A Joint Automotive Industry Forum Publication

# Global Transport Label

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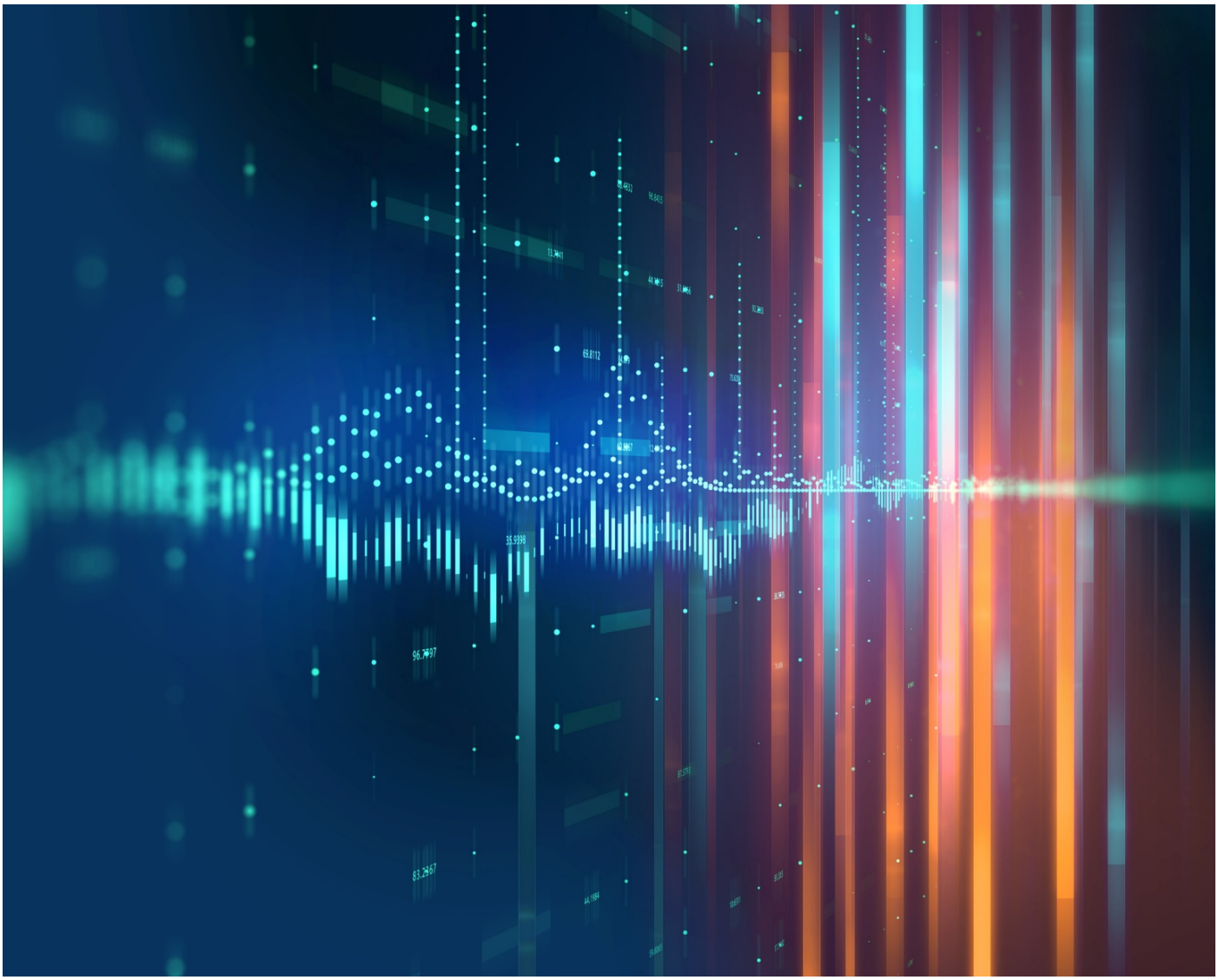

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# *FOREWORD*

In the spirit of international cooperation, members of automotive associations representing more than 80 percent of worldwide automotive productions have worked together to standardize container-labeling requirements for the automotive industry. Representatives from Europe (Odette), Japan (JAMA/JAPIA) and North America (AIAG) met via e-mail, by audio-conference and face-to-face in each group's regions to establish a common Global Transportation Label Standard to be used by suppliers and customers alike.

This standard takes into account existing templates from Odette's Transport Label (OTL) and the GM 1724 as well as design input from JAMA/JAPIA and is based on the AIAG B-10 Standard. All groups agreed on the need to share business process information, to abide by international standards and to have a common template for a Global Transport Label that could reduce costs throughout the automotive industry.

The following standard is the culmination of vigorous debate and active consensus which resulted in agreements to place this Global Transport Label on the containers of automotive suppliers and customers worldwide. Committee members view the consistent data layout and format as the industry's contribution to improving the movement of automotive materials across borders, through factory gates and to line-side positions around the world.

Users of this standard should also investigate regional implementation guidelines published by AIAG, Odette, JAMA/JAPIA or by individual trading partners.

| REVISION | COMMENT |
|---|---|
| **2** | Table 8 has been corrected |
| **3** | • Added Data Matrix ECC 200 and QR Code ECC M two-dimensional (2D) symbologies<br>• Macro "~2"; Structured Append capability to link up to16 2D symbologies added<br>• Restructured document to conform to ISO format |

Note – The next revision will include RFID requirements along with "Smart Label" (imbedded RFID tag in label stock) specifications.

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# *INTRODUCTION*

Today's global automotive suppliers ship to vehicle manufacturers around the world. This means that suppliers must follow widely differing container labeling requirements, depending on the location of their customer's operations. Studies show that unnecessary variations in this basic business process, multiplied by millions of parts transported every day, can lead to multiple millions of dollars in added supply-chain costs each year.

Members of automotive industry associations from Europe (Odette), Japan (JAMA/JAPIA) and North America (AIAG), have worked together to address this common problem. In the past, each group acted independently to set standards within their own regions for supply chain practices such as Electronic Commerce and bar code container labeling. But in our ever-shrinking world, regional solutions are no longer sufficient. The global automotive industry requires global productivity solutions. These industry associations met together and developed the answer.

Using current label templates as models – including ISO 15394, ANSI MH10.8.1, the Odette Transport Label (OTL) and AIAG's B-10 Standard – the Global Transport Label (GTL) Committee developed a model for a transport label design that included features such as the ISO "License plate," Code 128 and the two-dimensional symbologies Data Matrix, QR Code and PDF417.


**FIGURE 1 - Examples of Data Matrix, QR Code and PDF 417 Two-dimensional (2D) symbologies**

Standardizing transport labels is welcomed by suppliers, and logistics operations have been improved by the standardization activities of each region. Now, parts procurement has become a worldwide operation and global standardization is not only desirable, but critical. The Global Transport Label Standard is the first worldwide automotive industry standard that meets this requirement. The GTL committee expects the complete worldwide supply chain system, from lower tiers to OEMs, to become more efficient by implementing this Standard.

The purpose of the GTL is to facilitate the movement of goods and the exchange of data among all members within the supply chain (OEMs, suppliers (Tiers), logistics providers, carriers, and others. The amount of data (bar code or 2D symbol as well as human readable text) needed on a label is a function of the needs of the trading partners involved, and as defined within the limits of this document. **When a bar code label is used in conjunction with computerized data bases and Electronic Data Interchange (EDI), the amount of data needed on a label may be reduced significantly.**

Label, card and tag marking methods are covered in this standard under the general term, "label" Labels, as used in this standard, refer to pressure-sensitive, card stock, and tags. The terms "container" and "package" are used interchangeably. This document outlines the requirements for printing labels for unit loads and transport packages to ensure scannability of bar code symbols and to provide for consistency in label formats.

This standard describes the requirements for two common Global Transport Label templates for use on unit loads and transport packages – one of normal height and the other of reduced height – to convey data between trading partners. The physical parameters, orientation and placement of the labels are provided and a symbol quality level is specified. This standard does not supersede or replace any applicable safety or regulatory marking or labeling requirements. This standard is to be applied in addition to any other mandated labeling requirements.

The following have been identified as the most common label types in use by the global automotive industry:

- Individual container
- Reduced Height container
- Master Load container
- Mixed Load container
- Master/Mix load packing list

Note: This document does not address modular, sub-assembly or primary metal labels.

**It is the responsibility of the supplier to provide bar code marked labels that meet the specifications outlined in this standard. Strict adherence to these specifications for shipping parts identification labels will reduce implementation costs and increase benefits throughout the industry.**

In this document, the word “shall” indicates a requirement and the word “should” indicates a recommendation.

Precision and rounding shall be in accordance with Annex K, except where noted.

Label dimensions should be in accordance with the dimensions shown.

**All exhibits are for illustrative purposes only, and may not be to scale or bar code print quality standards. Every attempt is made to encode data in 1D bar codes and 2D symbologies in the illustrations per applicable standards. Symbols that are grey are intended for illustration ONLY.**

# 1 DEFINITIONS

| TERM | DEFINITION |
|---|---|
| **2D Symbol** | See two-dimensional symbol. |
| **~2 (pronounced tilde 2) Macro for "Structured Append"** | Structured Append Macro that permits up to 16 two-dimensional symbologies to be link. Consists of a 3 numeric character representing the Sequence Identifier (SID) and a maximum of 6 numeric characters for a File Identifier (FID) |
| **~6 (pronounced tilde 6) 06 Macro or Macro 06** | A means of abbreviating the header and trailer in one symbol character. This feature reduces the overhead character count by 8 characters. Macro must appear at the beginning of the input. The imager inserts the header [)>RS06GS and trailer RS EOT in the transmitted data stream. |
| **Alphanumeric** | A character set that contains alphabetic characters (letters), numeric digits (numbers), and usually other characters such as punctuation marks. |
| **ANSI** | **American National Standards Institute.** |
| **Qualifier** | Two character ANSI X12.3 Data Element Number 355 Unit of Measurement Code used with Data Identifier 7Q as used within this standard |
| **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 scanable entity. |
| **Carrier** | The party that provides freight services (freight movement and information). |
| **Character** | The smallest group of elements that represents one number, letter, punctuation mark or other information. |
| **Code 128** | For the purposes of this standard, Code 128 shall mean the symbology as described in ISO/IEC 15417 |
| **Compliance Indicator** | A specified character or string of characters indicating that the message that follows complies with an industry, regional or international standard. |
| **Container** | A receptacle or flexible covering for shipping goods. Examples are a box, bag, package or pallet. (See also **Transport Unit** and **Pack, Package** or **Load**.) |
| **Customer** | In a transaction, the party that receives, buys, or consumes an item or service. |
| **Customer Part Number** | The part number as defined by the customer. |

| TERM | DEFINITION |
|---|---|
| **Data Element** | The smallest named item of information that can convey data, analogous to a field in a data record or a word in a sentence. |
| **Data Element Separator** | The special character used to separate data elements in a data format. |
| **Data Identifier (DI)** | A specified character (or string of characters) that defines the general category or intended use of the data that follow. Data Identifiers are defined by ANSI MH10.8.2 / ISO/IEC 15418.<br>The DI is not part of the data. |
| **Data Matrix** | Data Matrix is a high density two-dimensional matrix style symbology that can encode up to 3116 characters using the entire ASCII 256 character set. The symbol is built on a square grid arranged with a finder pattern around the perimeter of the bar code symbol |
| **Decoder** | An electronic assembly, which translates the proportional electrical signals from a scanner into recognizable or computer-compatible data. |
| **D-U-N- S® also DUNS** | Data Universal Number System, a 9-character company identifier assigned by Dun & Bradstreet to uniquely identify business establishment. |
| **ECC (Error Correcting Code)** | A technique used at the byte level to detect and correct data transmission 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. See also "Error Correction Level." |
| **Electronic Data Interchange (EDI)** | The computer-to-computer exchange of formatted data between trading partners. |
| **EDI Message Data** | The data communicated between business trading partners in a standard format and syntax, e.g. ANSI ASC X12 or UN/EDIFACT. |
| **Element** | A single bar or space in a linear or stacked symbol or a single cell (module) in a matrix symbol (not the same as **Data Element**). |
| **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**.) |
| **Error Correction** | A method used to correct erroneous data produced during the transmission, transfer, or storage of data. |
| **Error Correction Level** | An indicator of the number of characters used in a two-dimensional symbol commonly referred to as "ECC", for error correction. Higher levels of error correction allow the correction of greater potential symbol damage. |

| TERM | DEFINITION |
|---|---|
| **Error Detection** | The automatic determination that a decoded message's content is incorrect. Error detection will keep the two-dimensional symbol from being decoded as erroneous data. |
| **Error Detection Characters** | Symbol characters that are reserved for error detection. These characters are calculated automatically from other symbol characters. |
| **Goods** | A term that refers to raw material and/or produced parts. |
| **Human Readable Interpretation** | The human readable letters, digits or other characters representing the data encoded in/and printed along with the linear bar code or 2D symbol. |
| **ID** | Abbreviation for Identification. |
| **Item** | A single part or material purchased, manufactured and/or distributed. |
| **Label** | A piece of paper, plastic, card stock or metal that is marked (by printing or some other means) and attached to an object to convey information. |
| **Labeller** | A term to identify the organization responsible for the labeling of a container, Unit Load or Transport Package. |
| **Labeling Area** | Area on the label available for printing. |
| **Label Provider** | See Labeller |
| **License Plate** | A license plate is assigned to a transport unit by its issuer. Any license plate issuer shall be authorized by an issuing agency in accordance with the rules set up by that agency, ISO/IEC 15459-1, and ISO 15394. Issuing agencies are authorized and registered by the Registration Authority.<br>A license plate number:<br>**a)** shall start with a string of characters, the issuing agency code (IAC), assigned to the issuing agency by the Registration Authority;<br>**b)** shall conform to a format specified by the issuing agency;<br>**c** this character string shall not be repeated within 365 days to a single customer;<br>**d)** shall contain only numeric and upper case alphabetic characters;<br>**e)** shall not contain more than 22 characters. |
| **Like Parts** | Same part/item number. |

| TERM | DEFINITION |
|---|---|
| **Linear Symbol** | A one-dimensional bar code Symbol, such as Code 128. An array (linear sequence) of variable width rectangular bars and/or spaces, arranged in a predetermined pattern, following specific rules, to represent elements of data; these bar and space patterns are referred to as characters. A bar code symbol typically contains a leading quiet zone, a start character, data character(s) including a check character (if any), a stop character and a trailing quiet zone. |
| **Lot** | A quantity of homogeneous material either manufactured or received. |
| **Manufacturer** | Actual producer or fabricator of an item; not necessarily the supplier in a transaction. |
| **Master Load** | A multiple pack or unit load of common items (sharing a single part number), such as a pallet. |
| **Message** | A continuous stream of data elements, including formatting characters and delimiters, to be encoded in a (two-dimensional) symbol or set of symbols. |
| **Message Envelope** | A pair of elements consisting of a Message Header and a Message Trailer that delimits the start and end of a data stream in a given message. |
| **Message Header** | A character or group of characters that defines the start of a Message Envelope. |
| **Message Trailer** | A group of character used to identify the end of a Message Envelope. |
| **Mixed Load** | A multiple pack or unit load of mixed items (different part numbers), such as a mixed-container pallet. |
| **Normative** | Establishing a norm or standard. |
| **Pack, Package or Load** | A transport package (container) that provides protection and containment of items plus ease of handling by manual or mechanical means, for example: bags, cartons, pallets, bins and racks. |
| **Pallet** | A platform to hold unit loads, permitting stacking of materials and transport packages, and the movement of the materials as a single load. A pallet may be either expendable or returnable. |
| **Part** | An identifiable item that has a unique name and/or number assigned to it. |
| **Part Number** | A unique code that identifies a part, assembly, component or kit. |
| **PDF417** | Symbology that essentially consists of a stacked set of smaller linear (1D) bar codes. The symbology is capable of encoding the entire (256 character) ASCII set. PDF stands for "Portable Data File" and can encode as many as 2725 data characters in a single bar code |

| TERM | DEFINITION |
|---|---|
| **Quantity** | On a label, the marking that indicates the number of parts or items or the amount in any other unit of measure that is contained within the package. |
| **Quiet Zone** | Areas free from interfering markings surrounding a bar code symbol and, in particular, preceding the start character and following the stop character. Also referred to as "light margin" or "clear area". |
| **QR Code** | QR Code is a matrix code (or two-dimensional bar code) created by Japanese corporation Denso-Wave. |
| **Reader** | A device consisting of a scanner and a decoder. |
| **Scanner** | An electronic device to collect and convert reflected light from the elements (e.g., bars and spaces in linear symbols) of a symbol into electrical signals for processing by the decoder. |
| **Serial Number** | A string of numeric or alphanumeric characters in the issuer's information system used for uniquely identifying an individual transport unit. This character string shall not be repeated within 365 days to a single customer. |
| **Shall/Should** | In this document, the word "shall" indicates a requirement and the word "should" indicates a recommendation. |
| **Ship From** | On a transport label, the address of the location where the carrier will return the shipment if the container is undeliverable. |
| **Ship To** | On a transport label, the address of the location where a carrier will deliver the shipment. |
| **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** | A graphic array of light and dark elements that forms a complete scanable entity. |
| **Symbology** | A standard means of representing data in optical readable form. Each symbology specification sets out its particular rules of composition or symbol architecture. |
| **Syntax** | The way in which data are combined to form messages. Syntax includes rules governing the use of appropriate identifiers, delimiters, separator character(s) and other non-data characters within the message. Syntax is the equivalent of grammar in spoken language. |
| **Tag** | A label (card) that is attached to a shipping container. |

| TERM | DEFINITION |
|---|---|
| **Trading Partner** | Any organization in a customer/supplier relationship. All members within the channels of distribution within an industry (suppliers, carriers, customers and intermediaries). |
| **Transport Unit** | One or more transport packages or other items held together by means such as strapping, interlocking, glue, shrink wrap, or net wrap, making them suitable for transport, stacking, and storage as a unit. |
| **Two-Dimensional Symbol** | A machine-readable symbol that must be examined both vertically and horizontally to read the entire message. A 2D symbol may be one of two types of machine-readable symbols: a Matrix Symbol or a Stacked Symbol. 2D symbols differ from linear bar codes in that they have the capability for high data content, small size, data efficiency, and error correction. |
| **UN/EDIFACT** | United Nations/EDI For Administration, Commerce, and Transport. The acronym for the international data standard for electronic business messages. |
| **Unit Load** | One or more transport containers or other items held together by means such as strapping, interlocking, glue, shrink wrap or net wrap, making them suitable for transport, stacking and storage as a unit. |
| **X Dimension** | The intended width of the narrowest elements (for bar codes or two-dimensional symbols) required by the application, symbology specification, or both. |
| **Y Dimension** | The intended height of the elements dictated by the application, symbology specification, or both. |

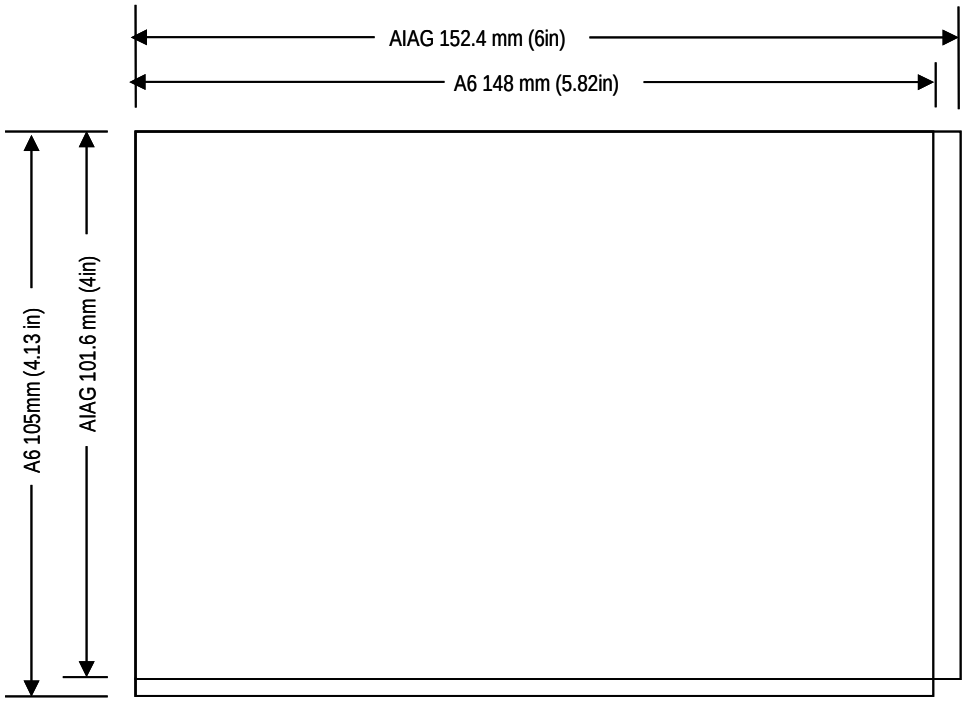
# 2 LABEL CONCEPTS

This section defines a standardized label concept for the Global Transport Label (GTL). It is intended to serve as the preferred format for those developing or revising unit load and transport container labels in order to provide a universally accepted format for the global automotive supply chain.

## 2.1 LABEL SIZE

The GTL is designed around ISO A6 label; 148 mm x 105 mm (5.82 inches x 4.13 inches) and the AIAG B-10 152.4 mm x 101.6 mm (6 inches x 4 inches). For the purposes of this document, the ISO A6 and the AIAG B-10 are considered the same size label.

