Bar
	2D		Should	may if encoded
	No			may
1. "Specified Optional Data Elements" are in this standard Supplier Item Identification, and Country of Origin. All Others belong to the category "Optional data elements not specified".				
2. If the data element is encoded in Linear Bar Code it shall also be included in the 2D symbol.				

Table 2 – Data Element Usage

Data Element	Market Sector	Requirement
Item Identification Code	Industrial Retail	Required Required
Quantity	Industrial Retail	Required. Note that some manufacturers may change the product code to represent a change in quantity. Regardless, of whether the package contains one of an item or the package contains more than one, the quantity shall be encoded, Required. Note that in the case of encoding item identification in an EAN.UCC GTIN, the quantity is reflected by a change in the GTIN.
Traceability Identification	Industrial Retail	Required Optional

* Optional data elements can be country or industry specific mandatory.

5.2.1   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 below. 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
8P	Product Number	an2+n14	UCC/EAN GTIN
11P	Product Number	an3+an10	CLEI Code for telecommunications equipment
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
N/A	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 Used primarily in EAN/UCC-128 symbology
02	GTIN	n2+n14	GTIN Used primarily in EAN/UCC-128 symbology
241	Part Number	n3+an...25*	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 (GCTIN) packed in separate parcels.
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.

* Table Note: UCC/EAN permits AI "241" to be a maximum of 30 characters.
This standard recommends no more than 25 characters.

5.2.2   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.

- 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 10 of an item are received in the same box and the product package identifies 10 products having the same product code. In this situation the quantity would be considered to be ten.

- 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 to 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 must 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 relates always to the complete package (packaging + contents). Distinction is made between Fixed Measure Trade Items are those which are always produced in the same version and composition (type, size, weight, 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 weight, 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.

Certain Item Identification codes imply a quantity other than one. In such cases a discrete quantity identifier is not required.

The quantity data field should be in one of the formats below. These identifiers represent the most frequently used formats for product package applications.

5.2.3   Traceability Identification

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 below. 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 Examples show encoded characters. Spaces are shown for clarity but are not encoded.
Q	Quantity in package	an1+n...14	The number of products (pcs) in the shipment container. Example: Q2000
2Q	Actual Weight	an2+n...14	The actual weight 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 must 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 Meter) 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 zeros.

Table 6 – AIs Used to Identify Quantity

Application Identifier	Data field	Data characteristics Type/length	Description Examples show encoded characters. Spaces are shown for clarity but are not encoded.
30	Quantity in package	n2 + n..8	Count of items contained in a Variable Measure Trade Item. Example: 302000
3nn* (*) Plus one digit for decimal point indication	Quantity with specific unit of measure (with decimal point indication)	n4 + n6	Defined quantity and unit measure of the package (weight, sqm, volume, length, etc) in a metric and non-metric system. Possible combinations of AIs: about 50 Example: 3101000025 equals 2.5 kilograms net weight
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.

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 with ANSI/HIBC 2-1997

Table 8 – AIs Used for Traceability Information

Application Identifier	Data Field	Data characteristics Type/length	Description
21	Serial No.	n2+an...20	Serial number or code assigned by the supplier to an entity for its lifetime
10	Batch or Lot Number	n2+an...20	Traceability code defined by the manufacturer
250	Secondary serial number	n3+an...30	Secondary serial number of a component of a trade item[Note]
251	Reference to Source Entity	n3+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

Note - If this AI "250" is being used a trade item must be 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.

5.2.3.1 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 is to be defined by the manufacturer.

5.2.3.2 Traceability Number

A traceability number is a code assigned by the Supplier to identify or trace a unique group of entities

5.3 Additional Data Elements

Whether a data element is mandatory or optional may be dependent on industry, market, or individual trading partner requirements. Beyond those identified in Table 1, 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 Information

- Country of origin

- Others (not specified)

5.3.1 Supplier Information

The Supplier Identification shall uniquely identify the supplier location 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.

It is further recommended that when using Data Identifiers all Supplier Identification migrate to the following formats:

- Where the item identification code is a separate encoded field from the supplier identification

Table 9 – Recommended DIs for Supplier Identification

Data Identifier	Data Field	Data Format	Description
18V	Supplier Identification	an3 +an...25	Combined Issuing Agency Code (IAC) & Company Identification Number (CIN)
21V	Supplier Identification	an3 +an...25	Combined IAC/CIN followed by an internally assigned entity identification

For Example:

18V	LE	XYZ
Data Identifier	Issuing Agency Code (IAC)	Company Identification Number (CIN)

- Where the supplier identification is concatenated with the item identification, serial number, or traceability number

Table 10 – Recommended DIs for Concatenating Supplier Identification with other Data

Data Identifier	Data Field	Data Format	Description
25P	Item Identification	an3 +an...25	Combined IAC/CIN and item code assigned by the supplier
25S	Serial Number	an3 +an...25	Combined IAC/CIN and serial number assigned by the supplier
25T	Traceability Number	an3 +an...25	Combined IAC/CIN and traceability number assigned by the supplier

It is further recommended that when using Application Identifiers that AI "01" neither the Company Identification nor the Product Identification have a fixed length, but the combined 13 character uniquely identify a product world-wide to the supplier location to which the component is traceable.

01	0	098756	100013
Application Identifier	Issuing Agency Code	Company Identification	Product Identification

Until migration identified above can be accomplished the supplier identification field may be in one of the following formats:

Table 11 – Recommended Vendor DIs Prior to Concatenation

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 U.S. Department of Defense or NATO
20V	Company Identification	an3+an1..3+ an3..13"+"+an3	Combined IAC/CIN and Party Qualifier Code (EDIFACT DE 3035)

Table 12 – Recommended Supplier Identification AIs

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

5.3.2   Country of Origin

When the country of origin is required to be included on the label it shall be shown in human readable information using the two-letter designation as specified in ISO 3166 standard.