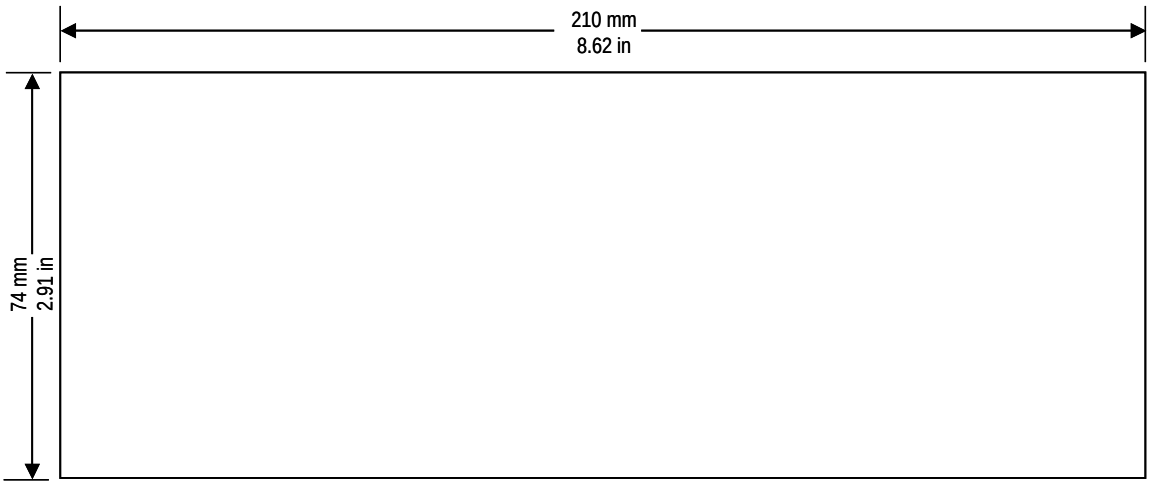
The label provider shall determine a label that shall not be smaller than these recommended minimums.




*Not to scale - for illustrative purposes only.*

**Figure 2 Global Transport Label Size**

This standard also describes an alternative label with dimensions of 210 mm x 74 mm (8.26 inch x 2.91 inch) and identical data content, designed for small height packages. Because of European requirements for label holders, a non-printable area, as illustrated in Figure 6, shall be maintained in order for the printable area not to be obstructed by the holder. Format for this label size shall follow the specifications of this standard. This label is referred to as Reduced Height (see Figure 3).




*Not to scale - for illustrative purposes only.*

**Figure 3 Global Transport Label Size – Reduced Height *(Alternate format to be used at supplier's option when shipping parts in small containers)***

## 2.2 BUILDING BLOCK CONCEPTS

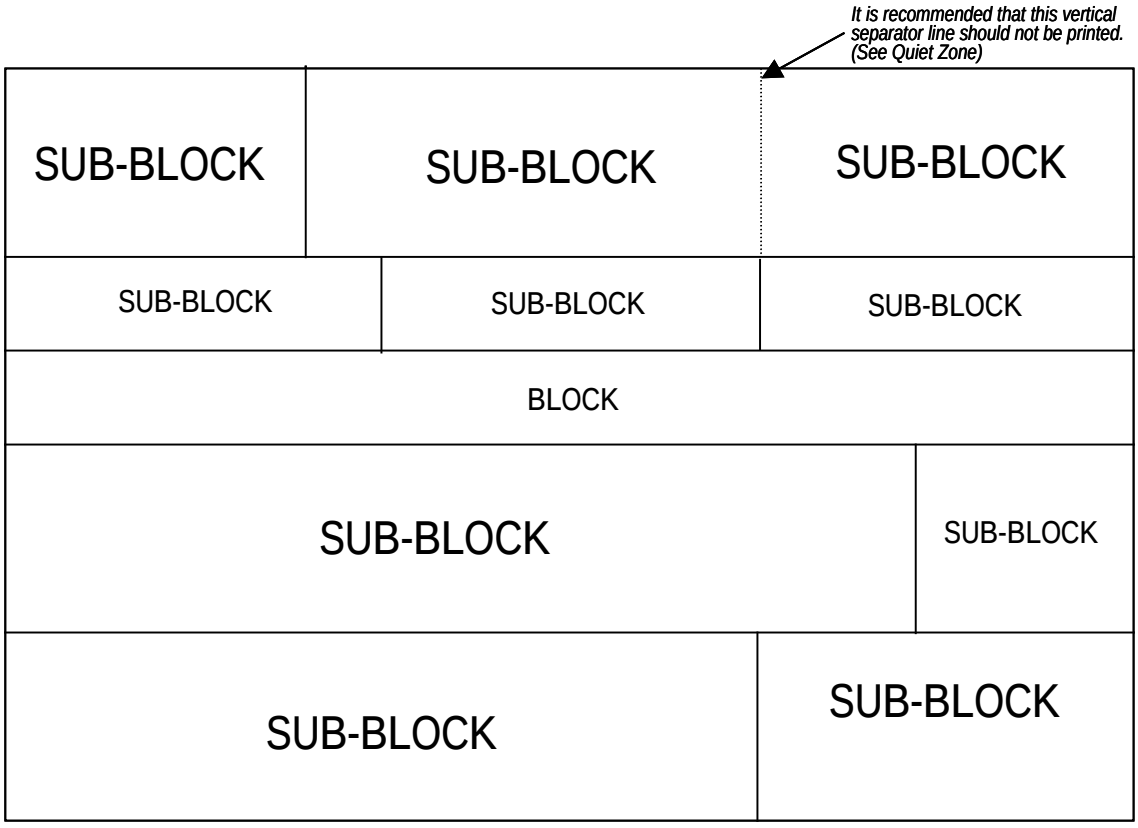
The following template describes the distribution of data within the active part of the label:

- the label is divided into horizontal blocks or sub-blocks
- each block or sub-block may be left blank or may contain:
  - text
  - graphics, and/or
  - a single bar code or 2D symbology(ies)

Data content shall not exceed the stated block/sub-block physical limits.

Building blocks shall be stacked vertically.

Building blocks should be separated by a horizontal line.




*Not to scale – for illustrative purposes only*

**Figure 4 Building Block Concepts**

# 3 GENERAL: GLOBAL TRANSPORT LABEL TEMPLATE DESCRIPTION BLOCKS AND SUB-BLOCKS

This section defines the label requirements for the Global Transport Label (GTL). It is intended to serve as the format for those developing or revising unit load and transport container labels for the automotive industry.

The following diagrams define the template and description of each block and sub-block for both the GTL and the small height label. If any block or sub-block is not used as designated, it shall be left blank.

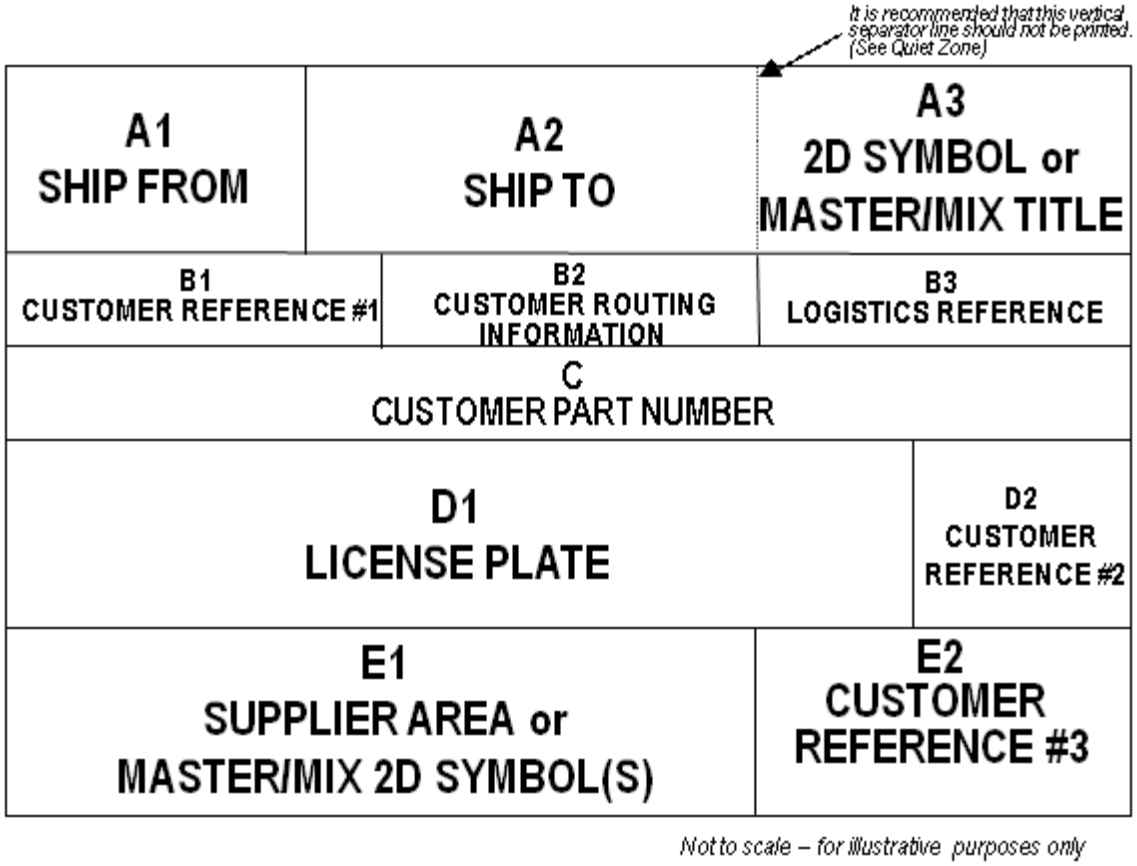



**Figure 5 Blocks and Sub-blocks**

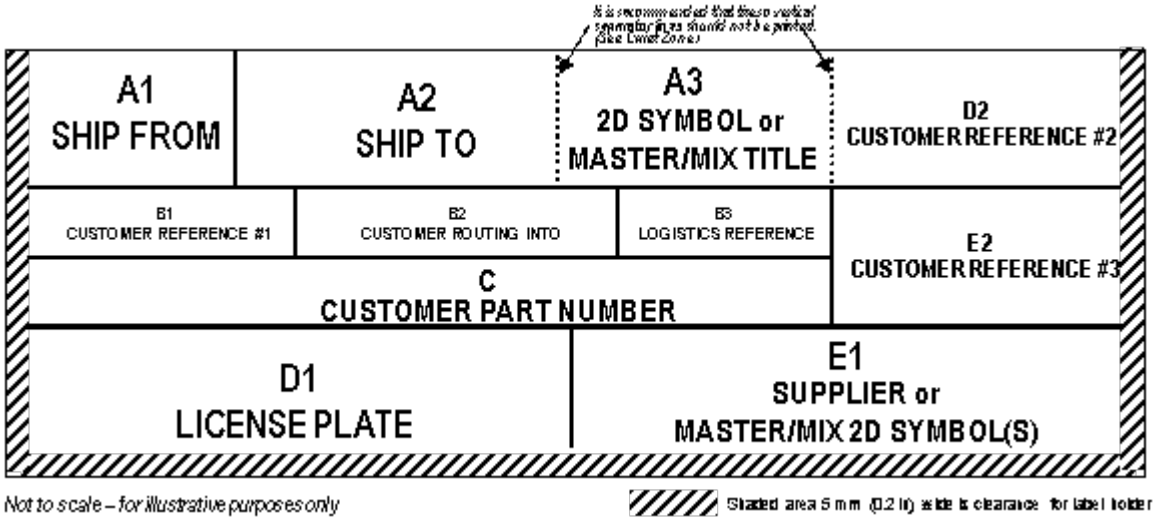



**Figure 6 Reduced Height Label - Blocks and Sub-blocks** ***(Alternate format to be used at supplier's option when shipping parts in small containers)***

## 3.1 Dimensions

For ease of showing the minor differences in label size between the ISO A6 148 mm x 105 mm (5.82 x 4.13 inch) and the AIAG B-10 152.4 mm x 101.6 mm (6 inch x 4 inch), the reference point for measurements in this standard will be the upper left-hand corner (0,0).

The height for a full building block shall be 25.4 mm (+/- 5 mm) or 1 inch (+/-0.2 inch). A half-height building block shall be 12.7 mm (+/- 5 mm) or 0.5 inch (+/- 0.2 inch). See Figure 7and 8.

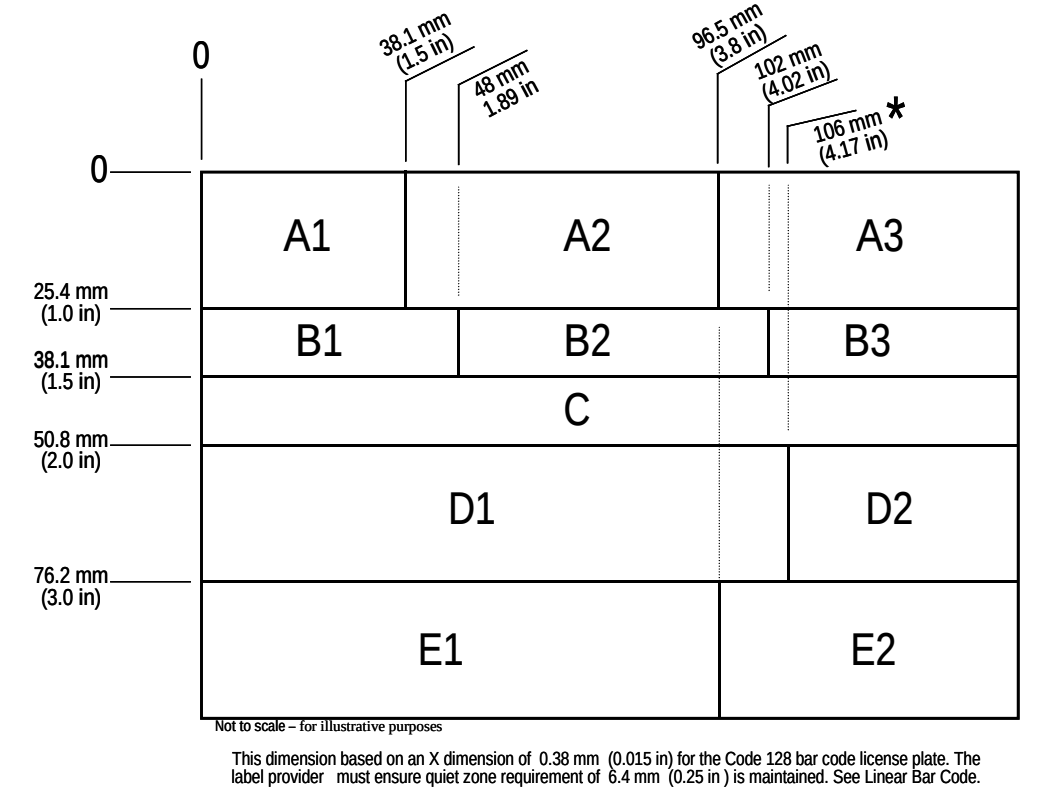



**Figure 7 Global Transport Label Dimensions**

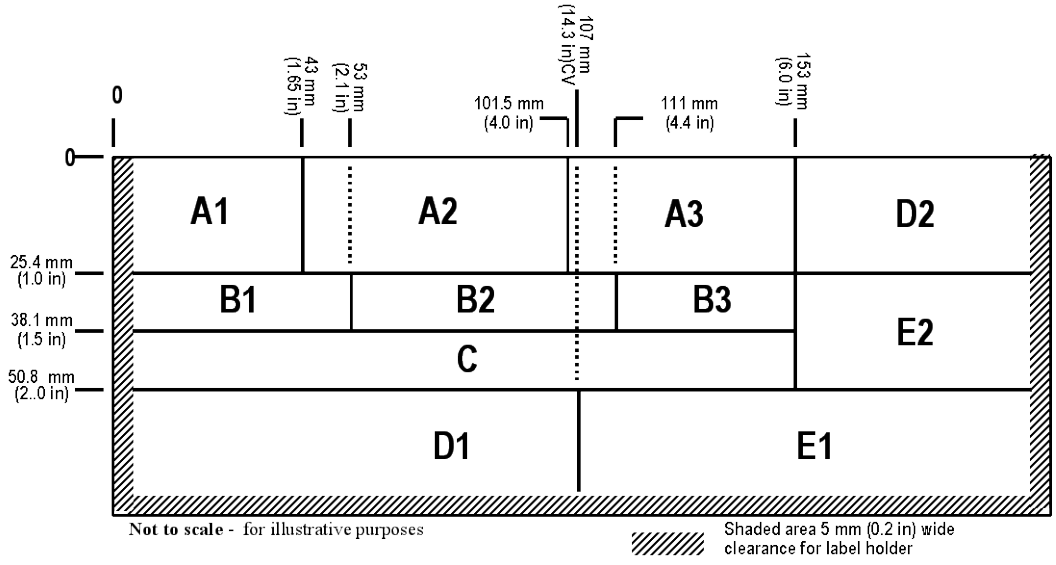



**Figure 8 Reduced Height Global Transport Label Dimensions**

74 mm (3”) x 210 mm (8”) label or equivalent *(Alternate format to be used at supplier’s option when shipping parts in small containers)*

# 4 TECHNICAL SPECIFICATIONS

## 4.1 Materials

The GTL shall be white substrate with black print. Card/tag stock is typically buff/off-white in color and is considered white for this document. Color adds cost and complexity and may affect the scannability of the bar code or two-dimensional symbol.

Because not all printers and/or software support reverse print capability - white 

on a black background shall not be used.

## 4.2 Printing Requirements

### 4.2.1 General Remarks

It is important that the linear bar code and two-dimensional symbol be decodable throughout the system of use. For this reason quality tests should not be limited to label production inspection, but should also be followed through to the point of use. The symbol quality and measurement parameters should ensure scannability over a broad range of scanning environments. To ensure that scannability, the goal is to have received print quality at the point of use (e.g., in production, or at receiving) be higher than the requirements for the print quality at the point of use.

Unattended scanning may require a higher print quality grade than that identified above. Consequently, those implementing this standard for unattended applications should discuss print quality requirements with the labeler.

To reduce errors associated with the mislabeling of containers, on-demand printing should be placed as close as possible to the point of application. Studies have shown that batch, central printing and pre-printed labels have higher error rates associated with mislabeling (wrong label on the container). Thermal direct, thermal transfer, and laser printers demonstrate the most consistent results for symbol print quality and text uniformity.

### 4.2.2 Fonts

- All fonts on the GTL shall be **bold UPPER CASE** for readability.
- Fonts shall be Arial Narrow, Helvetica Condensed, or equivalent.
- Color fonts shall not be used. Italics shall not be used.
- Font size selection shall accommodate the data to be printed (text wrap not allowed).
- Human readable text shall be left justified.

*Caution: Actual text dimensions and number of characters that can be printed depends on the font used and the capability of the label printer and software.* Arial Narrow Bold *is used in all drawings in this document and the suggested number of characters is based on the Arial*

*Narrow Bold font. The same font size may vary between printers due to several factors, including printer resolution.*

### 4.2.3 Titles

Titles should be used only when necessary to clarify the data content. When a title is used in a text building block, it shall be printed in the upper left of the building block or sub-block in **bold UPPER CASE** characters at a height of 6 point, 1.5 mm (0.06 inches), two lines maximum, left justified.

## 4.3 Linear Bar Code

The linear symbology used in this standard shall be Code 128 as described in ISO/IEC 15417. The print quality for information encoded in the Code 128 symbol shall comply with ISO/IEC 15416 for bar code print quality. In addition:

- The Code 128 symbol shall be left justified, allowing for a quiet zone at each end of the symbol of at least 6.4 mm (0.25 inches).
- The character set employed shall be the upper case alphabetic characters A to Z and the numeric digits 0 to 9. If the ANS MH10.8.2 data element recommends a "+" as a concatenation character, such a "+" character is also permitted in such a context.
  The minimum height of the symbol shall be 13 mm (0.5 inch).
- Non-significant zeros and spaces shall be omitted.
- The dimension of the narrowest element (X dimension) should be between 0.330 mm (0.013 inch) and 0.432 mm (0.017 inch) as determined by the printing capability of the supplier's printer. Conformance to the print quality requirements shall be determined in accordance with ISO/IEC 15416.
- The minimum symbol grade, at the point of customer scan, shall be "C"; 1.5/10/660, where:
  - 1.5 is the minimum print quality at the point of customer scan,
  - 10 (0.254 mm) is the measurement aperture, and
  - 660 (660 nanometers [nm] +/- 10 nm) is the wavelength of the light source used to do the inspection.

## 4.4 Two-Dimensional Symbol

### 4.4.1 Symbology Requirement

Three 2D symbologies are approved for this application; the label provider shall choose which symbology to print with customer concurrence.

#### *4.4.1.1 Data Matrix*

The Data Matrix ECC 200 two-dimensional symbology shall be used in accordance with ISO/IEC 16022 Data Matrix - Symbology Specification

**Figure 9 - Data Matrix ECC 200 0.51 mm (0.020 inch)**

### *4.4.1.2 QR Code*

QR Code, with ECC M, two-dimensional symbology shall be used in accordance with ISO/IEC 18004 QR Code– Symbol Specification.

**Figure10 - QR Code ECC M 0.38 mm (0.015 inch)**

### *4.4.1.3 PDF417*

PDF417, with ECC 3, 12 column two-dimensional symbology shall be used in accordance with ISO/IEC 15438 PDF417–Symbology Specification. Truncated PDF417 and Macro PDF417 shall not be used.

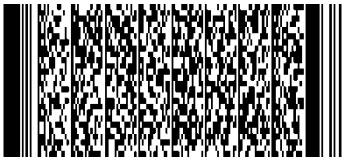


**Figure 11 - PDF417 ECC 3 0.254x 0.762 mm (0.010 x 0.030 inch)**

| Note: The encoded data used in figures 2, 3 and 4 use 06 Macro (represented by ~6) to save 8 data characters. The following is the encoded data used: |
|---|

~6P1A2B3C4D5E6F7G$^{G}_{S}$Q999$^{G}_{S}$1JUN123456789A2B4C6D8E$^{G}_{S}$

20LA2B4C6D8E1F3G5$^{G}_{S}$21LA2B4C6D8E$^{G}_{S}$7Q999GT$^{G}_{S}$15KA2B4C6D8E$^{G}_{S}$

BKLT1734$^{G}_{S}$14D03052001$^{G}_{S}$1TA2B4C6D8E1F3G5H7$^{G}_{S}$ 17D01012001

*(146 characters with macro 06 verses 154 characters without macro 06)*

Data Content used in this example is as follows:

- (P) Customer Part Number
- (Q) Quantity assumed pieces
- (1J) License Plate (Individual Container, Supplier's DUNS and serial number assigned by supplier)

- (20L) Customer receiving location
- (21L) Customer internal location
- (7Q) Gross Weight, qualifier GT for Gross Kilograms
- (15K) KANBAN number
- (B) Container type
- (14D) Expiration date
- (1T) Supplier traceability identification (lot, batch, heat, etc.)
- (17D) Production date

### 4.4.2 X Dimension

For the purposes of this document, the X dimension shall refer to the individual square element/cell size (sometimes referred to as a dot) for Data Matrix and QR Code. PDF417 consists of rectangular elements that shall have a minimum bar height (height of the symbol element) of three (3) times the width of the narrow element (X dimension).