This may be in addition to the data being encoded in a machine-readable symbol.

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 following format:

Table 13 – Country of Origin DI

Data Identifier	Data Field	Data characteristics Type/length	Description Examples show encoded characters. Spaces are shown for clarity but are not encoded.
4L	Country code	an2+an2	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 country code is found in ISO 3166 Example: 4L US

Table 14 – Country of Origin AI

Application Identifier	Data Field	Data characteristics Type/length	Description Examples show encoded characters. Spaces are shown for clarity but are not encoded.
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 country code is found in ISO 3166 Example: 422 840
423	Country 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.

5.3.3 Others Not Specified in this Standard

Examples of this category of data elements are Product Description and Parametric values.

5.4 Data Representation

5.4.1 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 this standard. The Data Identifiers/Application Identifiers for each

data element should be selected from the option given in clauses 5.2 and 5.3 (preferred) but in any case shall be selected from ISO/IEC 15418/ANSI MH10.8.2.

5.4.2 General Formatting for Machine Readable Symbols

In this standard, machine-readable symbols can be linear bar code symbols or 2D symbols.

5.4.2.1 Linear Bar Code

5.4.2.1.1 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 can 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 standard recommends the us of the plus "+" character (ASCII Decimal 43) to delimit variable length fields 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 which are followed by another field.

5.4.2.2 2D Symbols

5.4.2.2.1 Data Element Syntax for 2D Symbols

The encoding shall be as described in ISO/IEC 15434. When Data Identifiers are used, the first seven characters shall be "[)>^R_S06^G_S". When application Identifiers are used, the first seven characters shall be for Data Ior "[)>^R_S05^G_S". For both Data Identifier and Application Identifier messages the last 2 characters, "$^R_S$$^E_O_T$", 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.

5.4.2.2.1.1 Data Element Syntax for Data Identifier Data Encoded in 2D Symbols

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]

Figure 1: Example of Encoding Data Identifier Data in a 2D Symbol

Thus, the character string (without blank spaces) is represented as follows:

[ ) > ^{R} $_S$ 06 ^{G} $_S$ 1P Item-Ident ^{G} $_S$ Q Quant. ^{G} $_S$ 1T Trace-Ident ^{R} $_S$ ^{E} o $_T$

5.4.2.2.2 Data Element Syntax for Application Identifier Data Encoded in 2D Symbols

The example in Figure 2 is comprised of Application Identfiers, other overhead characters, and mandatory fields (an Item Identification, Quantity, and a Traceability Identification [e.g., Lot/Batch Number])
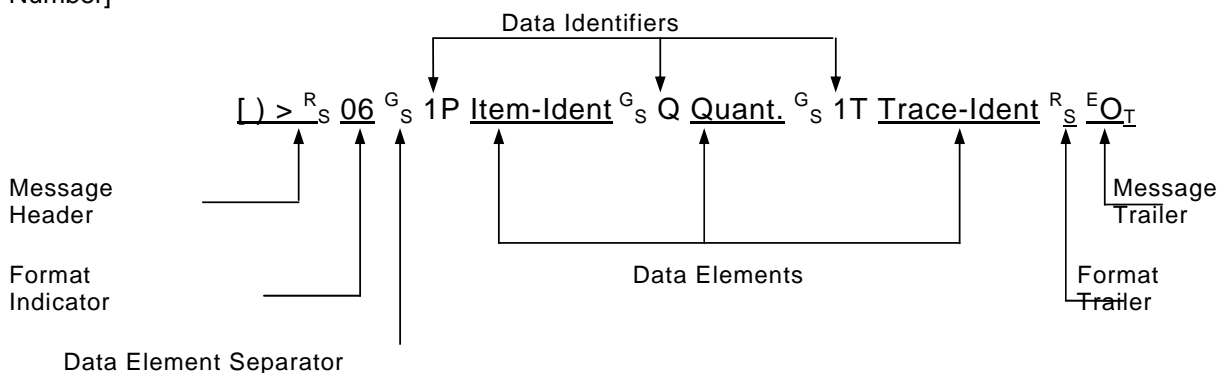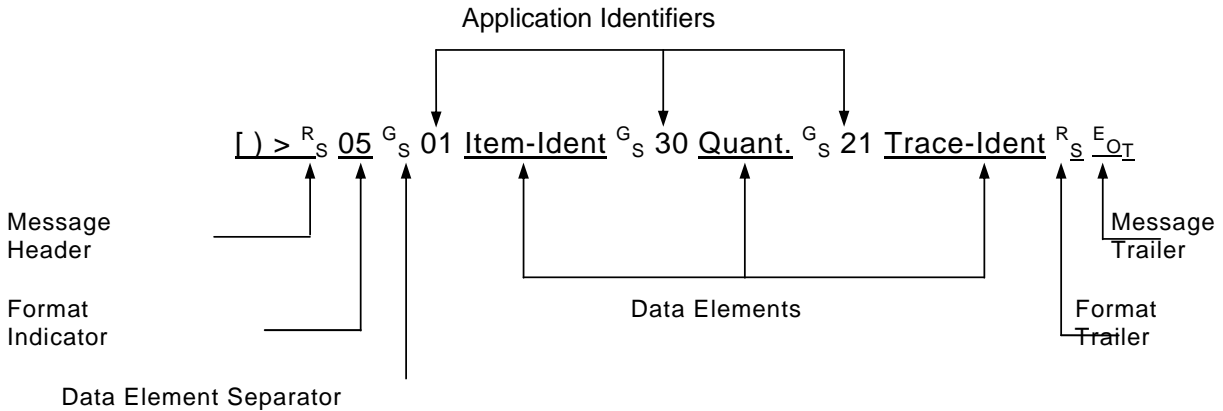

Figure 2: Example of Encoding Application Identifier Data in a 2D Symbol

Thus, the character string (without blank spaces) is represented as follows:

[ ) > ^{R} $_S$ 05 ^{G} $_S$ 01 Item-Ident ^{G} $_S$ 21 Trace-Ident ^{G} $_S$ 30 Quant. ^{R} $_S$ ^{E} o $_T$

5.4.3 General Formatting for Human Readable Information

Human Readable Information can be Human Interpretation, Human Translation, Data Titles or Free Text and Data.