### 4.4.3 Symbol Size

The actual achieved size of a Data Matrix, QR Code or PDF417 symbol may vary based on data content, element/cell X dimension and the printing process/capability.

### 4.4.4 Quiet Zone

The minimum quiet zone for Data Matrix shall be two (2) times the element/cell X dimension.

The minimum quiet zone for QR Code shall be four (4) times the element/cell X dimension.

The minimum quiet zone for PDF417 shall be two (2) times the element/cell X dimension.

### 4.4.5 Error Correction Level

Data Matrix: ECC200 signifies the use of a Reed-Solomon algorithm for error correction and has become the standard used within the automotive and in many other industries.

QR Code: ECC M is the recommended Reed-Solomon algorithm for error correction.

PDF417: ECC 3, 4 or is the recommended Reed-Solomon algorithm for error correction. Use the highest level the space will allow.

### 4.4.6 Print Quality

ISO/IEC 15415 *Bar Code print quality test specification –Two-dimensional symbols* shall be used to determine the print quality of the Data Matrix, QR Code and PDF417 symbologies. The minimum symbol grade should be “C”, 1.5/10/660, where:

- Minimum Print Quality grade = 1.5 (C) at the customer’s point of scan
  - Recommended Print Quality grade 2.5 (B) at the point of printing the symbol
- Measurement Aperture = 0.254 mm (0.010 inch)
- Inspection Light Source Wavelength = 660 nanometers (nm) ± 10 nm

# 5 INDIVIDUAL CONTAINER LABEL DATA IDENTIFIER 1J

The License Plate number that uniquely identifies the lowest level of packaging identification is Data Identifier 1J. That is, 1J identifies the unbreakable unit, e.g., cartons of articles, individually or bundled together to form a transport unit. Typically referred to as an "Individual Container".

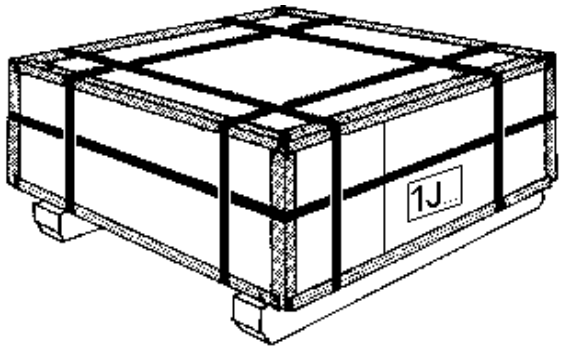



**Figure 12 - Data Identifier '1J' Individual Container of Like Parts**

## 5.1 A1 – SHIP FROM

| | |
|---|---|
| Function | To provide information about the Sender and Country of Origin of the goods/materials. |
| Title: | SHIP FROM |
| Number of Lines: | Maximum of six (6) lines of data |
| Font Size: | 10 Point, 2.5 mm (0.10 inch) |

Content Required:

- Company Name
- Company Address

Content Optional:

- Contact phone number or email address
- Country of Origin for Content Requirements such as
  - MADE IN or
  - ASSEMBLED IN

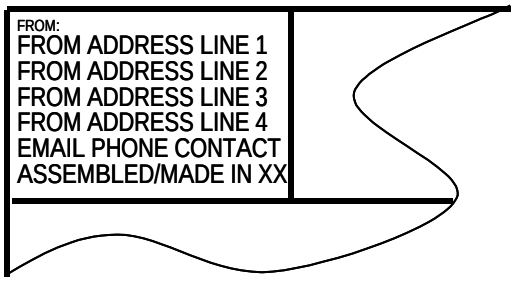



**Figure 13 Six line SHIP FROM Address**

## 5.2 A2 – SHIP TO

Function: To provide information about the receiving party. Included in the address information is the Receiver's Plant / Dock code, if applicable.

Title: SHIP TO

Number of Lines: Maximum of four (4) lines of address data, plus one (1) line for Plant / Dock code

Font Size: 12 point, 4.3 mm (.17 inch)

Content Required:

- Company Name (maximum one line)
- Company address (maximum three lines)

Content Optional:

- Plant and/or Dock (maximum one line)

Title: **PLANT / DOCK**

Font Size: Plant / Dock – 18 point 6.4 mm (.25 inch)

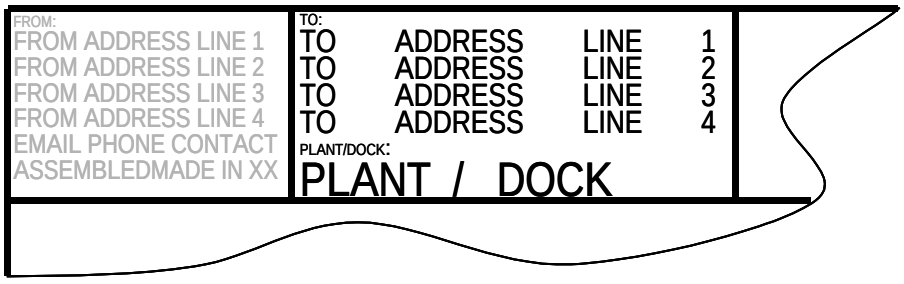



**Figure 14 Four line SHIP TO Sub-Block with PLANT / DOCK Data**

## 5.3 A3 –Two-Dimensional Symbol – Data Matrix, QR code or PDF417

Function: To allow significant machine-readable data, that has been selected through trading partner agreement, to be used in the supply chain. The objective of the two-dimensional symbol is to convey a message structured according to ISO 15434, *Information technology — Automatic*

*identification and data capture techniques — Syntax for high-capacity ADC media*. See Annex B.

Title: No title shall be used.

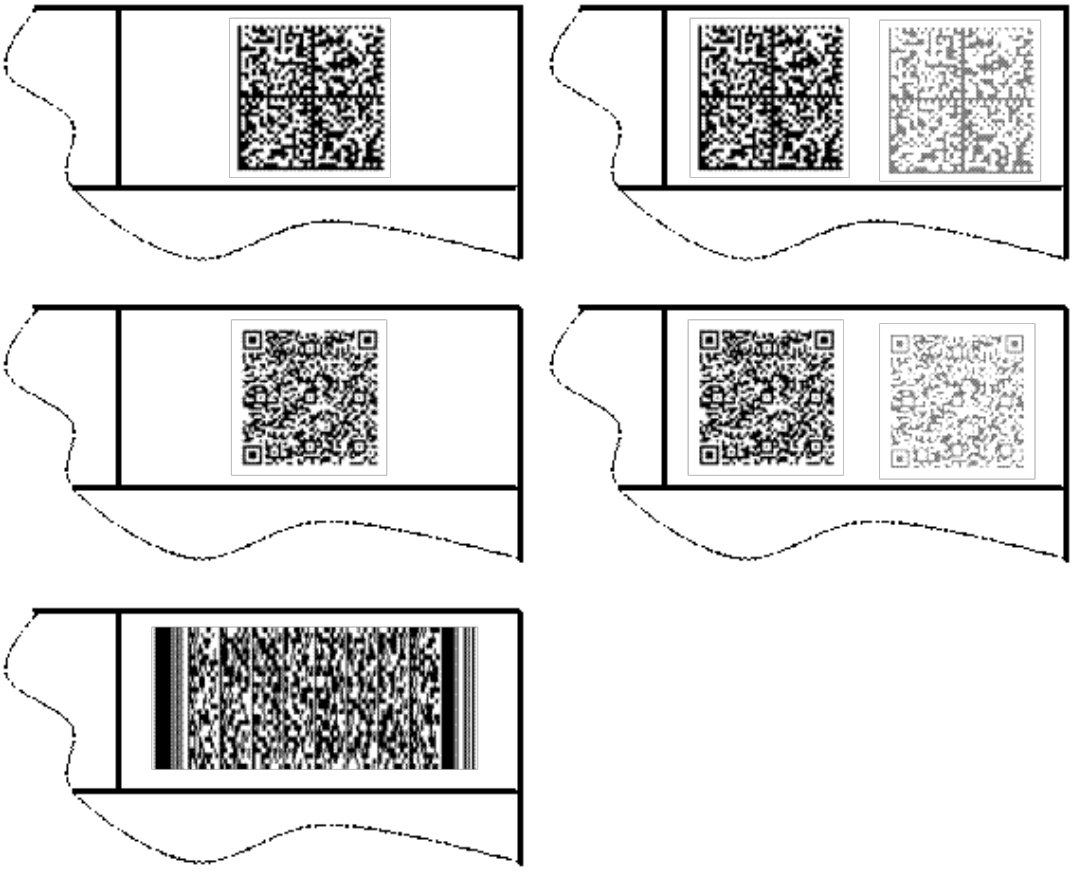


**Figure 15 Examples top to bottom-Data Matrix, QR Code and PDF417**

Note: It is possible to use two Data Matrix or QR Code symbols using Structured Append (See ANNEX E) to accommodate large amounts of data or gain enhanced scan distance

Example of data encoded in a single 2D symbol:

~6P1A2B3C4D5E6F7G$^{G}_{S}$Q999$^{G}_{S}$1JUN123456789A2B4C6D8E$^{G}_{S}$
20LA2B4C6D8E1F3G5$^{G}_{S}$21LA2B4C6D8E$^{G}_{S}$7Q999GT$^{G}_{S}$15KA2B4C6D8E$^{G}_{S}$
BKLT1734$^{G}_{S}$14D03052001$^{G}_{S}$1TA2B4C6D8E1F3G5H7$^{G}_{S}$ 17D01012001

Example of data encoded into two 2D symbols using **Structured Append** (See ANNEX E):

**Symbol 1:** ~6P1A2B3C4D5E6F7G$^{G}_{S}$Q999$^{G}_{S}$1JUN123456789A2B4C6D8E$^{G}_{S}$
20LA2B4C6D8E1F3G5$^{G}_{S}$21LA2B4C6D8E$^{G}_{S}$7Q999GT~**2015654321**
**Symbol 2:** ~615KA2B4C6D8E$^{G}_{S}$BKLT1734$^{G}_{S}$14D03052001$^{G}_{S}$
1TA2B4C6D8E1F3G5H7$^{G}_{S}$ 17D01012001~**2031654321**

## 5.4 B1 – CUSTOMER REFERENCE #1

Function: To convey human readable reference information.

> Note: If information is unavailable for this sub-block, it shall be left blank and shall not be used for any other purpose.

Line Titles: Customer to specify, if required.

Number of Lines: Maximum of three (3) lines

Data Font Size: The labeler shall use the largest font practical for the information being printed. All data content within this sub-block shall use the same font size (see Figures 12 and 14).

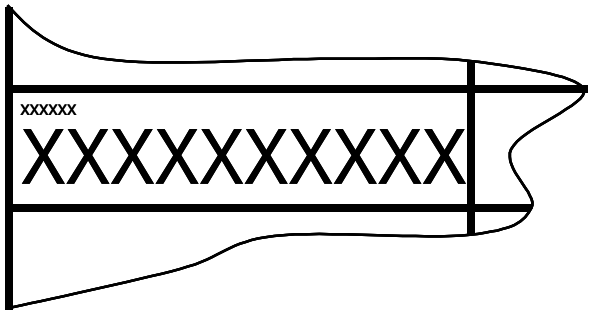



**Figure 16 One line (24 point) with title**

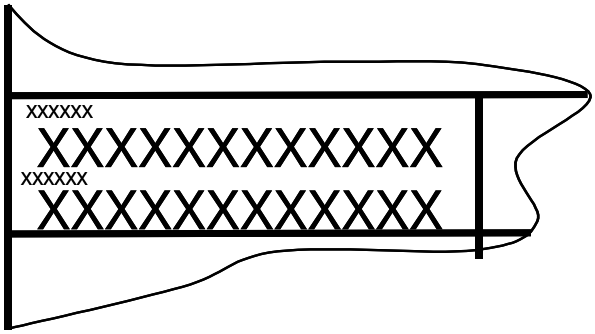



**Figure 17 Two lines (18 point)**

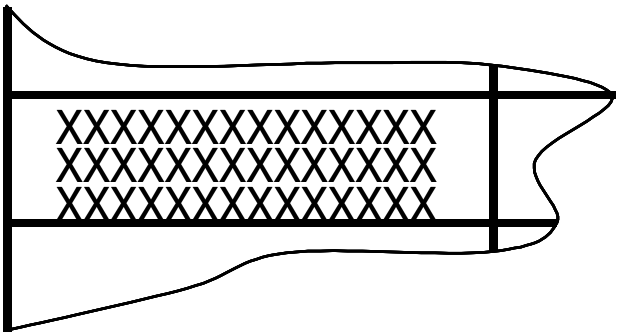



**Figure 18 Three lines (14 point)**

Content Examples:

1. Purchase Order Number
2. KANBAN Number
3. Pickup Sheet Number
4. Release Number
5. Sequence Number
6. Shipment Identification Number (SID, ASN, etc.)
7. Dispatch Advice Number
8. Customer Assigned Supplier ID
9. Quantity (Optional in the B1 sub-block, recommended in the D2 sub-block)

## 5.5 B2 – CUSTOMER ROUTING INFORMATION

Function: To convey customer-supplied, text-only data for customer's internal routing.

| Note: If information is unavailable for this sub-block, it shall be left blank and shall not be used for any other purpose. |
|---|

Line Title: Customer to specify, if required. (Example: MATERIAL HANDLING CODE, INTERNAL ROUTING INFORMATION)

Number of Lines: Maximum of two (2) lines. The second line is for data overflow only.

Data Font Size: The labeler shall use the largest font practical for the information being printed. All data fonts shall be the same size.


**Figure 19 One Line of Human Readable (24 point)**

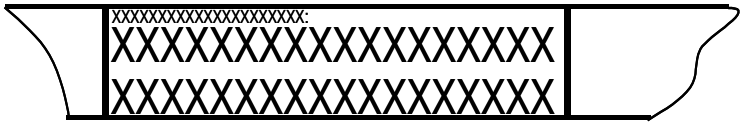



**Figure 20 Two Lines of Human Readable (16 point)**

Content examples:

- Storage Location
- Material Handling Routing Code
- Inspection Area
- Line-side-feed Location
- Staging Site

## 5.6 B3 – LOGISTICS REFERENCE

Function: To convey customer-requested logistic information.

| Note: If information is unavailable for this sub-block, it shall be left blank and shall not be used for any other purpose. |
|---|

Line Title: Customer to specify. (Example: POINT OF USE)

Number of Lines: Maximum of three (3) lines.

Data Font Size: The labeler shall use the largest font practical for the information being printed. All data fonts shall be the same size.

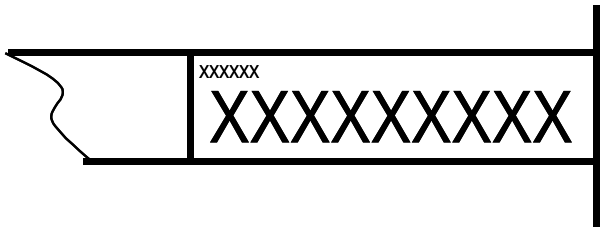



**Figure 21 One Line of Human Readable (24 point)**

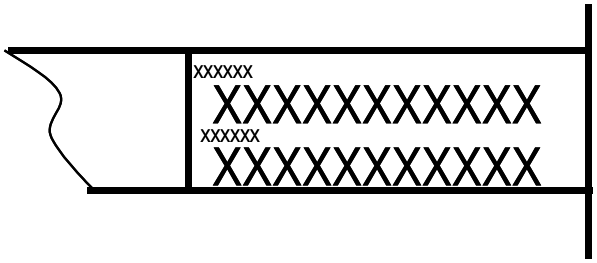



**Figure 22 Two Lines of Human Readable (18 point)**

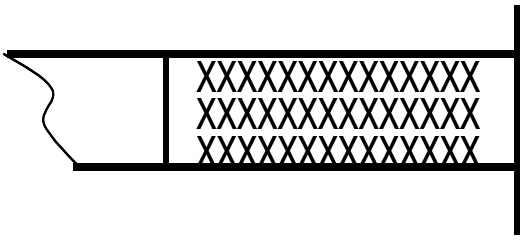



**Figure 23 Three lines of Human Readable (14 point)**

Content Examples:

- Point of Use
- VIN Number

## 5.7 C1- CUSTOMER PART NUMBER

Function: To convey the customer's part number, in human readable form, along with any applicable graphic (right justified).

Note: If information is unavailable for this sub-block, it shall be left blank and shall not be used for any other purpose.

Title: **PART NUMBER**

Number of Lines: Maximum one (1) line.

Data Font Size: Print the part number with the largest practical font size to ensure the maximum human readability.

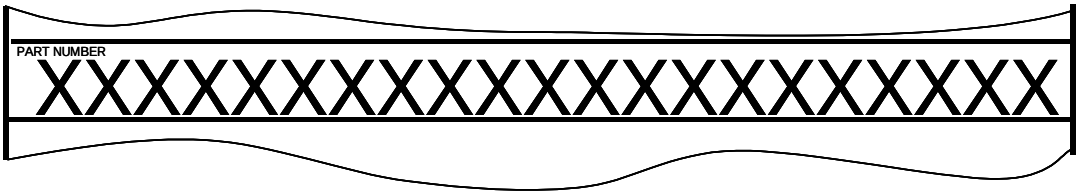



**Figure 24 Part number printed at 44 points**

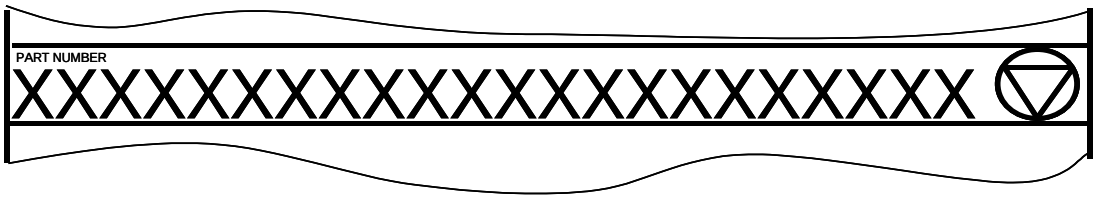



**Figure 25 Part Number Printed at 32 points with Safety-Related Graphic Symbol, Right Justified**

Content Required: Customer-specified part number

Content Optional: One right justified graphic symbol, associated with the part number, as specified on customer documentation. (Example: **SAFETY SYMBOL**).

| |
|---|
| Note - reference ISO 7000:2004 or ISO 7001:2007for black and white symbols some of which may require a royalty. |

Graphic size: Right justified graphic should not exceed 12.75 mm x 12.75 mm (0.5 x 0.5 inch).

## 5.8 D1 – LICENSE PLATE Data identifier 1J Individual Container

Function: To provide a required unique identification of the transport unit and enable systems to track and trace individual transport units, as described in ISO 15394. The identifier or "license plate" provides access to information stored in computer files and may be transmitted by EDI. The identifier may be used by all trading partners to retrieve information about the transport unit itself or about the status of the physical movement of the transport unit along the supply chain.

Title: **LICENSE PLATE** plus the appropriate Data Identifier (see Annex A)

Content Required: Bar code and human readable interpretation

Structure of the License Plate:

Data Identifier (DI = 1J): As described in Annex A. The DI shall be shown in parentheses after the title, and shall be one of the following:
1J - Unbreakable unit (Individual Container)

Issuing Agency Code: A unique company identifier issued by an agency acknowledged by ISO/IEC 15459 as a registration authority. The Issuing Agency Code shall be DUNS (UN), JIPDEC/ECPC (LA), or Odette (OD) If not specified by the customer, it is the suppliers' choice of which of the three Issuing Agency Codes to use.

Serial Number: A string of numeric or alphanumeric characters, generated by and maintained within the issuer's information system, used for uniquely identifying an individual transport unit. This character string shall not be repeated within 365 days.

Linear Symbology: Code 128 as described in ISO/IEC 15417. The minimum height of the bar code shall be 13 mm (0.5 inch)

Bar Code Print Quality: ISO/IEC 15416 shall be used. The minimum symbol grade shall be C (1.5) at the customer point of scan.

Human Readable Interpretation: A human readable interpretation of each linear bar code symbol shall be provided below the bar code.

The human readable interpretation shall be represented in bold UPPER CASE characters at a font size of 24 points, 6.1 mm (0.24 inches). Spaces may be inserted to facilitate visual processing, but shall not be encoded in the bar code.

Data Identifiers (DIs) shall not be printed in the human readable interpretation.

Symbology start and stop characters and the symbology check character are not part of the data and shall not be printed in the human readable interpretation.

Bar Code Placement: The linear bar code symbol shall be left justified, allowing for a quiet zone of at least 6.4 mm (0.25 inches) at both ends of the symbol.

Data Content: The total number of characters, including DI, shall not exceed 22. Non-significant zeros and non-significant space characters shall not be encoded in the bar code.


**Figure 26 License Plate Example**

*Assigning Authority OD=ODETTE*


**Figure 27 License Plate Example**

*Assigning Authority LA= JAPIA*


**Figure 28 License Plates Example**

*Assigning Authority UN=DUNS*

## 5.9 D2 – CUSTOMER REFERENCE #2

Function: To convey human readable information requested by the customer and known by the supplier.

| Note: If information is unavailable for this sub-block, it shall be left blank and shall not be used for any other purpose. |
|---|

| | |
|---|---|
| Number of Lines: | Maximum of four (4) lines. |
| Data Font Size: | The label provider shall use the largest font size practical for the information being printed. All data fonts shall be the same size. |
| Line Title: | Customer to specify, if required. (Examples: **QTY, SHIP DATE, REV, ENG. REL, LOT, BATCH, GROSS WEIGHT)** |

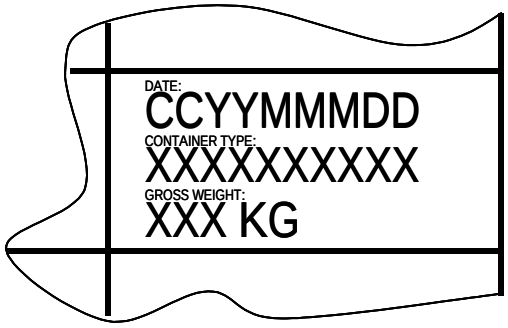



**Figure 29 Example of three lines of human readable data (20 point), with titles (6 point)**

Content Examples:

- Date (CCYYMMDD or CCYYMMMDD)
  - CCYY = Century, Year
  - MM = numeric designation of Month
  - MMM = alpha designation of Month as English abbreviation, e.g. FEB = February
  - DD = Date
  - Ship Date
  - Pack Date
  - Manufacturing Date
  - Use by Date
  - Expiration Date
- Container Type
- Quantity

## 5.10 E1 – SUPPLIER AREA

Function: This area is available for the supplier to use to support business/process requirements. The supplier may use human readable text, graphics, linear bar codes with Data Identifiers, or two-dimensional symbols using required data syntax as defined in ISO/IEC 15434. Only the supplier shall determine the information contained in this sub-block. If the supplier elects not to use this sub-block it shall be left blank and shall not be used for any other purpose.

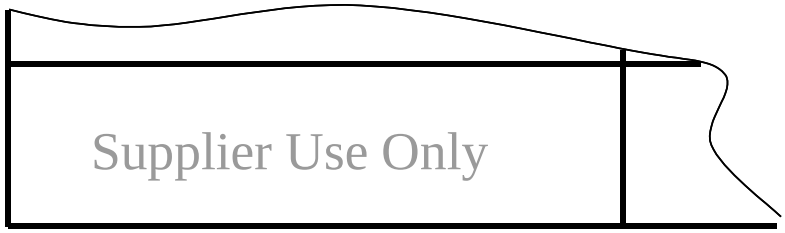



**Figure 30 For Supplier Use only, to support business/process requirements.**

## 5.11 E2 – CUSTOMER REFERENCE #3

Function: The customer may electronically provide data that supports their business/process requirements. Faxed or phoned information shall not be acceptable. The label issuer will print the received information without interpretation. The number of human readable text lines is fixed at five (5) and at a font size of 14 points, 5.1 mm (0.20 inches). If the transmitted information does not fit on the available line, the label provider shall truncate the data. If the customer elects not to use this sub-block, it shall be left blank and shall not be used for any other purpose.

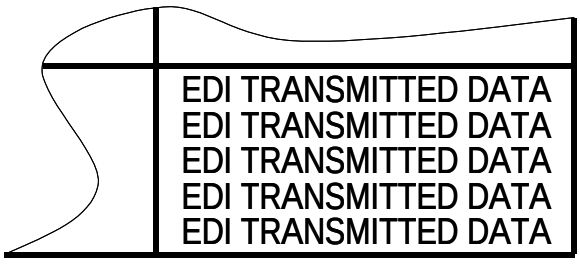



**Figure 31 Example of five lines of human readable (14 point) customer data transmitted via EDI.**

# 6 MASTER LABEL DATA IDENTIFIER 6J

The License plate number which uniquely identifies a transport unit containing multiple containers of like parts is Data Identifier 6J. For example, such a transport unit could be a pallet containing two or more identical DI "1J"-identified individual containers/packages. Typically referred to as a "Master Load Container".

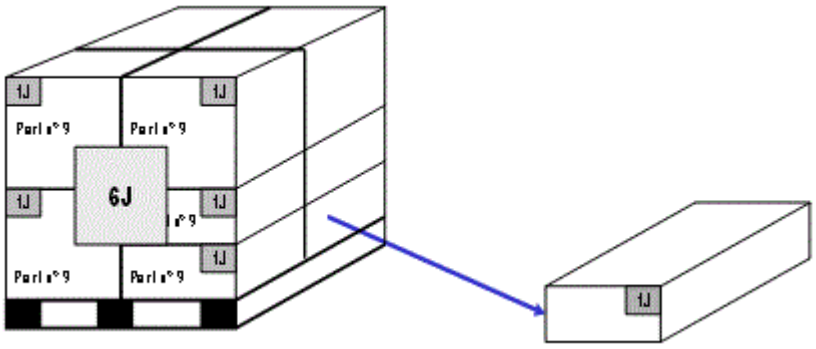



**Figure 32 – Example of Data Identifier '6J' MASTER LOAD on a container consisting of multiple individual containers of the same part number.**

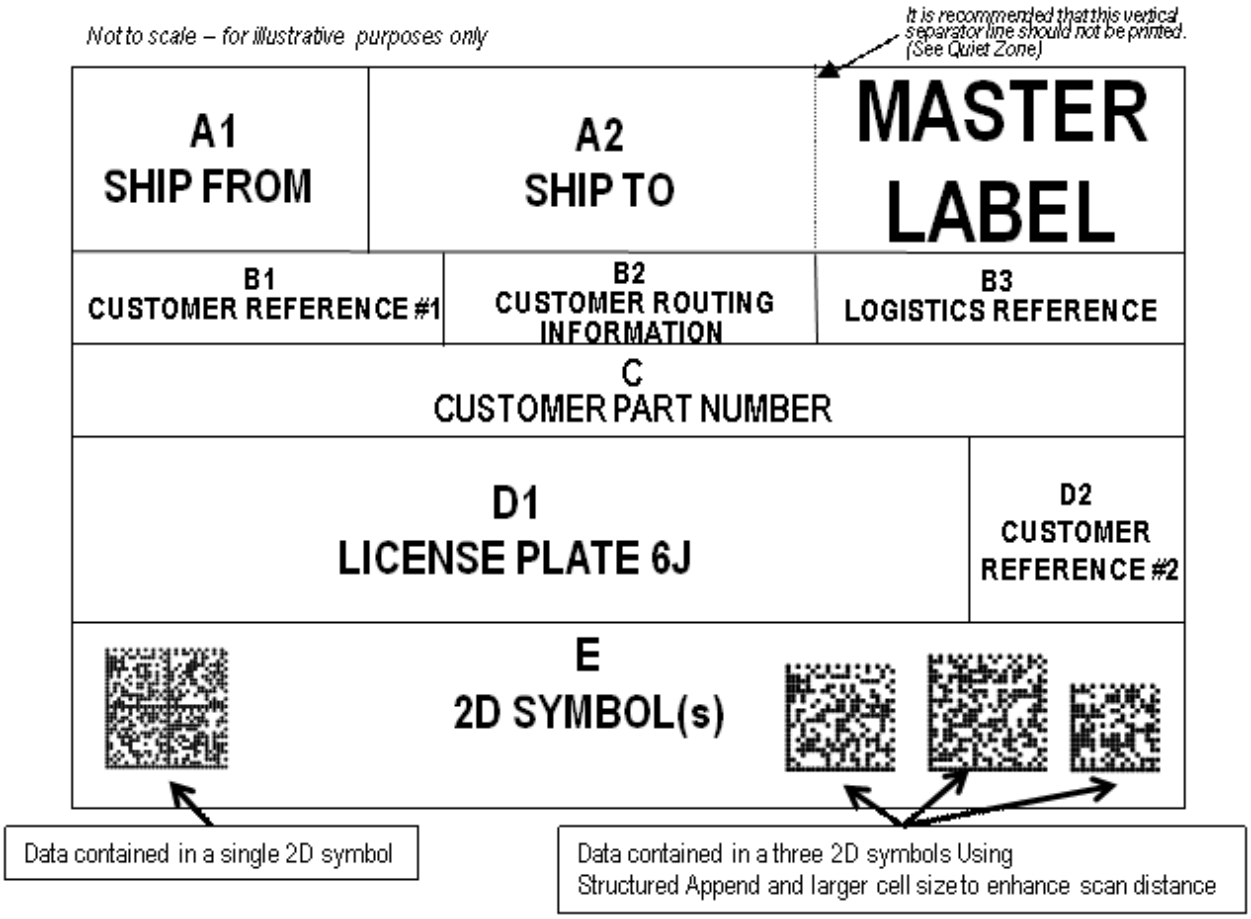



**Figure 33 - MASTER LOAD label blocks and sub-blocks**

## 6.1 A1 – SHIP FROM

Same as Individual Container Section 5.1.

## 6.2 A2 – SHIP TO

Same as Individual Container Section 5.2.

## 6.3 A3 –MASTER LOAD LABEL TITLE

Same as Individual Container Section 5.3

## 6.4 B1 – CUSTOMER REFERENCE #1

Same as Individual Container Section 5.4

## 6.5 B2 – CUSTOMER ROUTING INFORMATION

Same as Individual Container Section 5.5

## 6.6 B3 – LOGISTICS REFERENCE

Same as Individual Container Section 5.6.

## 6.7 C1- CUSTOMER PART NUMBER

Same as Individual Container Section 5.7

## 6.8 D1 – LICENSE PLATE Data identifier 6J MASTER LOAD CONTAINER

Same as Individual Container Section 5.8, except with Data Identifier 6J

## 6.9 D2 – CUSTOMER REFERENCE #2

Same as Individual Container Section 5.9

## 6.10 E1 – 2D Symbol(s)

Example of data encoded in a single 2D symbol:

~6P12345678$^{G}_{S}$Q1000$^{G}_{S}$7Q1000PL$^{G}_{S}$7Q10PK$^{G}_{S}$6JUN123456789A2B4C6D8E$^{G}_{S}$20LA6-987$^{G}_{S}$2SB03456789

Example of data encoded into two 2D symbols using **Structured Append** (See ANNEX E):

**Symbol 1:** ~6P12345678$^{G}_{S}$Q1000$^{G}_{S}$7Q1000PL$^{G}_{S}$7Q10PK~**2014654321**~6 6JUN123456789A2B4C6D8E$^{G}_{S}$20LA6-987~**2030654321**

**Symbol 2:** ~62SB03456789~**2046654321**

# 7 MIXED LOAD DATA IDENTIFIER 5J

The License plate number that uniquely identifies a transport unit containing multiple entities of unlike parts is Data Identifier 5J. For example, such a transport unit could be a pallet containing two or more dissimilar DI "1J"-identified items. Typically referred to as a "Mixed Load Container".

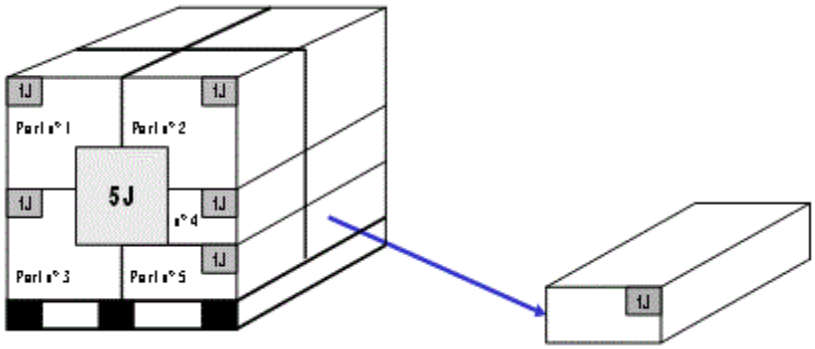



**Figure 34 - Example Data Identifier '5J' MIXED LOAD container consisting of more than one part number**

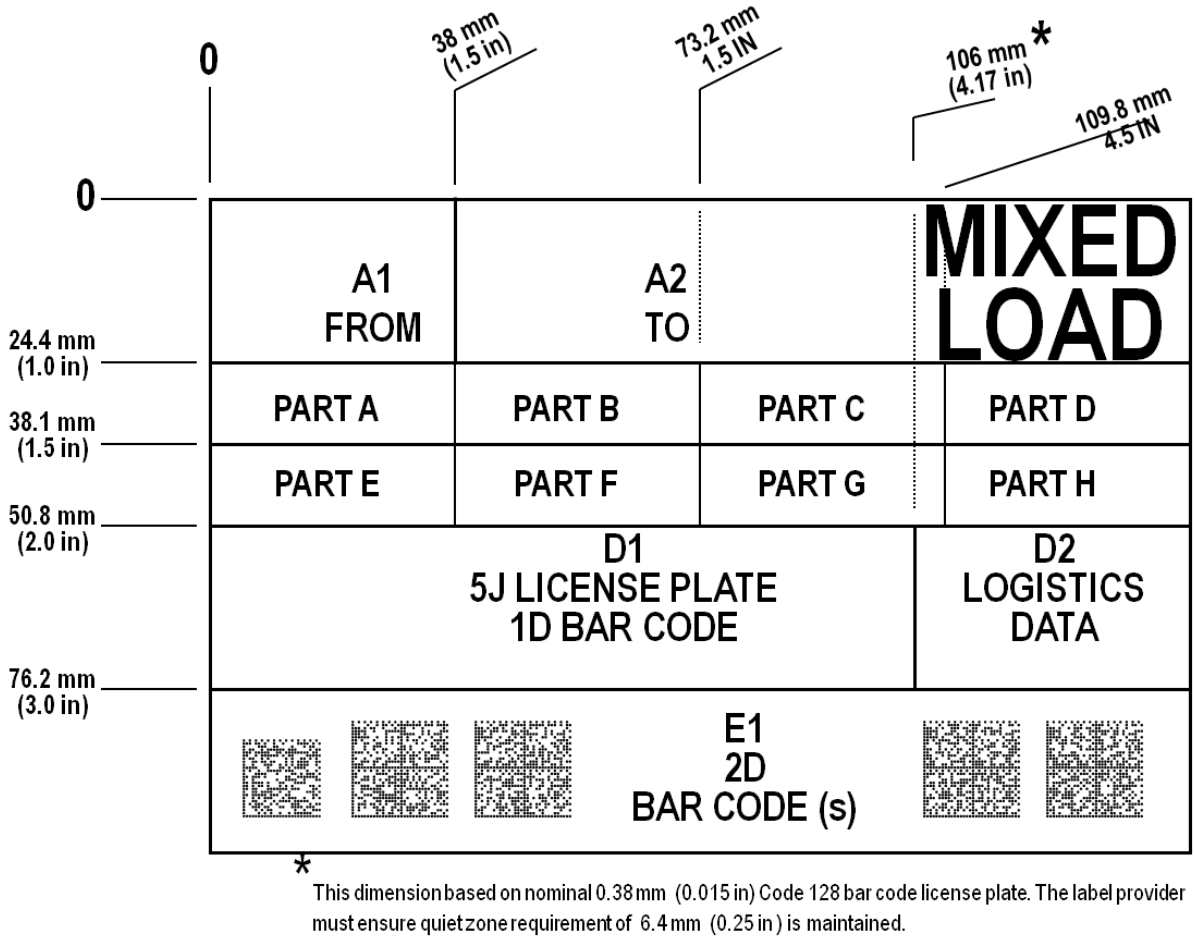



**Figure 35 - MIXED LOAD label blocks and sub-blocks**

## 7.1 A1 – SHIP FROM

Same as Individual Container Section 5.1.

## 7.2 A2 – SHIP TO

Same as Individual Container Section 5.2.

## 7.3 A3 –MASTER LABEL TITLE

## 7.4 PART A, B, C, D, E, F, G, H

The width and number of Part sub-blocks is dependent on the length of the part number field. Typical data content is:

- Part Number
- Total Quantity of Part Number
- Number of Individual Containers of Part Number
- Quantity of Part Number per Individual

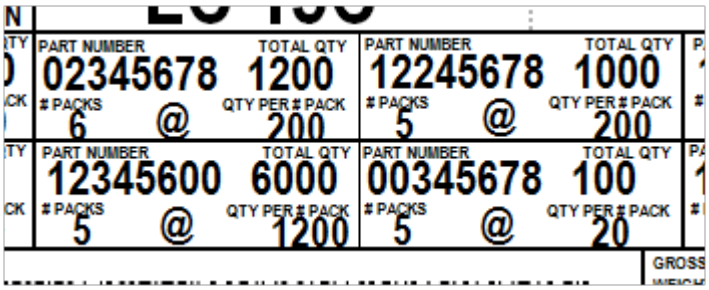



**Figure 36 - Example Part Number Sub-blocks data content**

## 7.5 D1 – LICENSE PLATE DATA IDENTIFIER 6J MASTER LOAD CONTAINER

Same as Individual Container Section 5.8, except with Data Identifier 6J

## 7.6 D2 – CUSTOMER REFERENCE #2

Same as Individual Container Section 5.9

## 7.7 E1 – 2D symbol(s)

Typical data content:

- 5J License Plate
- Gross Weight
- Plant/Dock
- Part Number A
  - Total Quantity Part A
  - Number of individual Packs of Part A
  - Quantity per Pack of Part A
- Part Number B
  - Total Quantity Part B
  - Number of individual Packs of Part B
  - Quantity per Pack of Part B
- Part Number C
  - Total Quantity Part C

  - Number of individual Packs of Part C
  - Quantity per Pack of Part C
- Part Number D
  - Total Quantity Part D
  - Number of individual Packs of Part D
  - Quantity per Pack of Part D
- Part Number E
  - Total Quantity Part E
  - Number of individual Packs of Part E
  - Quantity per Pack of Part E
- Part Number F
  - Total Quantity Part F
  - Number of individual Packs of Part F
  - Quantity per Pack of Part F
- Part Number G
  - Total Quantity Part G
  - Number of individual Packs of Part G
  - Quantity per Pack of Part G
- Part Number H
  - Total Quantity Part H
  - Number of individual Packs of Part H
  - Quantity per Pack of Part H

Example of encoded data using five 2D symbols linked using **Structured Append *(See ANNE E)***:

Symbol 1: ~65JUN123456789A2B4C6D8E$^{G}_{S}$7Q9999GT$^{G}_{S}$21LLC 15C~2012654321

Symbol 2: ~6P12345678$^{G}_{S}$7Q1000PL$^{G}_{S}$7Q5PK$^{G}_{S}$Q200RS06$^{G}_{S}$P02345678$^{G}_{S}$7Q1200PL$^{G}_{S}$7Q6PK$^{G}_{S}$Q200~2028654321

Symbol 3: ~6P12245678$^{G}_{S}$7Q1000PL$^{G}_{S}$7Q5PK$^{G}_{S}$Q200RS06$^{G}_{S}$P12045678$^{G}_{S}$7Q1000PL$^{G}_{S}$7Q10PK$^{G}_{S}$Q100~2044654321

Symbol 4: ~6P10345678$^{G}_{S}$7Q750PL$^{G}_{S}$7Q5PK$^{G}_{S}$Q150RS 06$^{G}_{S}$P12045600$^{G}_{S}$7Q6000PL$^{G}_{S}$7Q5PK$^{G}_{S}$Q1200~2060654321

Symbol 5: ~6P00345678$^{G}_{S}$7Q100PL$^{G}_{S}$7Q5PK$^{G}_{S}$Q20RS06$^{G}_{S}$P12005678$^{G}_{S}$7Q1000PL$^{G}_{S}$7Q5PK$^{G}_{S}$Q200~2076654321

# 8 GTL MASTER OR MIXED LOAD PACKING LIST (MANISFEST) TEMPLATE

The MIXED LOAD / MASTER LOAD DETAILS is a type of 'Packing List' or "Manifest" that provides details about the content of a transport unit (e.g. a Pallet with multiple Containers). It does not replace any other shipping documents! The MIXED LOAD / MASTER LOAD DETAILS sheet is designed around the paper sizes of the ISO A4, 210 mm x 297 mm (8.26 inches x 11.69 inches) and the US Letter, 215.9 mm x 279.4 mm (8.5 inches x 11 inches). For the purposes of this document, the ISO A4 and the US Letter are considered the same size.

The label provider shall determine a paper size that shall not be smaller than these recommended minimum dimensions.