5.4.3.1 Human Readable Interpretation

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 parenthesis immediately preceding the Human Readable Interpretation.

For 2D symbols Human Translation (see below) should be used.

5.4.3.2 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.

5.4.3.3 Data Area Titles

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.

Figure 3: Examples of Terminology for Data Identifier (not to scale)
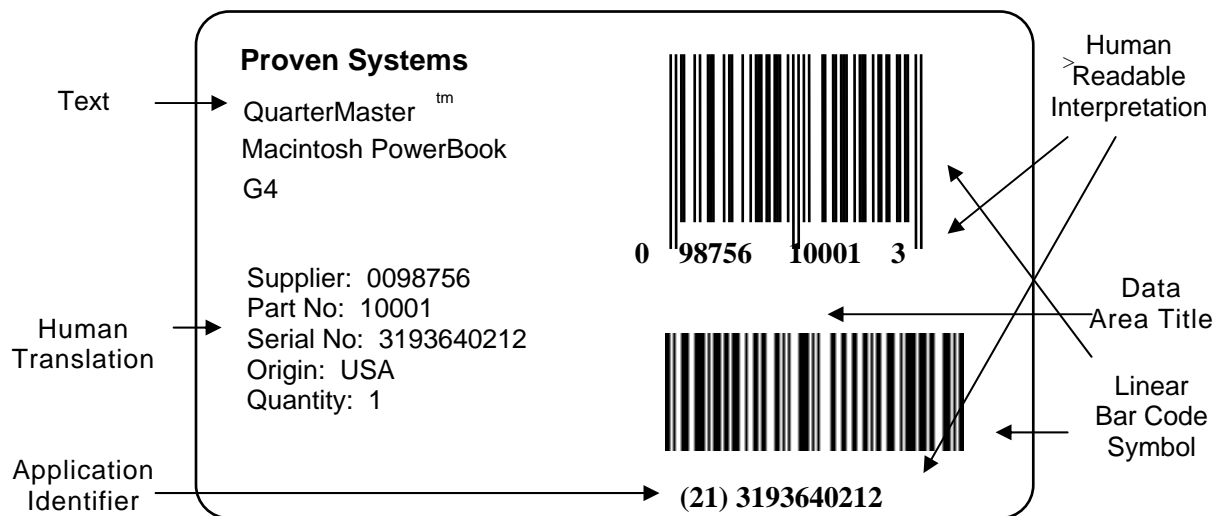
Figure 4: Examples of Terminology for Application Identifiers (not to scale)

When two-dimensional (2D) 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'.

5.4.3.4 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.

5.5   Data Carriers

5.5.1   Data Carrier Selection

The choice of use of Linear Bar Code, or 2D symbols, or both as Data Carrier shall be agreed between trading partners.

5.5.2   General Symbology Requirements

Bar code and 2D symbologies used to meet the requirements of clause 5.4.2.1.1 and 5.4.2.2.1 shall be in accordance with the appropriate ISO/IEC JTC1 SC31 standard.

5.5.2.1 Linear Symbologies Requirements

5.5.2.1.1 Selected Symbologies

The linear bar code symbologies to be used in this standard are:

- Code 39 (reference: ISO/IEC 16388)
- Code 128 (reference: ISO/IEC 15417)
- Interleaved 2 of 5 (reference: ISO/IEC 16390) for ITF-14 symbols
- EAN/UPC (reference: ISO/IEC 15420)

5.5.2.1.2 Symbol Requirements for Linear Bar Code Symbols

Recommended symbol parameters of the bar code symbols are shown in the Table 3 and 4 below. Deviations from the parameters recommended in this standard shall be mutually agreed between trading partners.

This standard recommends a minimum narrow element width of 0.17mm. Regardless of the narrow element width the linear symbol shall meet the minimum print quality requirements of 1.5/05/660.

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%[1]	0.43 mm±10%[1]
Intercharacter gap	1x	3x
Minimum Print quality	1.5 / 05 / 660 (±10 nm)	

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)	

---

[1] 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 more narrow element width.

Table 17: Product Package Label Symbol Requirements Interleaved 2 of 5 (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 0.635mm (0.025in) 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 1.016mm (0.040in) and 1.219mm (0.048in) are acceptable based on historical specifications, but a migration to the 1.016mm (0.040in) 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.

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	

Table 19: EAN/UPC Dimensions

Magnification factor	Module width (nominal) [mm]	EAN-13/UPC-A dimensions [mm]	
		Width	Height
0.80	0.2640	29.83	20.73
0.85	0.2810	31.70	22.02
0.90	0.2970	33.56	23.32
0.95	0.3130	35.43	24.61
1.00	**0.3300**	**37.29**	**25.91**
1.05	0.3460	39.15	27.21
1.10	0.3630	41.02	28.50
1.15	0.3790	42.88	29.80
1.20	0.3960	44.75	31.09
1.25	0.4120	46.61	32.39
1.30	0.4290	48.48	33.68
1.35	0.4450	50.34	34.98
1.40	0.4620	52.21	36.27
1.45	0.4780	54.07	37.57
1.50	0.4950	55.94	38.87
1.55	0.5110	57.80	40.16
1.60	0.5280	59.66	41.46
1.65	0.5440	61.53	42.75
1.70	0.5610	63.39	44.05
1.75	0.5770	65.26	45.34
1.80	0.5940	67.12	46.64
1.85	0.6100	68.99	47.93
1.90	0.6270	70.85	49.23
1.95	0.6430	72.72	50.52
2.00	0.6600	74.58	51.82

5.2.2.2 Two Dimensional (2D) Symbols Used on Product Packages

The two-dimensional (2D) symbologies identfied in this standard are:

- PDF417 (reference: ISO/IEC 15438) – Default symbology

- Data Matrix ECC 200 (reference: ISO/IEC 16022) – May be used with the mutual agreement between trading partners

- QR Code (reference: ISO/IEC 18004) – May be used with the mutual agreement between trading partners

For product package PDF417 shall be used as the default 2D symbology. With specific mutual agreement between trading partners, either Data Matrix ECC 200 and QR Code require 2d-capable image scanning technology.