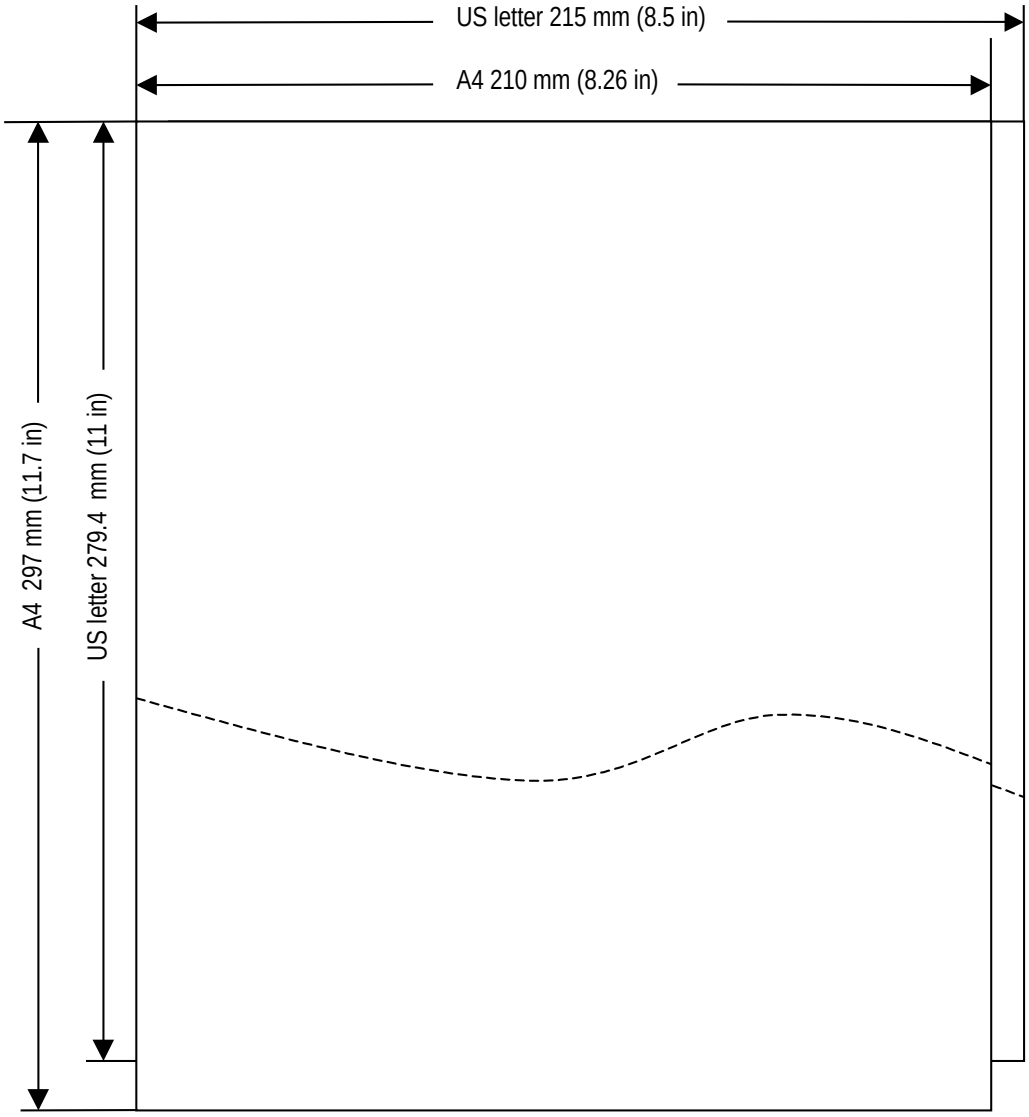


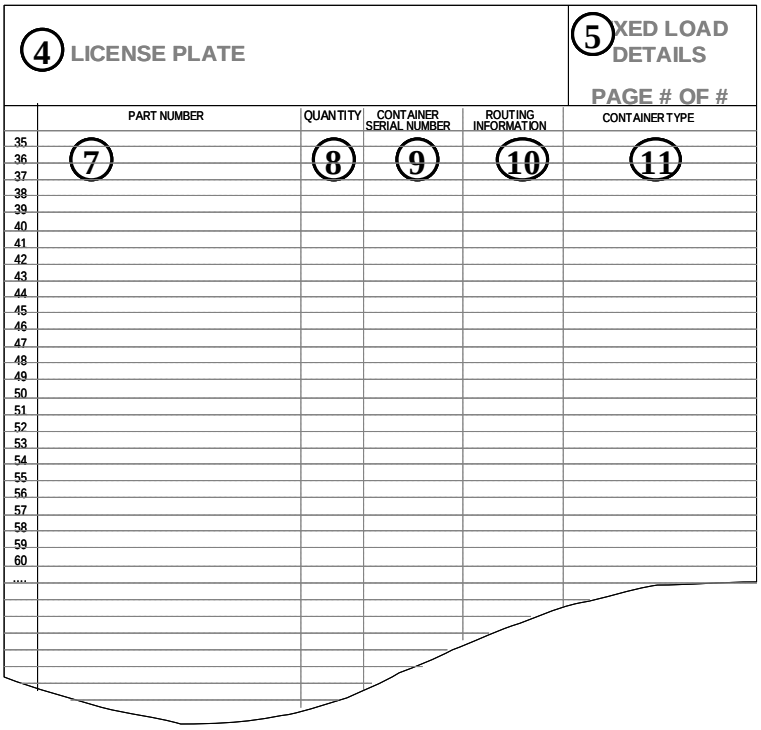

**Figure 37 – Paper Size**

## Content of "MIXED LOAD / MASTER LOAD DETAILS" - PAGE 1 OF 'n'

1. "**SHIP FROM**" information
2. "**SHIP TO**" information
3. Supplier Company Graphics

> Note: Company Graphic's may have to be considered, either optional in Sub-block 3 or above the Template which results in reduced number of available lines in Sub-block 7 to 11

4. Mixed Load "**LICENSE PLATE**" area
5. "**MIXED LOAD DETAILS**" or "**MASTER LOAD DETAILS**" title and "**PAGE # OF #**" if required
6. "**2D Symbo**l" and if required two of them
7. "**CUSTOMER PART NUMBER**"
8. Total "**QUANTITY**" per Customer Part Number
9. "**CONTAINER SERIAL NUMBER**", this is the Serial number portion of the Single Container License Plate
10. Additional "**ROUTING INFORMATION**" (as on Single Label area B2)
11. "**CONTAINER TYPE**" if required

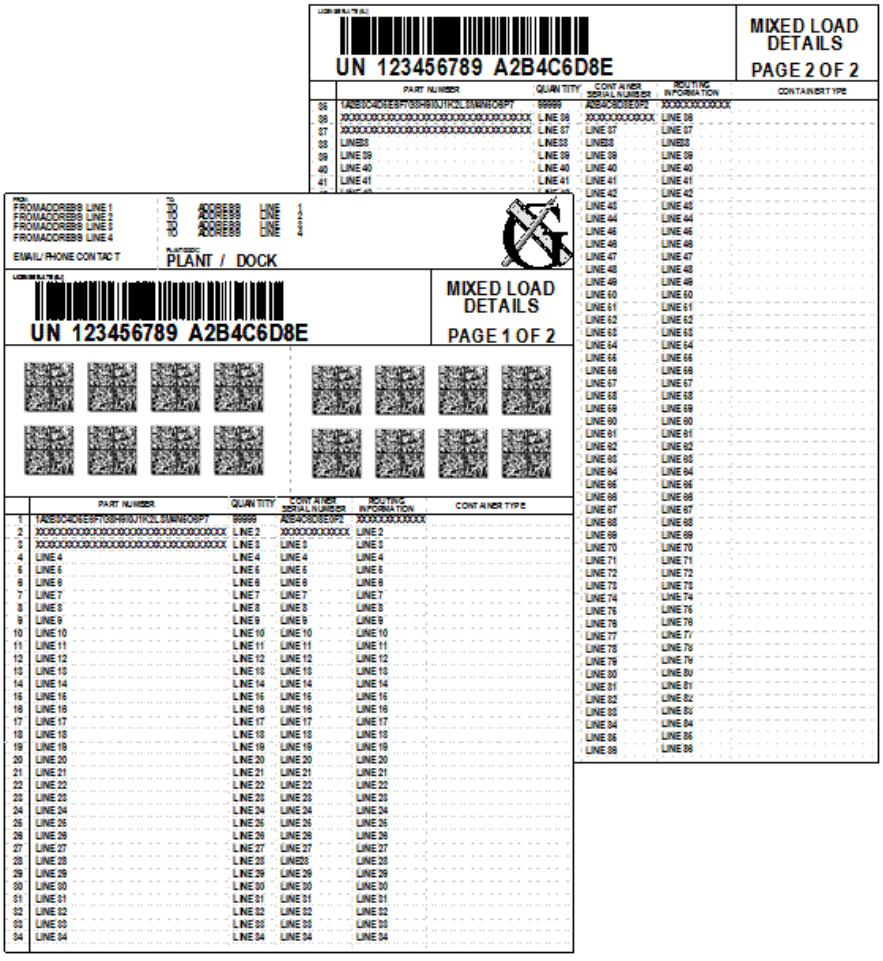



*Not to scale - for illustrative purposes only*

**Figure 38 Blocks and Sub-blocks of further Pages of "MIXED LOAD / MASTER LOAD DETAILS"**

## Content of "MIXED LOAD / MASTER LOAD DETAILS" - PAGE 2 OF 'n'

1. Mixed Load "**LICENSE PLATE**" area
2. "**MIXED LOAD DETAILS** " or **MASTER LOAD DETAILS** title and "**PAGE** # **OF** #" if required
3. "**CUSTOMER PART NUMBER**"
4. Total "**QUANTITY**" per Customer Part Number
5. "**CONTAINER SERIAL NUMBER**", - this is the Serial number portion of the Single Container License Plate
6. Additional "**ROUTING INFORMATION**" (as on Single Label area B2)
7. "**CONTAINER TYPE**"




Not to scale - for illustrative purposes only

**Figure 39 Blocks and Sub-blocks – "MIXED LOAD DETAILS" Example**

## Editing Lines in the MIXED LOAD / MASTER LOAD DETAILS

To enhance readability, the printed container information may be sorted by specific criteria, e.g. the customer part number. A blank line can be printed, if the sorting criteria changes.

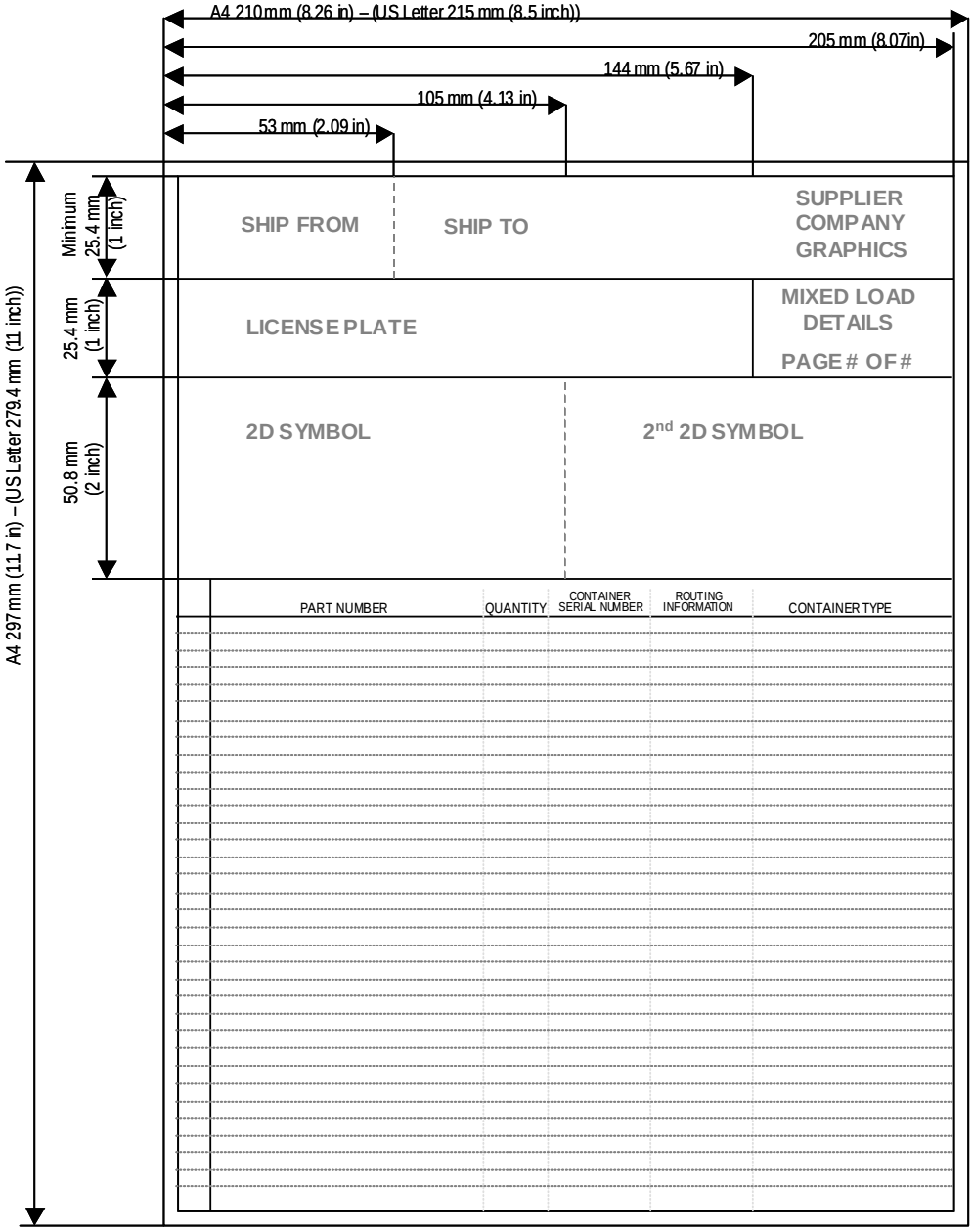
To support the quantity check in the customers goods receipt area, the total number of containers per sort criteria may also be printed in an extra line:

**Table 1. Example of Mixed Load Details sorted by Part Number**

| | Part Number | Quantity | Container Serial Number | Routing Information | Container Type |
|---|---|---|---|---|---|
| 1 | A21-4578k-B | 250 | 123456789 | XAB-2510 | KLT 6428 |
| 2 | A21-4578K-B | 250 | 123456790 | XAB-2810 | KLT 6428 |
| 3 | A21-4578K-B | 250 | 123456791 | XAB-2810 | KLT 6428 |
| 4 | **Total Number of Containers** | **3** | | | |
| 5 | | | | | |
| 6 | X25-4567C-Y | 150 | 987654321 | XAB-2810 | KLT-4328 |
| 7 | X25-4567C-Y | 150 | 987654322 | XAB-2810 | KLT-4328 |
| 8 | X25-4567C-Y | 150 | 987654323 | XAB-2810 | KLT-4328 |
| 9 | X25-4567C-Y | 150 | 987654324 | XAB-2810 | KLT-4328 |
| 10 | X25-4567C-Y | 150 | 987654325 | XAB-2810 | KLT-4328 |
| 11 | X25-4567C-Y | 150 | 987654326 | XAB-2810 | KLT-4328 |
| 12 | X25-4567C-Y | 150 | 987654327 | XAB-2810 | KLT-4328 |
| 13 | X25-4567C-Y | 150 | 987654328 | XAB-2810 | KLT-4328 |
| 14 | **Total Number of Containers** | **8** | | | |
| 15 | | | | | |

## "MIXED LOAD / MASTER LOAD DETAILS" Dimensions:

Paper size: DIN A4 210 mm x 297 mm (8.26 in x 11.7 in) or US Letter 215 mm x 279.4 mm (8.5 in x 11 in). A 5 mm Margin around the "Print Area" needs to be considered.




*Not to scale - for illustrative purposes only*

**Figure 40 MIXED LOAD / MASTER LOAD DETAILS Dimensions**

# *ANNEX A: DATA IDENTIFIERS*

The following table includes some of the commonly used Data Identifiers found in ANSI MH10.8.2 and ISO/IEC 15418.

> Note: Because ANSI MH10.8.2 is frequently updated a ”continuous maintenance” copy is officially maintained at http://www.autoid.org with the most current Data Identifiers.

**Table 2. Commonly Used Data Identifiers**

| DI | Description |
|---|---|
| **B** | Container Type |
| **D** | Date, in the format YYMMDD, mutually agreed upon by all trading partners. |
| **5D** | Date: in the ISO format YYMMDD immediately followed by an ANSI X12.3 Data Element Number 374 Qualifier providing a code for type of date (e.g., ship date, manufacture date) |
| **6D** | Date, in the ISO format YYYYMMDD immediately followed by an ANSI X12.3 Data Element Number 374 Qualifier providing code specifying type of date (e.g., ship date, manufacture date) |
| **12D** | Date, in the format YYYYMMDD |
| **I** | VIN - Vehicle Identification Number |
| **1J** | Unique license plate number assigned to a transport unit that is the lowest level of packaging, the unbreakable unit, as defined in ISO/IEC 15459-1 |
| **5J** | Unique license plate number assigned to a mixed transport unit that contains unlike items on a single customer transaction and may or may not have associated EDI data. |
| **6J** | Unique license plate number assigned to a master transport unit that contains like items on a single customer transaction and may or may not have associated EDI data. |
| **K** | Purchase Order Number, assigned by the customer |
| **5K** | Reference number assigned by the Customer to identify a Shipment Authorization (Release) against an established Purchase Order |
| **15K** | KANBAN Number |
| **4L** | Country of Origin - two-character code from the ISO 3166 standard country code list |
| **20L -** | Additional location numbers. The exact meaning of each DI is assigned internally. (This set of DI's could be used for a hierarchy of locations, for example: BUILDING [20L]; BAY [21L]; |

| DI | Description |
|---|---|
| **24L** | AISLE [22L]; SHELF [23L]; BIN [24L]) |
| **P** | Part number, assigned by the Customer |
| **1P** | Part number, assigned by the Supplier/Manufacturer |
| **2P** | Code assigned to specify the revision level of the part e.g., Engineering Change Level, revision or edition |
| **Q** | Quantity (integer numeric) (Unit of measure is assumed to be "each" unless otherwise agreed upon by the Supplier and the Customer) |
| **7Q** | Quantity and unit of measure in the format: Quantity followed by the two-character Unit of Measure code as defined in Data Element number 355 of the ANSI X12.3 Data Element Dictionary standard |
| **2S** | Shipment ID number. If you are using EDI, this corresponds to the SID (Data Element 396 of ANSI X12.3, as used in the 856 Shipment Notification transaction). |
| **3S** | Unique Package Identification assigned by Supplier (lowest level of packaging which has a package ID code; shall contain like items) |
| **4S** | Package Identification assigned by the Supplier to packaging containing multiple containers of like items on a single customer order. (Master Load) |
| **5S** | Package Identification assigned by the Supplier to packaging containing multiple containers of unlike items on a single customer order. (Mixed Load) |
| **T** | Traceability number assigned to a unique batch or group of items (lot, heat, batch) by the Customer |
| **1T** | Traceability number assigned to a unique batch or group of items (lot, heat, batch) by the Supplier/Manufacturer |
| **V** | Supplier Code assigned by the Customer |
| **12V** | DUNS® number of the Manufacturer |
| **W** | Work Order Number (e.g., "Production Paper") (internally assigned) |
| **Z** | Mutually defined between customer and supplier (title to reflect mutually agreed meaning) If a DI is not found in the ANSI MH10.8.2 this DI may be appropriate. |

# *ANNEX B: CODE 128 LICENCE PLATE 1J, 5J AND 6J*

The **LICENSE PLATE** is the key to the unique identification of the transport unit which enables systems to track and trace individual transport units as described in ISO 15394. The "license plate" provides access to information stored in computer files and may be transmitted by EDI. The identifier may be used by all trading partners to retrieve information about the transport unit itself or about the status of the physical movement of the transport unit along the supply chain.

Structure of the License Plate:

| | |
|---|---|
| Data Identifier (DI): | The DI shall l be one of the following:<br>1J - Unbreakable unit (Individual Container)<br>6J – Master Load of like part numbers<br>5J – Mixed Load consisting of multiple part numbers |
| Issuing Agency Code: | A unique company identifier issued by an agency acknowledged by ISO/IEC 15459 as a registration authority. The Issuing Agency Code shall be DUNS (UN), JIPDEC/ECPC (LA), or Odette (OD)<br>If not specified by the customer, it is the suppliers' choice of which of the three Issuing Agency Codes to use. |
| Serial Number: | A string of numeric or alphanumeric characters, generated by and maintained within the issuer's information system, used for uniquely identifying an individual transport unit. This character string shall not be repeated within 365 days. |
| Linear Symbology: | Code 128 as described in ISO/IEC 15417. The minimum height of the bar code shall be 13 mm (0.5 inch) |
| Bar Code Print Quality: | ISO/IEC 15416 shall be used. The minimum symbol grade shall be C (1.5) at the customers' point of scan. |
| Human Readable Interpretation: | A human readable interpretation of each linear bar code symbol shall be provided below the bar code.<br><br>The human readable interpretation shall be represented in bold UPPER CASE characters at a font size of 24 points, 6.1mm (0.24 inches). Spaces may be inserted to facilitate visual processing, but shall not be encoded in the bar code.<br><br>Data Identifiers (DIs) shall not be printed in the human readable interpretation.<br><br>Symbology start and stop characters and the symbology check character are not part of the data and shall not be printed in the human readable interpretation. |
| Bar Code Placement: | The linear bar code symbol shall be left justified, allowing for a quiet zone of at least 6.4 mm (0.25 inches) at both ends of the symbol. |
| Data Content: | The total number of characters, including DI, shall not exceed 22. Non-significant zeros and non-significant space characters shall not be encoded in the bar code. |


**Figure 41 License Plate Example**

*Assigning Authority OD=ODETTE*


**Figure 42 License Plate Example**

*Assigning Authority LA= JAPIA*


**Figure 43 License Plates Example**

*Assigning Authority UN=DUNS*

# *ANNEX C: 2D SYMBOLOGY DATA STRUCTURE DESCRIPTION*

MESSAGE FORMAT

This section defines how data shall be formatted within the 2D symbol.

The data within a 2D symbol is called a data stream. A two-level structure called enveloping is used to format the data within the data stream.

The outermost layer of the message is a Message Envelope that defines the beginning and end of the message. The Message Envelope contains one or more Format Envelopes that contain the formatted data (see Figure 44 below).

The Message Envelope consists of:

- A Message Header
- A Message Trailer

The Format Envelope within the Message Envelope consists of:

- A Format Header
- Formatted Data
- A Format Trailer

Figure 44 illustrates the complete enveloping structure:

- A Message Header
- A Format Header
- Formatted Data
- A Format Trailer
- A Message Trailer

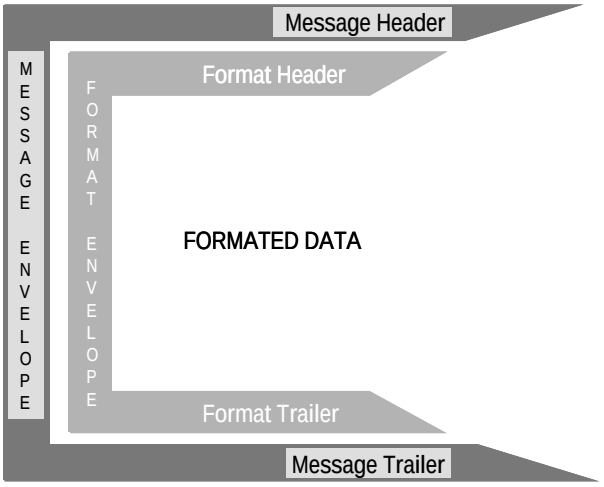



**Figure 44 – Structure of message format**

## 06 Macro (~6) - Header and Trailer Macro Code Word.

2D symbology macros provide a means of abbreviating the header and trailer into one character. This feature was created to reduce the number of symbol characters needed to encode data in a symbol using certain structured formats, such as the header/trailer used by the automotive industry. The Macro 06 character applies only when used in the first character position. The header will be transmitted as a prefix to the data stream and the trailer will be transmitted as a suffix to the data stream (Table 10). The authors of this document strongly encourage the use of Macro 06 as it will free up 8 characters which may be used for data.

**Table 3: 06 Macro Function**

| Macro Codeword | Name | Interpretation | |
|---|---|---|---|
| | | Header | Trailer |
| 237 | 06 Macro (~6) | []>$^{R}_{S}$06$^{G}_{S}$ | $^{R}_{S}$$^{E}$O$_{T}$ |

The Format Envelope defines the start and end of data in a given Format and provides the following functions:

- Identifies the Data Format used within the Envelope.
- Defines the character(s) used to separate the Segments, Data Elements (Fields), and Sub-elements (Sub-fields) within the Data Format.
- Indicates any applicable date, release, or control information.

Format Header "06" - Data Using Data Identifiers

When using format header “06”, each Data Element in the format shall be preceded by the appropriate Data Identifier (DI) code and followed by the Data Element Separator character $^{G}_{S}$. When the Data Element is the last field in the Data Format, the Data Element Separator does not follow and the Data Element is immediately followed by the Format Trailer character $^{R}_{S}$.