Users should ensure that the scanning technology they select is capable of reading the symbols they choose to read.

5.5.2.2.1   "X" Dimension

The minimum narrow element dimension "X" for the PDF417 and Data Matrix ECC 200, and QR Code symbologies shall be 0,254mm. The recommended "X" dimensions for each symbology are:

- 0,254mm for PDF417.

- 0,38mm (cell size) for Data Matrix ECC 200.

- 0,38mm (cell size) for QR Code.

The "X" dimension shall be determined by the printing capability of the supplier/printer of the label.

5.5.2.2.2 Print Quality

Print quality shall be tested in accordance with ISO/IEC 15438 – Bar Code Symbology Specification – PDF417 for the PDF417 symbology, ISO/IEC 16022 – Bar Code Symbology Specification – Data Matrix for the Data Matrix symbology, and ISO/IEC 18004 – Bar Code Symbology Specification – QR Code for the QR Code symbology. For the Product Packaging application, the minimum symbol grade should be 1,5/5/660, where:

- Recommended print quality grade, on 2,5(B) at the point of printing the symbol

- Measurement aperture = 0,125mm (0,005in)

- Light source wavelength = 660 nanometers (nm) ± 10 nm

5.5.2.2.3 Error Correction Level

The PDF417 symbol error correction level depends on the number of data codewords. A minimum error correction level of 3 is recommended.

Data Matrix ECC 200 uses the automatic error correction as specified in ISO/IEC 16022.

QR Code shall use Error Correction Level "M" as specified in ISO/IEC 18004.

5.5.2.2.4 Syntax and Semantic Recommendations

Symbols compliant to this standard should use the data identifier semantics specified in ISO 15418/ANSI MH10.8.2 and the syntax specified in ISO 15434/ANSI MH10.8.3, Syntax for High Capacity ADC media.

5.6   Label Size and Layout

5.6.1   Label Size

The dimension of the label should suit the dimensions of the package and may be dependent on the space needed for the required information.

5.6.2   Label Layout

Label layout refers to the positioning of the fields on a label. Layout of linear bar code or two-dimensional symbols will depend on the available space on a label, packaging techniques and other factors.

When multiple bar code symbols or two-dimensional (2D) symbols are to be placed in line or in contiguous fields, are must be taken to avoid layouts that inhibit scanning the individual data elements. The layout of the label should be designed to accommodate the package size and should facilitate scanning of the bar codes.

Examples of label layouts for patterns are shown in following pages.

5.6.3 Examples of Label and Label Layout

5.6.3.1 Examples of Labels with Linear Bar Code and Human Readable Information

Smelly Mature Cheddar Cheese

Best before: 21 March 2001   **Batch:** 123ABC

Euro/Kg: **NET:**

9.10   0.455 Kg

2235151 704103

EURO 4.10

Timmy T-Shirt

1054MF   010A

5 012345 678900

50% Polyester 50% Rayon
Made in E.U.

Mardi Gras   **10**

24 x Super Cleaner

5 00 98756 10001 8

100 Intrafix® Air   CE 0123

Schwerkraft-Infusionsgerät mit bakteriendichter Belüftung. Nicht verwenden in Verbindung mit Druckinfusionsapparaten (Infusionspumpen).
I.V. administration set for gravity infusion with bacteria–tight air vent. For single use only. Do not use with pressure infusion devices (infusion pumps).
Nécessaire à perfusion par gravité avec prise d'air anti-bactérienne. Ne pas utiliser avec des dispositifs de perfusion à pression (pompes à perfusion).

Equipo de infusión intravenosa por gravedad con toma de aire antibacteriana. Para utilizar una sola vez. No utilizar con aparatos de infusión a presión (bombas de infusión).
Set per infusione a caduta con dispositivo per presa d'aria antibatterico. Non usare con pompe per perfusioni.
Infusionsaggregat för gravitationsinfusion med bakteritätt luftning. Använd ej utrustning för övertrycksinfusion (infusionspump).

G = Gravity (Schwerkraft)
20 ∂ ≙ 1 g ± 0,1 g
15 µm Filter
Länge/length: 150 cm
Luer Lock

REF **0402 2955**

LOT 96B0299-010203
STERILE R
1996–02
2001–02
100 x PZN 2132898

B|BRAUN B. Braun Melsungen AG
D-34209 Melsungen

(01)04022495000026(17)010200(10)96B0299

Figure 5: Examples of Bar Code and HRI for EAN.UCC Symbols Including Those with Application Identifiers (not to scale)

(1P) SPLR PART

MH80312

(12V) DUNS SPLR ID

UN043325711MH80312

(1T) LOT #

110780

Supplier: UN043325711
Part No.: MH80312
Lot No.: 110780
Quantity: 21
Origin: Japan

(Q) QTY

21

Fixed Ceramic Glaze
Chip Capacitor
Fine Products Ltd.
-Division PGV-
Made in Japan
Manufactured Date: 2002-10-01

Figure 6: Examples of Terminology for Data Identifiers

5.6.3.2 Labels with 2D Symbols and Human Readable Information

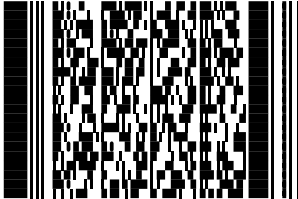
DUNS	SPLR	LOT #	QTY
SPLR ID	PART		
043325711	MH80312	110780	21

Figure 7: Example of PDF417 with DIs (not to scale)

DUNS SPLR ID
043325711

SPLR PART
MH80312

LOT #
110780

QTY
21

Figure 8: Example of Data Matrix with DIs (not to scale)

DUNS SPLR ID
043325711
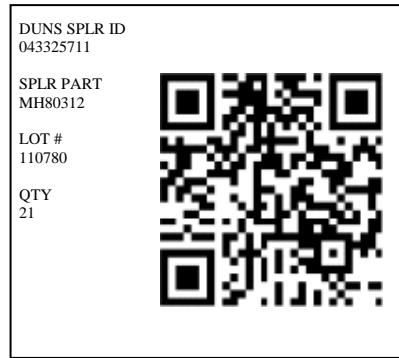
SPLR PART
MH80312

LOT #
110780

QTY
21

Figure 9: Example of QR Code with DIs (not to scale)

5.6.3.3 Label with Linear Bar Code, 2D Symbol and Human Readable Information

(21P) DUNS + SPLR PART

UN043325711MH80312

(1T) LOT #

110780

(Q) QTY

21

Supplier: UN043325711
Part No.: MH80312
Lot No.: 110780
Quantity: 21
Origin: Japan

SPLR DATA

Fixed Ceramic Glaze
Chip Capacitor
Fine Products Ltd.
-Division PGV-
Made in Japan
Manufactured Date: 2002-10-01

Figure 10: Linear Bar Codes, 2D Symbol, and Human Readable Information

5.6.4   Label Location

Label location refers to the positioning of the label on the package. Each label should be located in a position, which facilitates scanning.

Package
label

ATTENTION

Air Filters
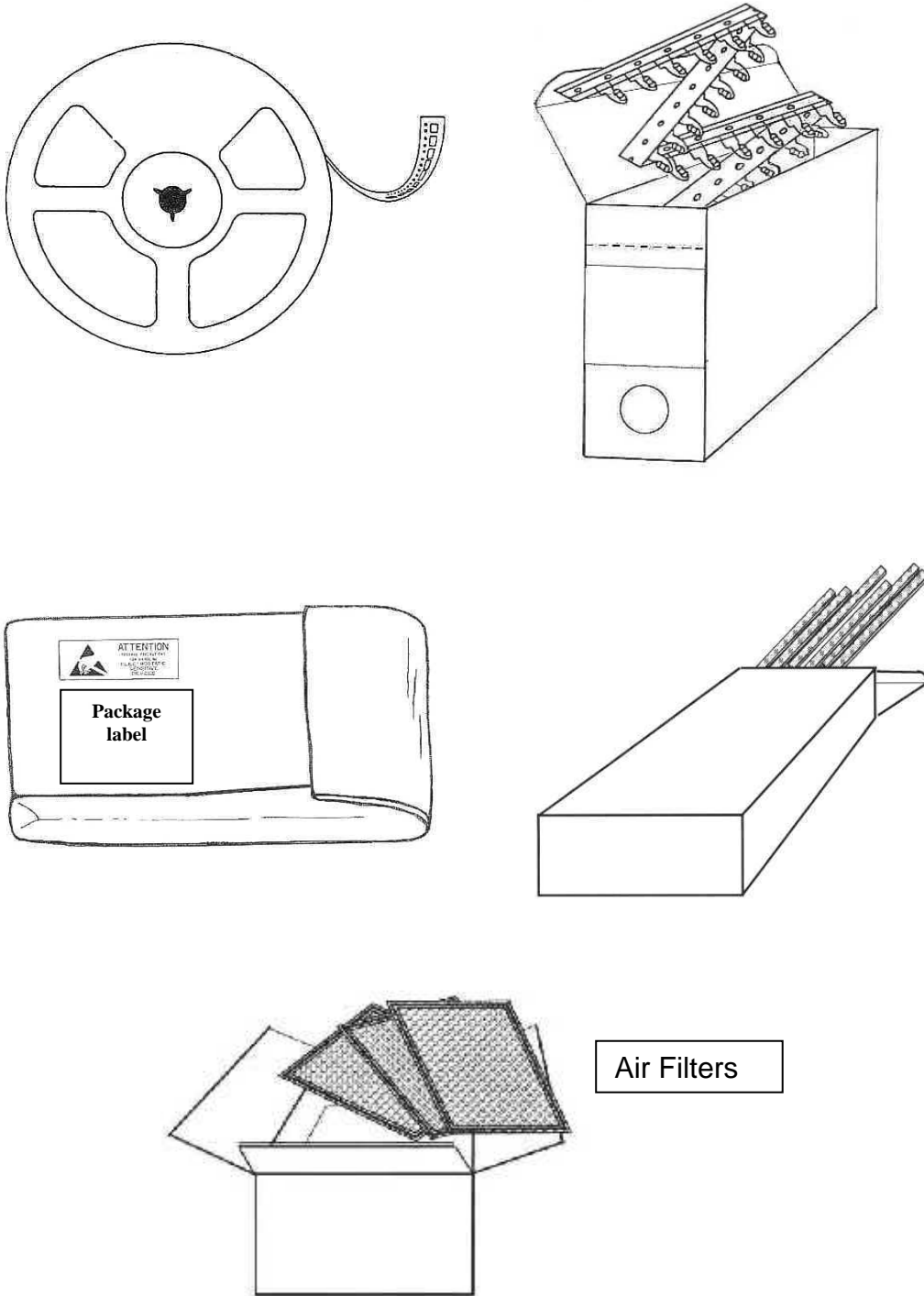
Annex A – Informative References

ANSI/EIA 624	Product Package Bar Code Label Standard for Non-Retail Applications
ANSI/HIBC-2	Health Industry Bar Code (HIBCC) Supplier Labeling Standard
ANSI MH10.8.2	Data Application Identifier Standard
EAN/UCC	General EAN/UCC Specifications
EIAJ – EDI	Standard (Chapter V. Bar Code Label System standard)
EDIFICE	Bar Code Label Implementation Guide for Product Package
Global Electronics	Guidelines for Bar Code/2D Marking of Products and Packages in Conjunction with EDI (Draft dated June, 1996)
IEC CDV 62090	Product Package Labels for Electronic Components Using Bar Code and Two-Dimensional Symbologies
UN/ECE	Recommendation 20 (Code list 6411)

Annex B – Glossary (normative)

2D symbol
See "two-dimensional symbol."

alphanumeric
Pertaining to data that consist of both letters and digits, and may contain other characteristics, such as punctuation marks, or pertaining to processes and functional units that use such data.