The Format Header for data using Data Identifiers shall be represented as:

06$^{G}_{S}$ or 06GS

where:

$^{G}_{S}$ or GS is the Data Element Separator to be used between data Fields.

## Format Envelope

The Format Envelope defines the start and end of the data contained within the data stream and provides the following functions:

- Indicates that the message contained within the symbol is formatted using Data Identifiers (DIs) in compliance with the rules of this Standard.
- Indicates the character that has been defined to separate Formats within the Message.
- Provides a unique character to indicate the end of the Message.

The structure within a data stream is as follows:

- A Message, containing one or more Formats
  - A Format, containing one or more Segments
    - A Segment, containing one or more Data Elements
      - A Data Element (field), potentially containing one or more Sub-elements (Subfields).

The Message Header shall consists of two parts,

- The three-character Compliance Indicator
- The Format Trailer Character

The complete Message Header shall be: **[)>**$^{R}_{S}$ or **[)>RS** (See Table 1 below)

**Table 4. Hexadecimal and Decimal Values - Subset of ASCII/ISO 646**

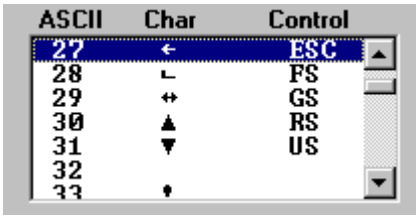
| ASCII/ISO 646 Character | DECIMAL | HEX |
|---|---|---|
| [ | 91 | 5B |
| ) | 41 | 29 |
| > | 62 | 3E |
| $^{R}_{S}$ or RS | 30 | 1E |
| $^{G}_{S}$ or GS | 29 | 1D |
| $^{E}_{OT}$ or EOT | 04 | 04 |

The full ASCII character set is allowed in the Message Header, Message Trailer, and Field Separator, as defined by ISO/IEC 15434. These specific ASCII characters are termed "non-printable characters" and require different techniques to encode, dependent upon the software and printer being used.

NOTE: Non-printable ASCII character have no “official” human readable representation. Below is just one example of how a particular software vendor chose to represent these non-printable ASCII characters.

GS = ISO/IEC 646 value 29hex

RS = ISO/IEC 646 value 30hex




*For example the ESC (Escape) key (ASCII 27) on the computer keyboard is a non-printable ASCII character and the software vendor chose to represent it with a right pointing arrow.*

**Compliance Indicator**

The Compliance Indicator shall be the first three characters in the Message Header. The Compliance Indicator shall be [)> (left bracket, right parenthesis, greater than. Spaces between characters provided for clarity, only).

**Format Trailer Character**

The Format Trailer Character shall be the fourth character in the Message Header. The Format Trailer Character shall be the non-printable ASCII character represented as “RS”. The Format Trailer Character is used to indicate the end of a Format Envelope.

**Message Trailer**

The Message Trailer identifies the end of the message within the data stream. The Message Trailer shall be the non-printable ASCII End Of Transaction character, "EOT". The Message Trailer character shall be used only once, at the end of the message.

The Format Trailer identifies the end of a Format Envelope. The Format Trailer shall be the Format Trailer Character, the non-printable ASCII character “RS” (see Table 11).

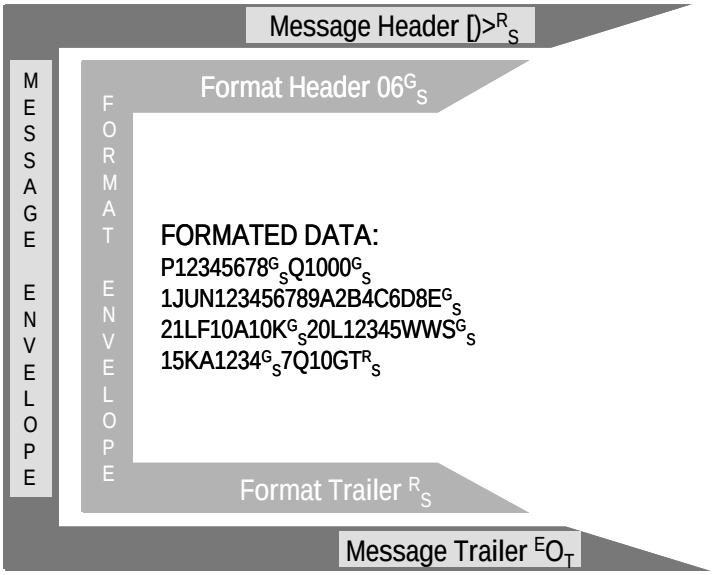



**Figure 45 Message Envelope Showing Formatted Data with Header and Trailer Characters**

# *ANNEX D: MACRO 06 (~6)*

2D symbology macros provide a means of abbreviating the header and trailer into one character. This feature was created to reduce the number of symbol characters needed to encode data in a symbol using certain structured formats, such as the header/trailer used by the automotive industry. The Macro 06 character applies only when used in the first character position. The header will be transmitted as a prefix to the data stream and the trailer will be transmitted as a suffix to the data stream (Table 10). The authors of this document strongly encourage the use of Macro 06 as it will free up 8 characters, which may be used for data.

**Table 5: 06 Macro Function**

| Macro Codeword | Name | Interpretation | |
|---|---|---|---|
| | | Header | Trailer |
| 237 | 06 Macro (~6) | [)>$^{R}_{S}$06$^{G}_{S}$ | $^{R}_{S}$$^{E}_{O_T}$ |

The Format Envelope defines the start and end of data in a given Format and provides the following functions:

- Identifies the Data Format used within the Envelope.
- Defines the character(s) used to separate the Segments, Data Elements (Fields) and Sub-elements (Sub-fields) within the data Format.
- Indicates any applicable date, release, or control information.

Format Header "06" - Data Using Data Identifiers

When using format header “06”, each Data Element in the format shall be preceded by the appropriate Data Identifier (DI) code and followed by the Data Element Separator character $^{G}_{S}$. When the Data Element is the last field in the Data Format, the Data Element Separator does not follow and the Data Element is immediately followed by the Format Trailer character $^{R}_{S}$.

The Format Header for data using Data Identifiers shall be represented as:

06$^{G}_{S}$ or 06GS

where:

$^{G}_{S}$ or GS is the Data Element Separator to be used between data fields.

# *ANNEX E: STRUCTURED APPEND (~2)*

A macro feature (~2) enabling multiple (up to 16) 2D symbols to be linked and carry a single long message or file exceeding the capacity of a single 2D symbol. Structured Append shall be encoded at the end of the data stream. Two reasons for using ~2 are:

1. When data exceeds what may reasonably be encoded in one 2D symbol within the available area and at a reasonable cell size to be easily scanned.
2. When it is desirable to optimize scan distance.

Structured Append consists of two elements:

1. Three numeric Sequence Identifier (SID) characters representing the symbol sequence.

   *The symbol SID is a number between 1 and 255 that indicates the position of the symbol within a sequence of up to 16 symbols. The sequence identifier actually consists of two four bit values representing the sequence number and the total number of symbols in the sequence (i.e. m of n where m is the sequence number and n is the total number of symbols). The upper four bits of this value represent the position of the particular symbol as the binary value of (m-1) and the lower order four bits identify the total number of symbols to be concatenated as the binary value of (17-n). For example, symbol 3 in a sequence of 7 symbols with file ID: 001015 is represented by 2042001015. The number 042 is derived as follows: 3-1=2, which equals 0010 when represented as a 4 bit binary number. 17-7=10 which equals 1010 when represented as a 4 bit binary number. After concatenating the two 4 bit binary values we end up with 00101010, which equals 42 in decimal. Table 13 provides SID values.*

2 Six numeric File Identifier (FID) characters to uniquely identify a sequence so that only logically linked sequences are processed as part of the same sequence

Example of encoded data using five 2D symbols linked using **Structured Append**:

~65JUN123456789A2B4C6D8E$^{G}_{S}$7Q9999GT$^{G}_{S}$21LLC 15C~2012654321

~6P12345678$^{G}_{S}$7Q1000PL$^{G}_{S}$7Q5PK$^{G}_{S}$Q200RS06$^{G}_{S}$P02345678$^{G}_{S}$7Q1200PL$^{G}_{S}$7Q6PK$^{G}_{S}$Q200~2028654321

~6P12245678$^{G}_{S}$7Q1000PL$^{G}_{S}$7Q5PK$^{G}_{S}$Q200RS06$^{G}_{S}$P12045678$^{G}_{S}$7Q1000PL$^{G}_{S}$7Q10PK$^{G}_{S}$Q100~2044654321

~6P10345678$^{G}_{S}$7Q750PL$^{G}_{S}$7Q5PK$^{G}_{S}$Q150RS 06$^{G}_{S}$P12045600$^{G}_{S}$7Q6000PL$^{G}_{S}$7Q5PK$^{G}_{S}$Q1200~2060654321

~6P00345678$^{G}_{S}$7Q100PL$^{G}_{S}$7Q5PK$^{G}_{S}$Q20RS06$^{G}_{S}$P12005678$^{G}_{S}$7Q1000PL$^{G}_{S}$7Q5PK$^{G}_{S}$Q200~2076654321

## Table 6 - Sequence Identification (SID)

| M of N | M | (M-1) | N | (17-N) | Binary (M-1) | Binary (17-N) | Concanating (M-1 &17- N) | Decimal Value | Sequence ID Value |
|---|---|---|---|---|---|---|---|---|---|
| 1 of 2 | 1 | 0 | 2 | 15 | 0000 | 1111 | 00001111 | 15 | 015 |
| 2 of 2 | 2 | 1 | 2 | 15 | 0001 | 1111 | 00011111 | 31 | 031 |
| | | | | | | | | | |
| 1 of 3 | 1 | 0 | 3 | 14 | 0000 | 1110 | 00001110 | 14 | 014 |
| 2 of 3 | 2 | 1 | 3 | 14 | 0001 | 1110 | 00011110 | 30 | 030 |
| 3 of 3 | 3 | 2 | 3 | 14 | 0010 | 1110 | 00101110 | 46 | 046 |
| | | | | | | | | | |
| 1 of 4 | 1 | 0 | 4 | 13 | 0000 | 1101 | 00001101 | 13 | 013 |
| 2 of 4 | 2 | 1 | 4 | 13 | 0001 | 1101 | 00011101 | 29 | 029 |
| 3 of 4 | 3 | 2 | 4 | 13 | 0010 | 1101 | 00101101 | 45 | 045 |
| 4 of 4 | 4 | 3 | 4 | 13 | 0011 | 1101 | 00111101 | 61 | 061 |
| | | | | | | | | | |
| 1 of 5 | 1 | 0 | 5 | 12 | 0000 | 1100 | 00001100 | 12 | 012 |
| 2 of 5 | 2 | 1 | 5 | 12 | 0001 | 1100 | 00011100 | 28 | 028 |
| 3 of 5 | 3 | 2 | 5 | 12 | 0010 | 1100 | 00101100 | 44 | 044 |
| 4 of 5 | 4 | 3 | 5 | 12 | 0011 | 1100 | 00111100 | 60 | 060 |
| 5 of 5 | 5 | 4 | 5 | 12 | 0100 | 1100 | 01001100 | 76 | 076 |
| | | | | | | | | | |
| 1 of 6 | 1 | 0 | 6 | 11 | 0000 | 1011 | 00001011 | 11 | 011 |
| 2 of 6 | 2 | 1 | 6 | 11 | 0001 | 1011 | 00011011 | 27 | 022 |
| 3 of 6 | 3 | 2 | 6 | 11 | 0010 | 1011 | 00101011 | 43 | 038 |
| 4 of 6 | 4 | 3 | 6 | 11 | 0011 | 1011 | 00111011 | 59 | 054 |
| 5 of 6 | 5 | 4 | 6 | 11 | 0100 | 1011 | 01001011 | 75 | 070 |
| 6 of 6 | 6 | 5 | 6 | 11 | 0101 | 0110 | 01010110 | 86 | 086 |
| | | | | | | | | | |
| 1 of 7 | 1 | 0 | 7 | 10 | 0000 | 1010 | 00001010 | 10 | 010 |
| 2 of 7 | 2 | 1 | 7 | 10 | 0001 | 1010 | 00011010 | 26 | 026 |
| 3 of 7 | 3 | 2 | 7 | 10 | 0010 | 1010 | 00101010 | 42 | 042 |
| 4 of 7 | 4 | 3 | 7 | 10 | 0011 | 1010 | 00111010 | 58 | 058 |
| 5 of 7 | 5 | 4 | 7 | 10 | 0100 | 1010 | 01001010 | 74 | 074 |
| 6 of 7 | 6 | 5 | 7 | 10 | 0101 | 1010 | 01011010 | 90 | 090 |
| 7 of 7 | 7 | 6 | 7 | 10 | 0110 | 1010 | 01101010 | 106 | 106 |
| | | | | | | | | | |
| 1 of 8 | 1 | 0 | 8 | 9 | 0000 | 1001 | 00001001 | 9 | 009 |
| 2 of 8 | 2 | 1 | 8 | 9 | 0001 | 1001 | 00011001 | 25 | 025 |
| 3 of 8 | 3 | 2 | 8 | 9 | 0010 | 1001 | 00101001 | 41 | 041 |
| 4 of 8 | 4 | 3 | 8 | 9 | 0011 | 1001 | 00111001 | 57 | 057 |
| 5 of 8 | 5 | 4 | 8 | 9 | 0100 | 1001 | 01001001 | 73 | 073 |

| M of N | M | (M-1) | N | (17-N) | Binary (M-1) | Binary (17-N) | Concanating (M-1 &17- N) | Decimal Value | Sequence ID Value |
|---|---|---|---|---|---|---|---|---|---|
| 1 of 12 | 1 | 0 | 12 | 5 | 0000 | 0101 | 00000101 | 5 | 005 |
| 2 of 12 | 2 | 1 | 12 | 5 | 0001 | 0101 | 00010101 | 21 | 021 |
| 3 of12 | 3 | 2 | 12 | 5 | 0010 | 0101 | 00100101 | 37 | 037 |
| 4 of 12 | 4 | 3 | 12 | 5 | 0011 | 0101 | 00110101 | 53 | 053 |
| 5 of 12 | 5 | 4 | 12 | 5 | 0100 | 0101 | 01000101 | 69 | 069 |
| 6 of 12 | 6 | 5 | 12 | 5 | 0101 | 0101 | 01010101 | 85 | 085 |
| 7 of 12 | 7 | 6 | 12 | 5 | 0110 | 0101 | 01100101 | 101 | 101 |
| 8 of 12 | 8 | 7 | 12 | 5 | 0111 | 0101 | 01110101 | 117 | 117 |
| 9 of 12 | 9 | 8 | 12 | 5 | 1000 | 0101 | 10000101 | 133 | 133 |
| 10 of 12 | 10 | 9 | 12 | 5 | 1001 | 0101 | 10010101 | 149 | 149 |
| 11 of 12 | 11 | 10 | 12 | 5 | 1010 | 0101 | 10100101 | 165 | 165 |
| 12 of 12 | 12 | 11 | 12 | 5 | 1011 | 0101 | 10110101 | 181 | 181 |
| | | | | | | | | | |
| 1 of 13 | 1 | 0 | 13 | 4 | 0000 | 0100 | 00000100 | 4 | 004 |
| 2 of 13 | 2 | 1 | 13 | 4 | 0001 | 0100 | 00010100 | 20 | 020 |
| 3 0f 13 | 3 | 2 | 13 | 4 | 0010 | 0100 | 00100100 | 36 | 036 |
| 4 of 13 | 4 | 3 | 13 | 4 | 0011 | 0100 | 00110100 | 52 | 052 |
| 5 of 13 | 5 | 4 | 13 | 4 | 0100 | 0100 | 01000100 | 68 | 068 |
| 6 of 13 | 6 | 5 | 13 | 4 | 0101 | 0100 | 01010100 | 84 | 084 |
| 7 of 13 | 7 | 6 | 13 | 4 | 0110 | 0100 | 01100100 | 100 | 100 |
| 8 of 13 | 8 | 7 | 13 | 4 | 0111 | 0100 | 01110100 | 116 | 116 |
| 9 of 13 | 9 | 8 | 13 | 4 | 1000 | 0100 | 10000100 | 132 | 132 |
| 10 of 13 | 10 | 9 | 13 | 4 | 1001 | 0100 | 10010100 | 148 | 148 |
| 11 of 13 | 11 | 10 | 13 | 4 | 1010 | 0100 | 10100100 | 164 | 164 |
| 12 of 13 | 12 | 11 | 13 | 4 | 1011 | 0100 | 10110100 | 180 | 180 |
| 13 of 13 | 13 | 12 | 13 | 4 | 1100 | 0100 | 11000100 | 196 | 196 |
| | | | | | | | | | |
| 1 of 14 | 1 | 0 | 14 | 3 | 0000 | 0011 | 00000011 | 3 | 003 |
| 2 of 14 | 2 | 1 | 14 | 3 | 0001 | 0011 | 00010011 | 19 | 019 |
| 3 of 14 | 3 | 2 | 14 | 3 | 0010 | 0011 | 00100011 | 35 | 035 |
| 4 of 14 | 4 | 3 | 14 | 3 | 0011 | 0011 | 00110011 | 51 | 051 |
| 5 of 14 | 5 | 4 | 14 | 3 | 0100 | 0011 | 01000011 | 67 | 067 |
| 6 of 14 | 6 | 5 | 14 | 3 | 0101 | 0011 | 01010011 | 83 | 083 |
| 7 of 14 | 7 | 6 | 14 | 3 | 0110 | 0011 | 01100011 | 99 | 099 |
| 8 of 14 | 8 | 7 | 14 | 3 | 0111 | 0011 | 01110011 | 115 | 115 |
| 9 of14 | 9 | 8 | 14 | 3 | 1000 | 0011 | 10000011 | 131 | 131 |
| 10 of 14 | 10 | 9 | 14 | 3 | 1001 | 0011 | 10010011 | 147 | 147 |
| 11 of 14 | 11 | 10 | 14 | 3 | 1010 | 0011 | 10100011 | 163 | 163 |

# *ANNEX F: 2D SYMBOLOGIES*

Several factors must be considered when using two-dimensional symbologies. These considerations include:

- Data requirements
- Printer capabilities
- Scanner capabilities

**BIG RULE:** Make 1D/2D symbols as large as practical not as small as possible. Why? As symbol size decreases, scanning and printing issues increase exponentially.

## DATA MATRIX ECC200

*Data Matrix is a two-dimensional matrix symbology consisting of black and white square modules arranged in either a square or a rectangular pattern. ECC200 version of the symbol utilizes Reed-Solomon error correction to ensure data reliability.*

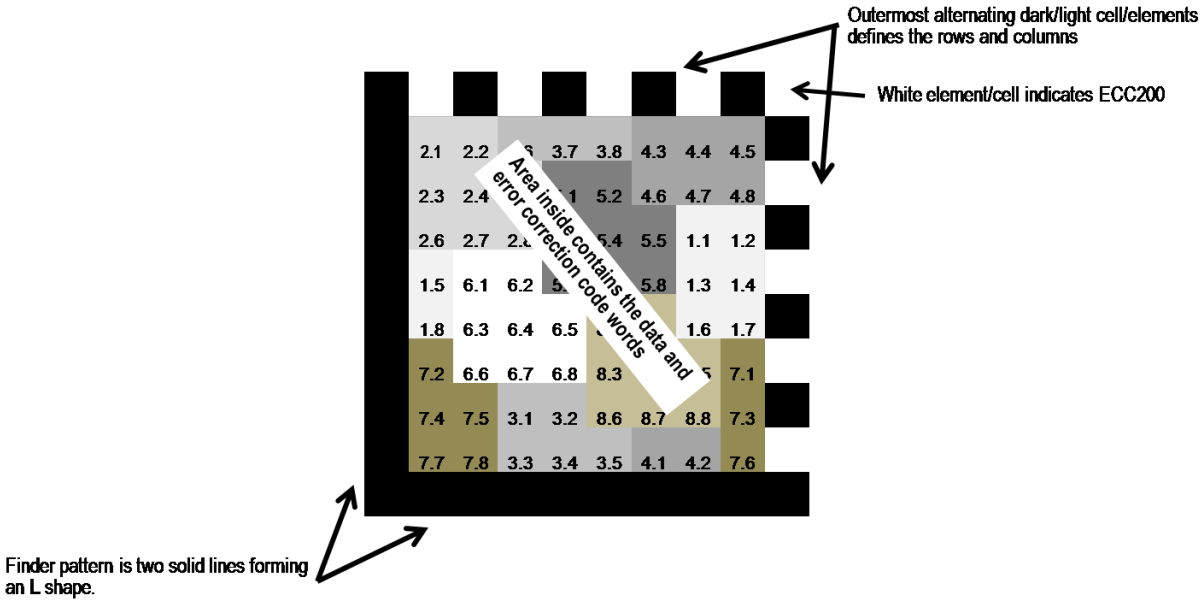



**Figure 46 - Data Matrix structure**

- ✓ Data Matrix ECC200 can have multiple data regions *(this example 4 regions)*
- ✓ Each data region has it's own finder/row/column pattern
- ✓ Maximum data capacity for each region is 64 alphanumeric characters

**Figure 47 - Data Matrix ECC200 can have multiple data regions**

**Table 7 - Data capacity Data Matrix ECC200 square symbol**

| Symbol Size | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Rows | 10 | 12 | 14 | 16 | 18 | 20 | 22 | 24 | 26 | 32 | 36 | 40 | 44 | 48 | 52 | 64 | 72 | 80 | 88 | 96 | 104 | 120 | 132 | 144 |
| Columns | 10 | 12 | 14 | 16 | 18 | 20 | 22 | 24 | 26 | 32 | 36 | 40 | 44 | 48 | 52 | 64 | 72 | 80 | 88 | 96 | 104 | 120 | 132 | 144 |
| Data Capacity | | | | | | | | | | | | | | | | | | | | | | | | |
| Alphanumeric | 3 | 6 | 10 | 16 | 25 | 31 | 43 | 52 | 64 | 91 | 127 | 169 | 214 | 259 | 304 | 418 | 550 | 682 | 862 | 1024 | 1222 | 1573 | 1954 | 2335 |

**Table 8 - Data capacity Data Matrix ECC200 rectangular symbol**

| Symbol Size | | | | | | |
|---|---|---|---|---|---|---|
| Rows | 8 | 8 | 12 | 12 | 16 | 16 |
| Columns | 18 | 32 | 26 | 36 | 36 | 48 |
| Data Capacity | | | | | | |
| Alphanumeric | 6 | 13 | 22 | 31 | 46 | 72 |

To estimate the size (Length x Height) of a Data Matrix symbol use the following procedure:

a) Count the number of data characters to be encoded _____

b) Go to Table 1 for a square or Table 2 for a rectangular Data Matrix symbol

c) Find the alphanumeric number equal to or next greater than the character count

d) Rows = _____

e) Columns = _____

f) Cell/element size = _____

g) Multiply # of Rows (d) by Cell/element size = _____ width

h) Multiply # of Columns (e) by Cell/element size = _____ height

i) Quiet Zone = 4 x Cell/element size = _____

j) Add Quiet Zone (i) to width (g) = _____ estimated total width

k) Add Quiet Zone (i) to height (h) = _____ estimated total height

## QR CODE ECC M

*QR Code is a two-dimensional matrix symbology consisting of black and white square modules arranged in a square pattern. ECC M version of the symbol utilizes Reed-Solomon error correction to ensure data reliability.*

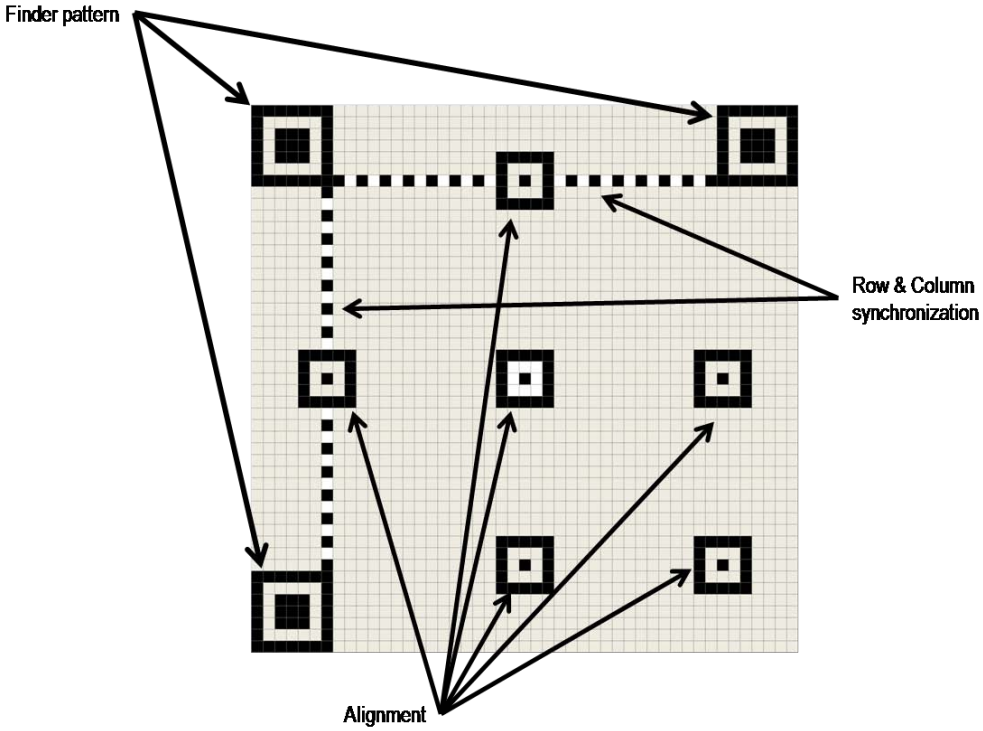



**Figure 48 - QR Code structure**

**Figure 49 - Example QR Code enlarged to show features**

**Table 9- QR Code ECC M data capacity**

| Symbol Size | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Rows | 21 | 25 | 29 | 33 | 37 | 41 | 45 | 49 | 53 | 57 | 61 | 65 | 69 | 73 | 77 | 81 | 85 | 89 | 93 | 97 |
| Columns | 21 | 25 | 29 | 33 | 37 | 41 | 45 | 49 | 53 | 57 | 61 | 65 | 69 | 73 | 77 | 81 | 85 | 89 | 93 | 97 |
| Data Capacity | | | | | | | | | | | | | | | | | | | | |
| Alphanumeric | 20 | 38 | 61 | 90 | 122 | 154 | 178 | 221 | 262 | 311 | 366 | 419 | 483 | 528 | 600 | 656 | 734 | 816 | 909 | 970 |
| | | | | | | | | | | | | | | | | | | | | |
| Symbol Size | | | | | | | | | | | | | | | | | | | | |
| Rows | 101 | 105 | 109 | 113 | 117 | 121 | 125 | 129 | 133 | 137 | 141 | 145 | 149 | 153 | 157 | 161 | 165 | 169 | 173 | 177 |
| Columns | 101 | 105 | 109 | 113 | 117 | 121 | 125 | 129 | 133 | 137 | 141 | 145 | 149 | 153 | 157 | 161 | 165 | 169 | 173 | 177 |
| Data Capacity | | | | | | | | | | | | | | | | | | | | |
| Alphanumeric | 1035 | 1134 | 1248 | 1326 | 1451 | 1542 | 1637 | 1732 | 1839 | 1994 | 2113 | 2238 | 2369 | 2506 | 2632 | 2708 | 2894 | 3054 | 3220 | 3391 |

To estimate the size (Length x Height) of QR Code symbol use the following procedure:

a) a) Count the number of data characters to be encoded _____

b) Go to Table 3

c) Find the alphanumeric number equal to or next greater than the character count

d) d) Rows = _____

e) e) Columns = _____

f) f) Cell/element size = _____

g) g) Multiply # of Rows (d) by Cell/element size = _____ width

h) h) Multiply # of Columns (e) by Cell/element size = _____ height

i) i) Quiet Zone = 8 x Cell/element size = _____

j) j) Add Quiet Zone (i) to width (g) = _____ estimated total width

k) k) Add Quiet Zone (i) to height (h) = _____ estimated total height

**PDF 417**

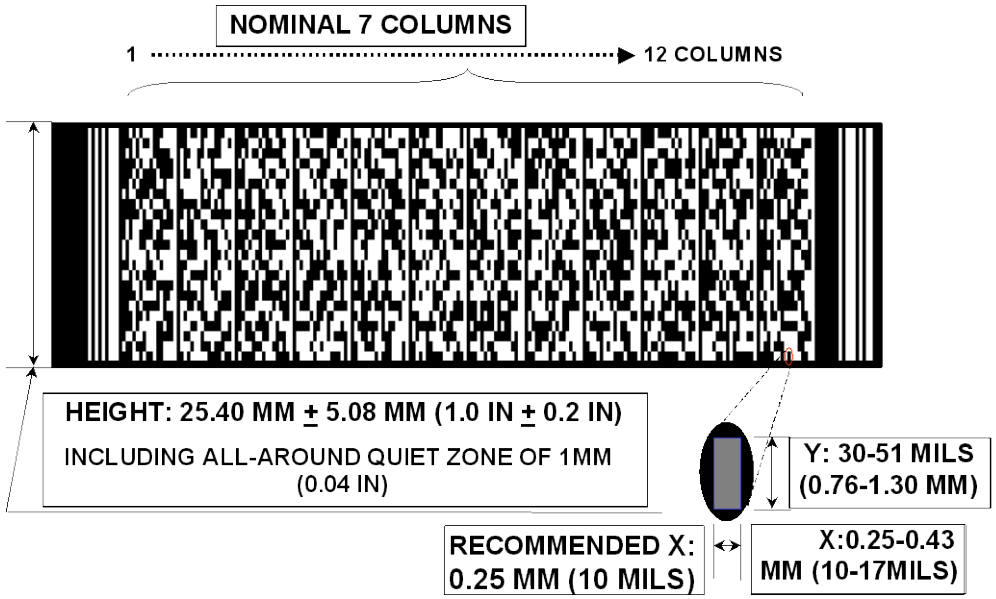



**Figure 50 Structure of PDF417**

All of these factors must be used to determine which values to use for PDF417 options, including:

- Number of data columns - GTL standard specifies PDF417 symbols with no more than 12 columns.
- Narrow element dimension shall have a minimum height (height of the symbol element) of three (3) times the width of the narrow element (X dimension). Increasing the bar height may improve scanning performance, but will reduce the number of characters that can be encoded in a given space.
- Error correction level (level 3 to 5 recommended)
- The PDFD417 symbol, including quiet zone, shall not exceed the space available.

Developers and users of 2D printing software should use the following guideline when determining which values to use for PDF417 options. Since there are many design decisions and potential solutions when configuring PDF417 symbols, Tables 2 through 4 have been included to aid in that selection. These guidelines will help ensure that valid symbols are printed. In addition, they will help ensure that a user's scanning and printing requirements have been considered.

Designing The Label Layout

**Table 10. The Effect of Error Correction Levels on the Size of PDF417 Symbols Encoding 154 Alphanumeric Characters**

** Shaded areas indicate symbol size will not fit in space available on the GTL. Information provided for comparison purposes only.*

| Amount of Data | Element Size | ECC Level | Symbol Width | Symbol Height |
|---|---|---|---|---|
| | | | | |
| 154 Characters | 0.25 mm (10 mils) | ECC 3 | 44.5 mm (1.75 in) | 20.8 mm (.82 in) |
| | | ECC 4 | 44.5 mm (1.75 in) | 23.1 mm (.91 in) |
| | | ECC 5 | 48.8 mm (1.92 in) | 23.1 mm (.91 in) |
| | | | | |
| | 0.33 mm (13 mils) | ECC 3 | 52.3 mm (2.06 in) | 25.4 mm (1.00 in) |
| | | ECC 4 | 52.3 mm (2.06 in) | 27.7 mm (1.09 in) |
| | | ECC 5 | 58.2 mm (2.29 in) | 26.9 mm (1.06 in) |
| | | | | |
| | 0.38 mm (15 mils) | ECC 3 | 59.9 mm (2.36 in) | 25.4 mm (1.00 in) |
| | | ECC 4 | 59.9 mm (2.36 in) | 27.7 mm (1.09 in) |
| | | ECC 5 | 66.8 mm (2.63 in) | 26.9 mm (1.06 in) |

**Table 11. The Effect of Error Correction Levels on the Size of PDF417 Symbols Encoding 104 Alphanumeric Characters**

** Shaded areas indicate symbol size will not fit in space available on the GTL. Information provided for comparison purposes only.*

| Amount of Data | Element Size | ECC Level | Symbol Width | Symbol Height |
|---|---|---|---|---|
| | | | | |
| 104 Characters | 0.25 mm (10 mils) | ECC 3 | 62.2 mm (1.58 in) | 28.7 mm (0.73 in) |
| | | ECC 4 | 62.2 mm (1.58 in) | 33.5 mm (0.85 in) |
| | | ECC 5 | 68.9 mm (1.75 in) | 33.5 mm (0.85 in) |
| | | | | |
| | 0.33 mm (13 mils) | ECC 3 | 72.0 mm (1.83 in) | 35.8 mm (0.91 in) |
| | | ECC 4 | 72.0 mm (1.83 in) | 40.6 mm (1.03 in) |
| | | ECC 5 | 81.1 mm (2.06 in) | 40.6 mm (1.03 in) |
| | | | | |
| | 0.38 mm (15 mils) | ECC 3 | 82.7 mm (2.10 in) | 35.8 mm (0.91 in) |
| | | ECC 4 | 82.7 mm (2.10 in) | 40.6 mm (1.03 in) |
| | | ECC 5 | 92.9 mm (2.36 in) | 40.6 mm (1.03 in) |

**Table 12. The Effect of Error Correction Levels on the Size of PDF417 Symbols Encoding 48 Alphanumeric Characters**

** Shaded areas indicate symbol size will not fit in space available on the GTL. Information provided for comparison purposes only.*

| Amount of Data | Element Size | ECC Level | Symbol Width | Symbol Height |
|---|---|---|---|---|
| | | | | |
| 48 Characters | 0.25 mm (10 mils) | ECC 3 | 48.4 mm (1.23 in) | 27.6 mm (0.70 in) |
| | | ECC 4 | 55.1 mm (1.40 in) | 25.2 mm (0.64 in) |
| | | ECC 5 | 62.2 mm (1.58 in) | 28.7 mm (0.73 in) |
| | | | | |
| | 0.33 mm (13 mils) | ECC 3 | 63.4 mm (1.61 in) | 27.6 mm (0.70 in) |
| | | ECC 4 | 63.4 mm (1.61 in) | 33.5 mm (0.85 in) |
| | | ECC 5 | 72.0 mm (1.83 in) | 34.6 mm (0.88 in) |
| | | | | |
| | 0.38 mm (15 mils) | ECC 3 | 72.4 mm (1.84 in) | 27.6 mm (0.70 in) |
| | | ECC 4 | 72.4 mm (1.84 in) | 33.5 mm (0.85 in) |
| | | ECC 5 | 82.7 mm (2.10 in) | 34.6 mm (0.88 in) |

# *ANNEX G: SCANNING GUIDANCE*

Two-dimensional symbols can be read by a range of products based on imaging (camera) technology; both in handheld and fixed-position devices, as well as integrated within handheld portable computers. Imagers are becoming more popular for scanning both 1D and 2D symbols. Some imagers are capable of reading multiple 1D or 2D symbols at one time, reducing the need to read individual symbols.

The following types of readers are also available for reading PDF417 since it is a stacked linear symbology:

- Rastering Laser: A rastering laser device scans the 2D symbol both horizontally and vertically at high speed. Rastering lasers pattern must be aligned with the rows in the PDF417 symbol. The raster laser generally provides full backward compatibility with linear bar codes (Code 39/Code 128) used today. A rastering laser may be used in a fixed position along a moving assembly line or conveyor while the label is moved through the scanner's field of view.
- Linear Laser: A linear laser beam can be moved across the PDF417 symbol to collect (row by row) all codeword elements to accomplish a complete symbol decode. One example of an application for a linear laser is with a continuously "on" fixed-position scanner reading a label attached to an object moving along an assembly line.
- Linear Charge Coupled Device (CCD): A linear CCD reader in a handheld device may be moved across the PDF417 symbol to collect (row by row) all of the codeword elements. The device needs to be somewhat aligned with the rows in the PDF417 symbol. A linear CCD reader also captures an image of a PDF417 symbol if passed under the field of view of the CCD at a fixed speed (overhead scanner mounted above a conveyor).

# *ANNEX H: NESTING VERSES LOOPING*

This document provides a guideline for using two methods of encoding multiple occurrences of the same Data Identifier (DI) in a single two-dimensional (2D) symbol message:

- "Nesting", as outlined under the AIAG B-10 Trading Partner Labels Implementation Guideline "Looping", as outlined under in Section VI of ANSI MH10.8.2 Data Identifier and Application Identifier Standard.

Both encoding structures use the same formats for the Message Header, Data Element Separator and Message Trailer:

- Message Header: $[)>^{R}_{S}$
  - [)> is the Compliance Indicator (Counted as 3 characters)
  - $^{R}_{S}$ = Format Separator (Counted as a single character)
- Data Element Separator = $^{G}_{S}$ (Counted as a single character)
- Message Trailer: $^{R}_{S}\ ^{E}O_{T}$
  - $^{R}_{S}$ = Format Separator (Counted as a single character)
  - $^{E}O_{T}$ = End of Transaction (Counted as a single character)

When using the "Nesting" method, multiple instances of the same data type are encoded in separate Format Envelopes within the Message Envelope.

Figure 54 illustrates the "Nesting" data format of a Mixed Load Pallet with various part numbers, containers types and serial numbers to be delivered to several locations:

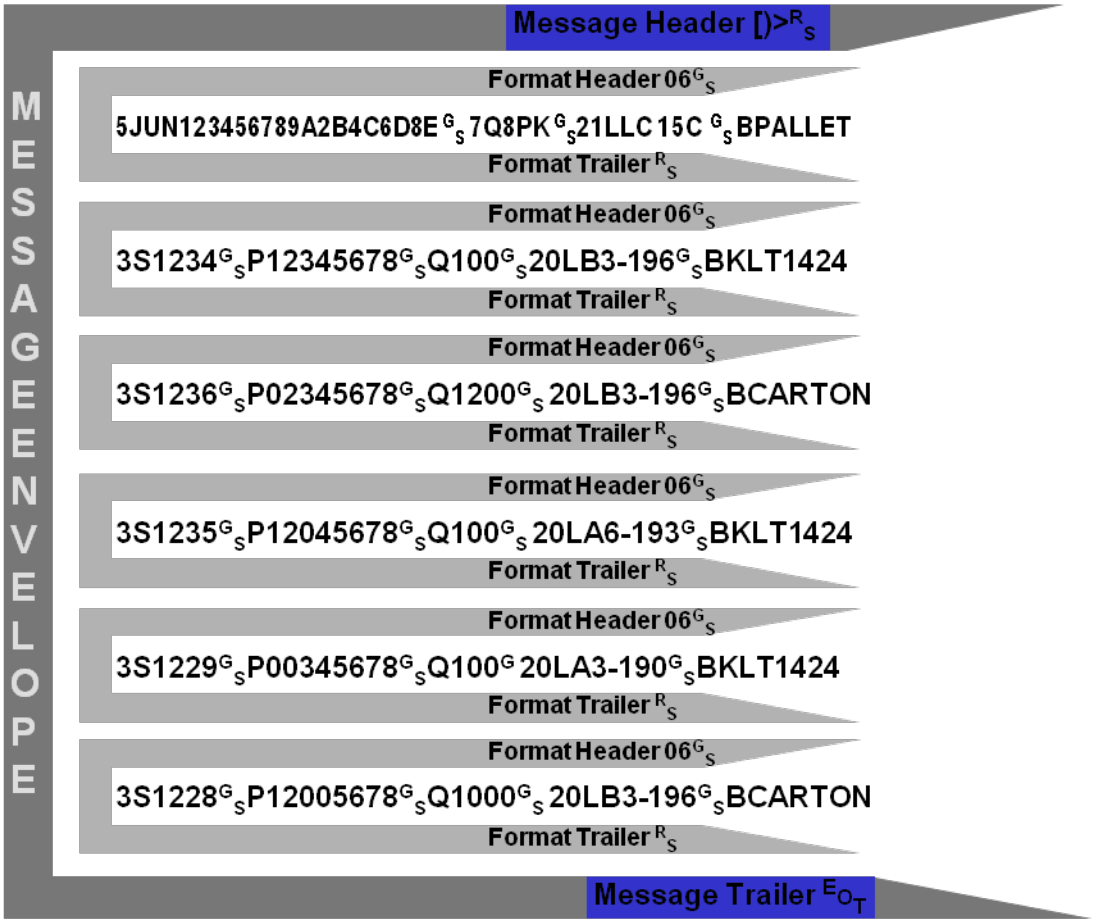



**Figure 51. Example of Mixed Load "Nesting"**

In this example, each Format Envelope inside the Message Envelope requires the use of both a Format Header and a Format Trailer. The complete message encodes 274 characters of data.

Figure 49 provides an explanation of the data stream in the example above.

**Table 13. "Nesting" data stream for a Mixed Load encoding 274 characters**

| Portion of Message | Data | Formatted Data |
|---|---|---|
| Message Header | | [)>$^{R}_{S}$ |
| Format Header | | 06$^{G}_{S}$ |
| Formatted Data | License Plate Information:<br>DI for Mixed Load = 5J<br>DUNS # = 123456789<br>Serial # = A2B4C6D8E<br>Quantity (7Q) = 8 packs (PK)<br>Location (21L) = LC15C<br>Container type (B) = Pallet | 5JUN123456789A2B4C6D8E$^{G}_{S}$ 7Q8PK$^{G}_{S}$21LLC 15C$^{G}_{S}$ BPALLET |
| Format Trailer | | $^{R}_{S}$ |
| Format Header | | 06$^{G}_{S}$ |
| Formatted Data | Serial # (3S) = 1234<br>Item Code (P) = 12345678<br>Quantity (Q) = 100<br>Location (20L) = B3-196<br>Container type (B) = KLT1424 | 3S1234$^{G}_{S}$P12345678$^{G}_{S}$Q100$^{G}_{S}$20LB3-196$^{G}_{S}$BKLT1424 |
| Format Trailer | | $^{R}_{S}$ |
| Format Header | | 06$^{G}_{S}$ |
| Formatted Data | Serial # (3S) = 1236<br>Item Code (P) = 02345678<br>Quantity (Q) = 1200<br>Location (20L) = B3-196<br>Container type (B) = Carton | 3S1236$^{G}_{S}$P02345678$^{G}_{S}$Q1200$^{G}_{S}$20LB3-196$^{G}_{S}$BCARTON |
| Format Trailer | | $^{R}_{S}$ |
| Format Header | | 06$^{G}_{S}$ |
| Formatted Data | Serial # (3S) = 1237<br>Item Code (P) = 12245678<br>Quantity (Q) = 100<br>Location (20L) = AB3-190<br>Container type (B) = KLT1424 | 3S1237$^{G}_{S}$P12245678$^{G}_{S}$Q100$^{G}_{S}$20LA3-190$^{G}_{S}$BKLT1424 |
| Format Trailer | | $^{R}_{S}$ |
| Format Header | | 06$^{G}_{S}$ |
| Formatted Data | Serial # (3S) = 1235<br>Item Code (P) = 12045678<br>Quantity (Q) = 100<br>Location (20L) = A6-193<br>Container type (B) = KLT1424 | 3S1235$^{G}_{S}$P12045678$^{G}_{S}$Q100$^{G}_{S}$20LA6-193$^{G}_{S}$BKLT1424 |
| Format Trailer | | $^{R}_{S}$ |
| Format Header | | 06$^{G}_{S}$ |
| Formatted Data | Serial # (3S) = 1228<br>Item Code (P) = 12005678<br>Quantity (Q) = 1000<br>Location (20L) = B3-196<br>Container type (B) = Carton | 3S1228$^{G}_{S}$P12005678$^{G}_{S}$Q1000$^{G}_{S}$20LB3-196$^{G}_{S}$BCARTON |
| Format Trailer | | $^{R}_{S}$ |
| Message Trailer | | $^{E}O_{T}$ |

The complete data stream is:

[)>[RS]06[GS]5JUN123456789A2B4C6D8E[GS]7Q8PK[GS]21LLC15C[GS]BPALLET[RS]06[GS]3S1234[GS]P12345678[GS]Q100[GS]20LB3-196[GS]BKLT1424[RS]06[GS]3S1236[GS]P02345678[GS]Q1200[GS]20LB3-196[GS]BCARTON[RS]06[GS]3S1237[GS]P12245678[GS]Q100[GS]20LA3-190[GS]BKLT1424[RS]06[GS]3S1235[GS]P12045678[GS]Q100[GS]20LA6-193[GS]BKLT1424[RS]06[GS]3S1228[GS]P12005678[GS]Q1000[GS]20LB3-196[GS]BCARTON[RS][EOT]

Using the data from the example above, "Looping" can encode the message in 240 characters of data, saving 34 characters.