ANSI
American National Standards Institute

ANSI/MH 10
An ANSI accredited committee responsible of the development of American National Standards on unit-load and transport-package sizes, package testing standard, definitions and terminology, standardization of unit-load height, sacks and multi-wall bag standards, coding and labeling of unit-loads.

ANSI/MH 10/SC 8
An ANSI accredited committee responsible for the development of American National Standards on the coding and labeling of transport packages and unit loads, product packaging, and radio frequency identification for returnable containers. ANSI/MH 10/SC 8 serves as the U.S. Technical Advisory Group (TAG) to ISO TC 122.

ASCII
American Standard Code for Information Interchange: a computer code, as described in ISO 646, consisting of 128 alphanumeric and control characters, each encoded with 7 bits (8 including parity check), used for the exchange of information between computerized systems.

bar
A dark element corresponding to a region of a scan reflectance profile below the global threshold.

bar code
An array of parallel rectangular and spaces arranged according to the encodation rules of a particular symbol specification in order to represent data in machine readable form.

bar code density (symbol density)
The number of characters that can be represented in a bar code symbol per unit of measure, usually expressed as characters per inch (cpi) or per centimeter for linear bar codes and per square inch or per square centimeter for multi-row symbologies. The width of the narrowest bar or space, the wide to narrow ratio, the number of bars and spaces per character and the width of the intercharacter gap, if any, are the controlling factors.

bar code symbol
The combination of symbol characters and features required by a particular symbology, including quiet zones, start and stop characters, data characters, check characters and other auxiliary patterns, which together form a complete scannable entity.

character
See Character Set, Data Character, Symbol Character, Human Readable Character.

character set
The total range of letters, numbers, and symbols that can be encoded in a particular symbology. A finite set of characters that are complete for a given purpose; for example, ASCII See Code Page, Code Set.

check digit/character
A digit or character calculated from other characters in a code by means of a defined algorithm and used to check that the code is correctly composed. See Symbol Check Character, Data Check Character/Digit.

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

Code 128
A 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. Code 128 allows numeric data to be represented in a compact double-density mode, 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 element (bar or space) may 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 alphanumeric 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.

code page
A table showing the character allocated to each byte value in a coded character set.

code set
A subset of the character set of a particular symbology. See Character Set.

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

customer
In a transaction, the party that receives, buys, or consumes an item or service.

coded character set
A set of single characters that is mapped onto their byte values according to a linear bar code or two-dimensional symbology.

component
For the purposes of this document, electronic or electrical parts (e.g., bare printed circuit boards, integrated circuits, capacitors, diodes, electronic modules, switches, heat sinks, resistors, electronic/electrical connector, etc.) of a first level assembly.

component packaging
A commercial unit of components defined by the supplier including, if applicable, their means for protection, structured alignment or for automated assembly i.e.,

- Leaded components – taped on reels or in ammo box according to IEC 60286-1 and 60286-2

- Surface Mount Devices (Surface mount components) – taped on reels according to IEC 60286-3, in bulk case, IEC 60286-6.

- Integrated Circuits (ICs) – in stick magazines according to IEC 60286-4, in matrix trays according to IEC 60286-5.

Compare to Product Package.

Country of Origin
The country of origin is defined as the manufacturing country wherein the product obtained its present identity as a part, subassembly, or finished product. The definition of country of origin shall be in line with local jurisdictions.

data area title
A descriptor contained within a portion of a label that indicates the purpose of the data within that portion of the label. For linear symbols, the data area title includes the Data Identifier and the Data Element Title, e.g., (S) SERIAL NUMBER, (S) SERIAL #, or (S) SN. For two-dimensional symbols, the data area title signifies the intended user of the 2D symbol, e.g., SPLR, CUST, CARR. See "human readable information."

data character
A single numeric digit, alphabetic character or punctuation mark, or control character, which represents information. Compare Symbol Character.

data check character/digit
A digit or character calculated from data and appended as part of the data string to ensure that the data is correctly composed and transmitted. Compare Symbol Check Character.

data codeword
A codeword which encodes data according to one of the compaction schemes of a symbology.

data element separator
A specified character used to delimit discrete fields of data.

data element title
A part of the data area title for linear code that gives a brief description of the data element, e.g. Partnumber, Customer nr. The data element may contain abbreviations.

Data Identifier (DI)
A specified character string which defines the specific intended use of the data that immediately follows. The identifier shall be an alphabetic character or an alphabetic character preceded by up to three numeric characters as defined by ANSI MH10.8.2, Data Application Identifier Standard. A character (or set of characters) within a machine-readable symbol that defines the general category or specific use of the data that is encoded in the same machine-readable symbol. See ISO/IEC 15418/ANSIMH10.8.2.

Data Matrix
An error correcting two-dimensional matrix symbology, developed in 1989 with finalized design in 1995 by International Data Matrix, capable of encoding various character sets including strictly numeric data, alphanumeric data, and all ISO 646 (ASCII) characters, as well as special character sets. The symbology has error detection and error correction 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. There are two types of Data Matrix symbologies: ECC 000 – 140 with several available levels of convolutional error correction, and ECC 200 which uses Reed-Solomon error correction. For ISO/IEC JTC 1/SC 31 purposes, only ECC 200 is recommended. The intellectual property rights associated with Data Matrix have been committed to the public domain. See ISO/IEC 16022.

decoder
An electronic assembly that translates the proportional electrical signals from a scanner into recognizable or computer-compatible data.

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

dot misalignment within a cell
The distance between the physical center point of a dot and the cell center point.

EAN International
Based in Brussels, Belgium, an organization of EAN Member Organizations that jointly manages the EAN.UCC Systems with the UCC.

EAN.UCC System
The specifications, standards, and guidelines co-administered by EAN International and the UCC.

EAN/UPC
A 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. See ISO/IEC 15420. See U.P.C.

EDIFICE
The Standardized Electronic Commerce forum for companies with interests in Computing, Electronics and Telecommunication. Tiensestraat, 2 3320 Hoegaarden Belgium Telephone: +32.16.76.54.40   Telefax: +32.16.76.53.58.

EIA
Electronic Industries Alliance. A group of electronics industry suppliers and customers having developed standardized conventions for bar code marking, as well as other standardized approaches to intra-industry issues. EIA, 2500 Wilson Blvd., Arlington, VA 22201-3834, Telephone: +1 703/907-7554   Telefax: +1 703/907-7501.

EIAJ
Electronic Industries Association Japan. EDI Center (EIAJ), 5-13 Nishi-Shimbashi 1-chome, Dai-8 Toyo Kaiji Bldg 6F, Minato-ku, Tokyo 105, Japan, Telephone: +81-3-3593-8323   Telefax: +81-3-3593-8324

Electronic Data Interchange (EDI)
For the purposes of this document, EDI shall mean the computer communication of data which permits the receiver to perform the function of a standard business transaction and is in a standard data format. The exchange of routine business transactions (documents) in a computer-processible format, covering such traditional applications as inquiries, planning, purchasing, acknowledgements, pricing, order status, scheduling, test results, shipping and receiving, invoices, payments, and financial reporting.

element
A single bar or space in a bar code symbol or a polygonal or circular single cell in a matrix symbol, which according to symbology rules for a symbol character.
NOTE – The width of individual elements may be expressed in modules, or in multiples of the X dimension.

element width
The thickness of an element measured from the leading edge of an element to the trailing edge of the same element. See "X" Dimension.

erasure
A type of error represented by a physically missing character, or a symbol character which has failed to be decoded, as opposed to a substitution error or misdecode.

erasure correction
A use of the error correction characters to correct data errors that have known locations (these locations may have insufficient contrast in the image, may fall outside of the image field, or may have incorrect parity for symbologies with symbol character parity). Only one error correction character is required to correct each erasure.

error correction
A technique used at the byte level to detect and correct received data errors. Supplemental bits introduced or source encoded into a data stream to allow automatic correction of erroneous bits and/or derivation of missing bits, in accordance with a specific computational algorithm.

error correction codeword
A codeword in a symbol which encodes a value derived from the error correction codeword algorithm to enable decode errors to be detected and, depending on the error correction level, to be corrected.

error correction level
The degree of error correction capability in a symbology, where this is not fixed by subject to some user choice.

error detection
A scheme or action to determine the presence of errors in a data stream.

European Norm (EN)
A standard of the European Union.

finder pattern
A unique pattern in a symbology used to locate symbols conforming with the symbology rules within a field of view.

first level assembly
For the purposes of this document, a manufactured electronic item or a mechanical assembly of an electronic item (e.g., populated printed circuit board, plug-in or PCMCIA card) made up of components.

format (high-capacity ADC media)
Formats comprise one or more "segments." A format contains one "format type."

format envelope
The format envelope, consisting of a "format header" and a "format trailer", delimits the start and end of data in a given "format."

format header
The string of character, including the "format indicator," used to identify the start of a "format envelope."

format indicator
A two-digit numeric code used to identify the specific "format type" of the application data.

format trailer
A character used to identify the end of a "format envelope."

format type
The rules under which a specific "format" is encoded.

free text
Letters, digits or other characters contained on the label that are not represented in a machine-readable symbol, e.g., product description, compatibility. See "human readable information."

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

human readable character
The representation of a bar code data character or data check character in a standard eye-readable alphabet or numerals, as distinct from its machine-readable representation.

human readable information
Information contained on a label along with machine-readable information. Types of human readable information include human readable interpretation (HRI), human translation, data area titles, and free text.

human-readable interpretation (HRI)
The letters, digits or other characters associated with the encoded message and printed adjacent to the bar code or two-dimensional symbol. See "human readable information."

human translation
The representation of machine-readable data in a standard eye-readable alphabet or numerals, located in a separate part of a label from the associated machine-readable data. Human translation provides for more human understandable representation of the data encoded in the machine-readable symbol(s), e.g., SUPPLIER PART # : MH80312 instead of (P) PART # SPLR: MH80312 or (P) MH80312. Human translation is also used to represent in a human friendly manner, some or all of the data encoded in a two-dimensional symbol. See "human readable information."

Interleaved Two of Five (ITF)
A bar code symbology encoding the ten digits 0 through 9. The name Interleaved 2 of 5 is derived from the method used to encode two adjacent characters. In the symbol, two characters are paired, using bars to represent the first character and the interleaved spaces to represent the second character. Each character has two wide elements and three narrow elements for a total of five elements. 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 and the symbol should employ bearer bars. Most commonly represented in the U.P.C. Shipping Container Symbol (SCC-14). See ISO/IEC 16390.

ITF-14
The 14-digit implementation of the EAN.UCC Global Trade Item Number (GTIN) when encoded in the Interleaved 2 of 5 symbology. The 14-digit version of the GTIN was formerly known as the U.P.C. Shipping Container Symbol (SCC-14).

Japanese Industrial Standard
A Japanese standards body responsible for the development of specific Japanese standards, such as those providing a technical specification for a bar code symbology. Japanese Industrial Standards Council (JISC), Japanese Standards Association,
1-24, Akasaka 4, Minato-Ku, Tokyo 107 JAPAN.

Linear bar code or Two Dimensional symbol (Common ORM)
A graphic representation of data in the form of a combination of symbol characters and features required by a particular linear bar code or two dimensional symbol, which together form a complete scannable entity.
NOTE – Features include quiet zones, start and stop characters, data characters, check characters and other auxiliary patterns, etc.

linear symbology
A bar code symbology in which the symbol is formed of a single row of symbol characters. Compare Multi-Row Symbology.

matrix symbology
A collection of polygonal or circular elements in a regular pattern to represent data for retrieval by a vision scanning system.

message (high-capacity ADC media)
The data stream that is contained within the "message envelope." A message usually consists of two parts: content and envelope.

message envelope
Consisting of a "message header" data, and a "message trailer," the message envelope delimits the start and end of a "data stream" in a given message.

message header
The string of characters used to identify the start of a "message envelope."

v04a

message trailer character
The End of Transmission character, "^{E}o$_T$", (ASCII/ISO646 Decimal "04") (ASCII/ISO646 Hex "04") serves to define the end of a message.

multi-row symbology (also stacked symbology)
A bar code symbology in which the symbol consists of two or more vertically adjacent rows of symbol characters. Compare Linear Symbology.

PDF417
An error correcting two-dimensional multi-row symbol developed in 1992 by Symbol Technologies, PDF417 symbols are constructed from 4 bars and 4 spaces over 17 modules. 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, 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.

print quality
The degree to which a printed optical symbol complies with the requirements which are specified for it, such as dimensions, reflectance, edge roughness, spots, voids, etc., which will affect the performance of the scanner. See Verification.

product package
The first tie, wrap or container to a single item or quantity thereof that constitutes a complete identifiable pack. 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 document the term "product package" includes component packages and packaging intended for storage and transport.

QR Code
An error correcting matrix symbology, introduced in 1994 by Denso Corporation, 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. A wide range of sizes of symbol is provided for together with four levels of error correction. Module dimensions are user-specified to enable symbol production by a wide variety of techniques. The symbol size (not including 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.

quiet zone
The area free form interfering markings which must surround a bar code symbol and, in particular, precede the start character and follow the stop character. Also referred to as light margin or clear area.

reader
A device used to capture the data encoded in a machine-readable symbol or other automatic data capture media. Machine-readable symbol readers consists of two parts: the transducer that sends signals proportional to the reflectivity of each successive element of the symbol to the decoder, that examines the signals from the scanner and translates them into recognizable or computer-compatible data. The decoder itself is sometimes called a reader.

resolution
Measure of the fineness of detail of an image which a piece of equipment can produce or distinguish. The width of the narrowest element capable of being read by the equipment under test.

scanner
A device that converts optical information (e.g., a printed bar code or two dimensions symbol) into electrical signals for subsequent decoding and transmission to a computer. See also Bar Code Reader, Decoder.

segment
A logical group of "data elements", specifically, a logical portion of an EDI message.

segment terminator
The single character used to separate "segments."

semantics
The means by which the purpose of a field of data is identified, 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.

serial number
A code assigned by the Supplier to an entity for its lifetime, (e.g., computer serial number, traceability number, contract tool identification).

space
A light element corresponding to a region of a scan reflectance profile above the global threshold.

speck
See Spot.

spot
An ink or dirt mark or other area of low reflectance in an area of a symbol which is intended to be of high reflectance. Compare Void.

structure
The order of data elements in a message.

supplier
In a transaction, the party that produces, provides, or furnishes an item or service.

symbol
See bar code symbol.

symbol character
The physical representation of the codeword as a pattern of dark and light elements. There may be no direct one-to-one mapping between symbol character and data character or auxiliary character. Decoding through the compaction rules is necessary to identify the data.

symbol check character
A symbol character calculated from the other symbol characters in a bar code symbol in accordance with an algorithm defined in the symbology specification and used to check that the bar code has been correctly composed and read. The symbol check character does not form part of the data encoded in the symbol.

symbology
A standard means of representing data in bar code form or two-dimensional symbol form. Each symbology specification sets out its particular rules of composition or symbol architecture.

symbology identifier
A sequence of characters, generated by the decoder and prefixed to the decoded data transmitted by the decoder, that identifies the symbology from which the data has been decoded. See ISO/IEC 15424, *International Specification – Data Carrier/Symbology Identifiers*.

syntax
The way in which data is put together to form messages. 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 include ISO 15434/ANSI MH10.8.3 – *Transfer Syntax for High Capacity ADC Media*.

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

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

two-dimensional (2D) symbols
Optically readable symbols that must be examined both vertically and horizontally to read the entire message. Two-dimensional symbols may be one of two types: matrix symbols and multi-row symbols. Two-dimensional symbols have error detection and may include error correction features.

Uniform Code Council (UCC)
Based in the United States, a membership organization that jointly manages the EAN.UCC System with EAN International. The UCC also administers the EAN.UCC System in the United States and Canada.

U.P.C. (Universal Product Code)
A 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 position. See ISO/IEC 15420.

verification
The technical process by which a bar code or two-dimensional symbol is measured to determine its conformance with the specification for that symbol.

void
An area of high reflectance in an area of a bar code symbol which is intended to be of low reflectance. Compare Speck, Spot.

X dimension
The specified width of the narrow elements in a bar code symbol (See Z Dimension). The specified width of a single element in a matrix symbol.

Z dimension
The average achieved width of the narrow elements in a bar code symbol. It is equal to half the sum of the average narrow bar width and the average narrow space width, in two-width symbologies, or to the quotient of the average overall character width divided by the number of modules per character in modular symbologies.