The ANSI MH10.8.2 "Looping" structure, following the Hierarchical Level (HL) structure of the ASC X12 EDI 856 Ship Notice / Manifest, uses the Data Identifier "F", as illustrated in the example below.

In this particular example, the containers on the Mixed Load are sorted according to delivery location. The Hierarchical structure will accommodate almost any sortation approach.

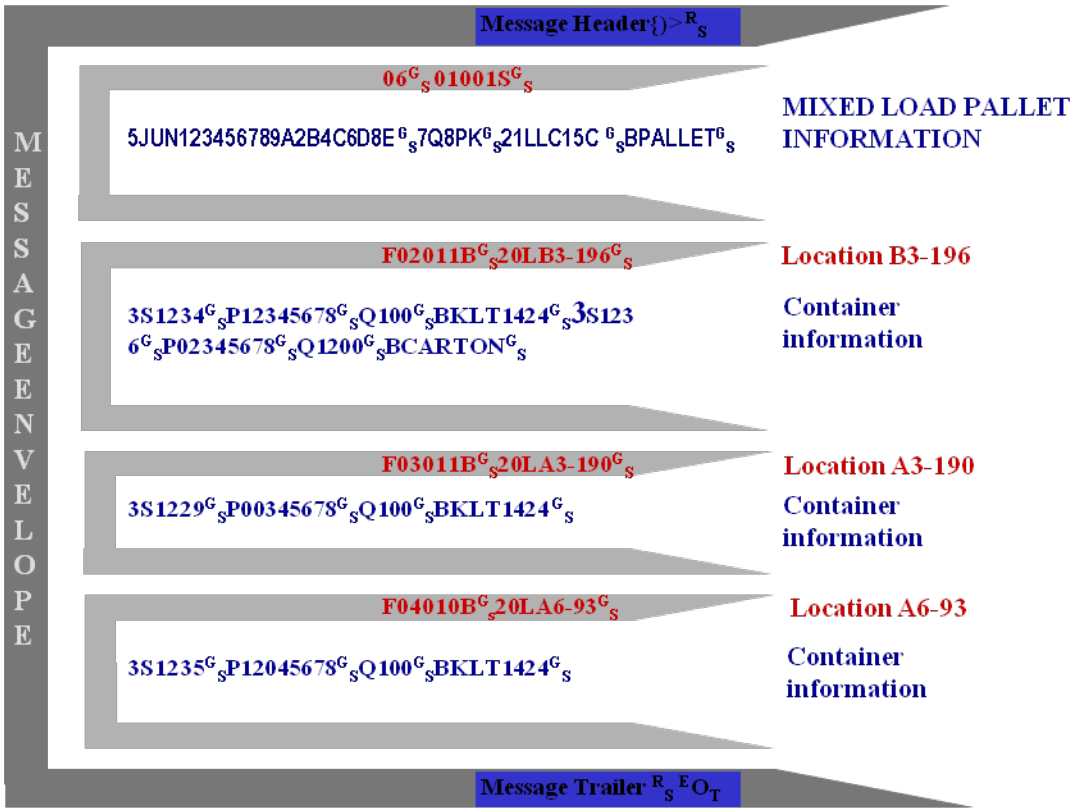



**Figure 52. Looping Structure for a Mixed Load encoding 240 Characters**

The structure of the "Header" information for the "Looping" hierarchy is as follows:

- Hierarchical ID Number: 2 alphanumeric characters
- Answers the question, "Who am I?"
- Parent ID Number: 2 alphanumeric characters
  - Answers the question, "Who is my Parent?"
- Child Code: 0 = No; 1 = Yes

- Answers the question, “Do I have a child?”

- Hierarchical Level Code: 1 or 2 characters. From Data Element 735 of the ASC X12 Data Element Dictionary
  - Answers the question, “What am I?”

The following examples describe the interpretation of the first two format headers in Figure 50.

**F01001S**

| | |
|---|---|
| F | is the DI for “Looping” |
| 01 | answers the question, “Who am I?” I am the highest level of this Hierarchy. |
| 00 | answers the question, “Who is my Parent?” Since this is the highest level of the Hierarchy, there is no parent. |
| 1 | answers the question, “Do I have a child?” The number “1” means “Yes,” there are subordinate segments. |
| S | answers the question, “What am I?” S = “S”hipment in Data Element 735 of the ASC X12 Data Element Dictionary |

**F02011B**

| | |
|---|---|
| F | is the DI for “Looping.” |
| 02 | answers the question, “Who am I?” I am the second level of the Hierarchy. |
| 01 | answers the question, “Who is my Parent?” Since this is the second level of the Hierarchy, “01” is the parent. |
| 1 | answers the question, “Do I have a child?” The number “1” means “Yes,” there are subordinate segments. |
| B | answers the question, “What am I?” B = “B”uyer’s location in Data Element 735 of the ASC X12 Data Element Dictionary. |

**Table 14. Looping Data format for Mixed Load encoding 240 characters of data**

| Portion of Message | Data | Formatted Data |
|---|---|---|
| Message Header | | []>$^{R}_{S}$ |
| Format Header | DI Format Indicator = **06**<br>DI for "Looping" = **F**<br>Hierarchy Level ID = **01**<br>Parent ID = **00**<br>Child ID = **1**<br>Hierarchical Level = **S** (Shipment) | 06$^{G}_{S}$ F01001S$^{G}_{S}$ |
| Formatted Data for Mixed Load Pallet | License Plate Information:<br>DI for Mixed Load = 5J<br>DUNS # = 123456789<br>Serial # = A2B4C6D8E<br>Quantity (7Q) = 8 packs (PK)<br>Location (21L) = LC15C<br>Container type (B) = Pallet | 5JUN123456789A2B4C6D8E$^{G}_{S}$7Q8PK $^{G}_{S}$21LLC 15C $^{G}_{S}$BPALLET$^{G}_{S}$ |
| Format Header | DI for "Looping" = **F**<br>Hierarchical level ID = **02**<br>Parent ID = **01**<br>Child ID = **1**<br>Hierarchical Level = **B** (Customer's ["B"uyer's] location)<br>DI for Location = **20L**<br>Location = B3-196 | F02011B$^{G}_{S}$20LB3-196$^{G}_{S}$ |
| Example of Formatted Data for Container #1 | DI for Serial # **(3S)** = 1234<br>DI for Item Code **(P)** = 12345678<br>DI for Quantity **(Q)** = 100<br>DI for Container Type **(B)** = KLT1424 | 3S1234$^{G}_{S}$P12345678$^{G}_{S}$Q100$^{G}_{S}$BKLT1424$^{G}_{S}$ |
| Formatted Data for Container #2 | Same data format as above | Data for remaining container at Location B3-196 |
| Format Header | DI for "Looping" = **F**<br>Hierarchical level ID = **02**<br>Parent ID = **01**<br>Child ID = **1**<br>Hierarchical Level = **B** (Customer's ["B"uyer's] location)<br>DI for Location = **20L**<br>Location = A3-190 | F03011B$^{G}_{S}$20LA3-190$^{G}_{S}$ |
| Formatted Data for Container #3 | Same data format as above | Data for container at Location A3-190 |
| Format Header | DI for "Looping" = **F**<br>Hierarchical level ID = **02**<br>Parent ID = **01**<br>Child ID = **1**<br>Hierarchical Level = **B** (Customer's ["B"uyer's] location)<br>DI for Location = **20L**<br>Location = A6-193 | F04010B$^{G}_{S}$20LA6-193$^{G}_{S}$ |
| Formatted Data for Container #4 | Same data format as above | Data for container at Location A6-193 |
| Message Trailer | | $^{R}_{S}$ $^{E}$O$_{T}$ |

A Master Load has the potential of saving even more data when using the "Looping" structure.

Following is an example of “Nesting” data for a Master Load.

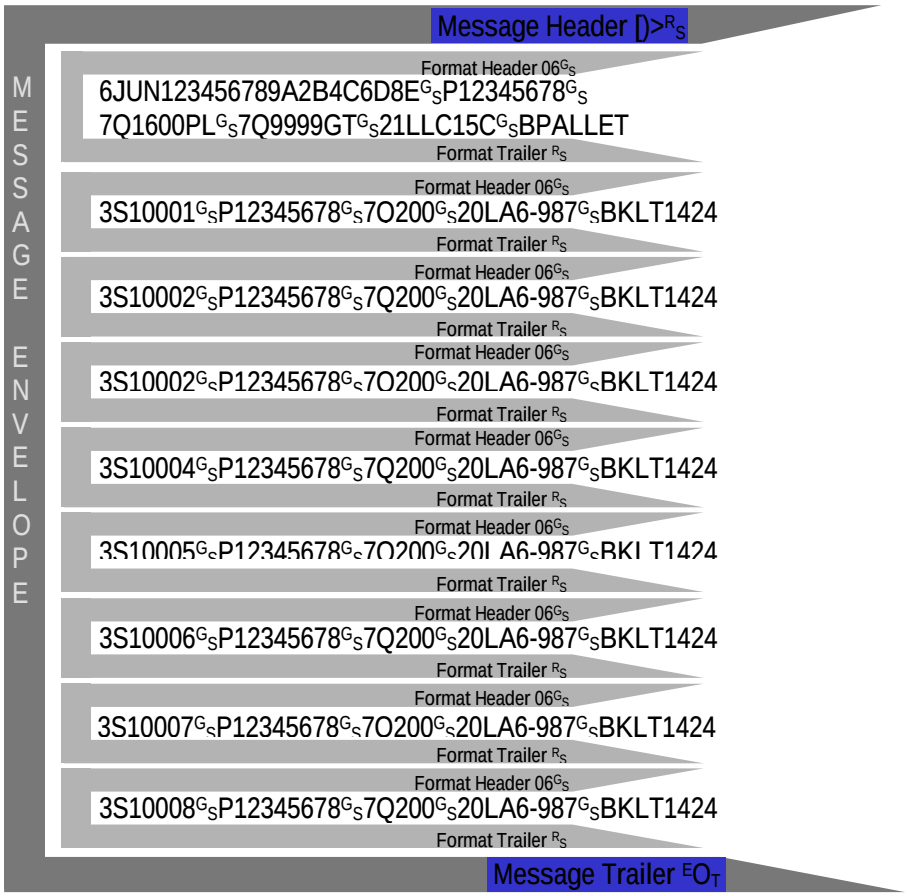



**Figure 53. Example of Master Load “Nesting” structure encoding 460 data characters.**

In this example, the same Part Number, Quantity, Location and Container Type are repeated eight times, along with the Format Envelope Header and Trailer information, requiring 460 data characters to encode the message.

Using “Looping”, the duplication is eliminated, thereby requiring only 203 data characters, saving 257 characters.

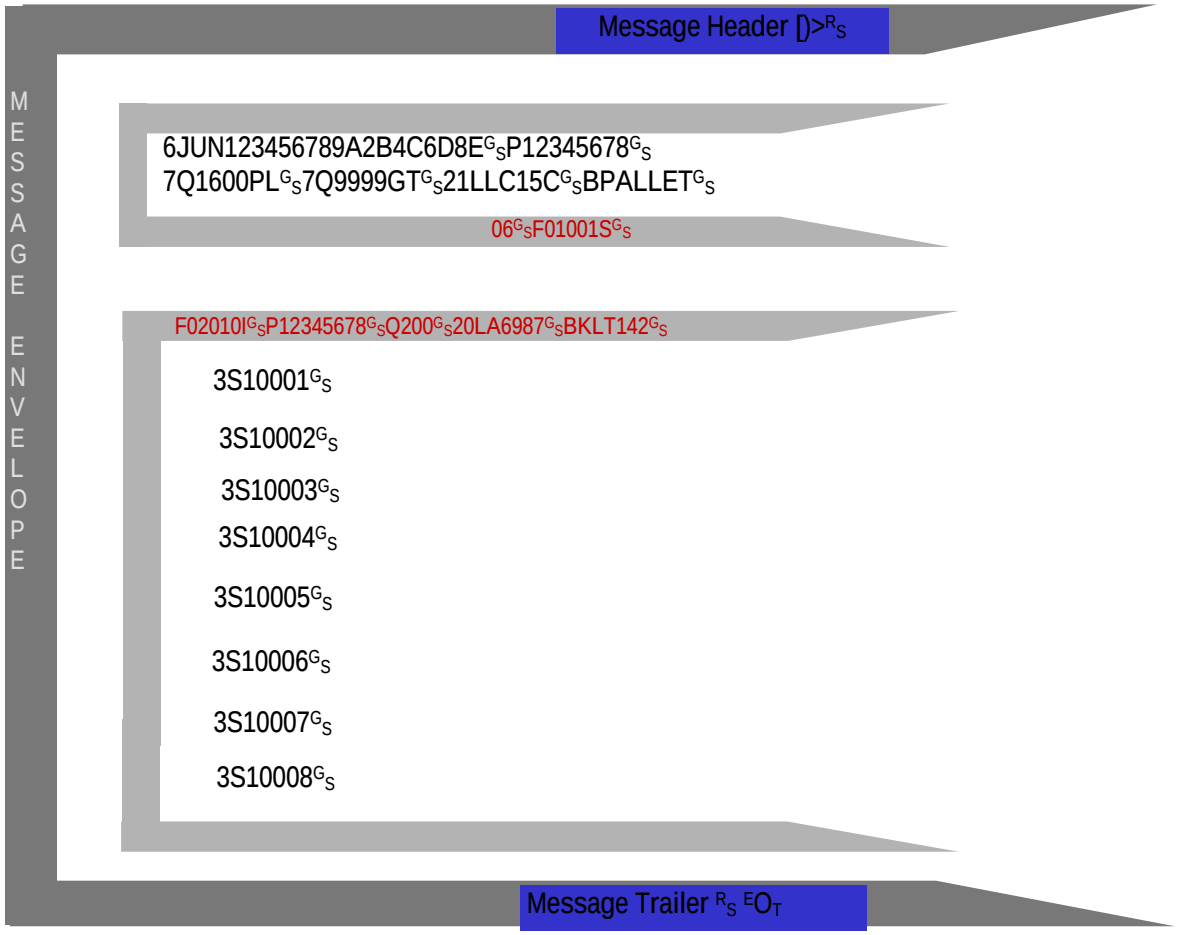



**Figure 54. "Looping" structure of Master Load encoding 203 characters of data.**

**Table 15. Master Load "Looping"**

| Portion of Message | Data | Formatted Data |
|---|---|---|
| Message Header | | [)>$^{R}_{S}$ |
| Format Header for first Format Envelope | DI Format Indicator = **06**<br>DI for "Looping" = **F**<br>Hierarchy Level ID = **01**<br>Parent ID = **00**<br>Child ID = **1**<br>Hierarchical Level = **S** (Shipment) | 06$^{G}_{S}$F01001S$^{G}_{S}$ |
| Formatted Data for Mixed Load Pallet | License Plate Information:<br>DI for Master Load = 6J<br>DUNS # = 123456789<br>Serial # = A2B4C6D8E<br>Part Number **(P)** = 12345678<br>Quantity (7Q) = 1600 (PL)<br>Quantity (7Q) = 9999 kilograms Gross Weight<br>Location (21L) = LC15C<br>Container type (B) = Pallet | 6JUN123456789A2B4C6D8E$^{G}_{S}$P12345678$^{G}_{S}$ 7Q1600PL$^{G}_{S}$7Q9999GT$^{G}_{S}$21LLC15C$^{G}_{S}$BPALLET$^{G}_{S}$ |
| Format Header for second Format Envelope | DI for "Looping" = **F**<br>Hierarchical level ID = **02**<br>Parent ID = **01**<br>Child ID = **0**<br>Hierarchical Level = **I** (Item)<br>DI for Item = **P**<br>Part Number = 12345678<br>DI for Quantity = **Q**<br>Quantity = 200<br>DI for Location = **20L**<br>Location = A6-987<br>DI for Container type = **B**<br>Container type = KLT1424 | F02010I$^{G}_{S}$P12345678$^{G}_{S}$Q200$^{G}_{S}$20LA6987$^{G}_{S}$ BKLT1424$^{G}_{S}$ |
| Example of Formatted Data for first Serial Number | DI for Serial # = **3S**<br>Serial # = 10001 | 3S10001 $^{G}_{S}$ |
| Formatted Data | Same data format as above | **Formatted Data for 7 remaining Serial Numbers** |
| Message Trailer | | $^{R}_{S}$ $^{E}$O$_{T}$ |

# *ANNEX I: RECOMMENDED FORMAT FOR COMPLIANCE SPECIFICATIONS*

The single-page documentation format described in this annex provides a common approach to creating documentation for customer labeling standards. This format has been shown to support the documentation requirements of QS-9000 and ISO 9000.

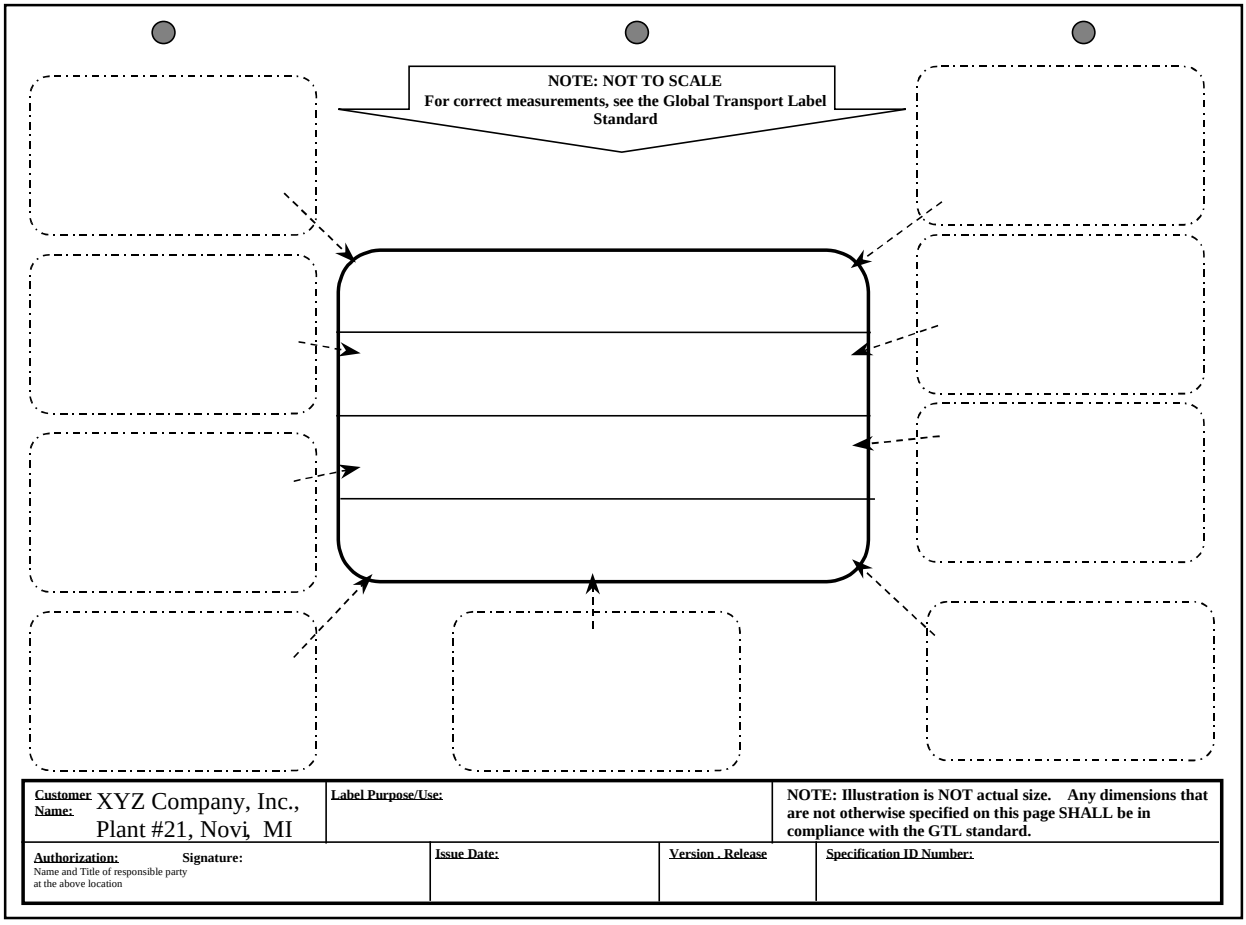



**Figure 55 Example of a Blank Customer Compliance Specification**

In the center of the suggested specification page should be an example of the label, printed according to the layout designed by the customer.

The example may need to be scaled down to 60 percent to 80 percent of the planned size. If the example is reduced, that should be noted on or below the example (see Figure 36).

The title block provides the information needed to properly track customer compliance specifications as required by ISO 9000 and QS-9000.

The title block should include:

- The name of the Customer (and, if necessary, the facility) for which this format is required.
- Contact information for the person (or department) at the Customer's location who is responsible for this label.
- The date on which the specification was issued, and its revision level.
- The situation in which this format is to be used (for example, container vs. pallet label).

“Balloons” around the edges of the label example should contain descriptions of the exact data needed inside each block or sub-block. The description balloon provided for a bar code or text block or sub-block should include:

- a name that can be used when referring to this sub-block,
- the title, if required, to be printed in this block,
- what data should go in the bar code or text data required,
- the Data Identifier to be used as the prefix of the data in the bar code and the maximum number of characters allowed in this field (both data length and Data Identifier length) or the maximum number of text characters allowed in this field and text font size.

The compliance specification sheet(s) should be sent to suppliers with a cover letter explaining its purpose and the relationship to the GTL document. At a minimum the cover letter should state:

- The name and phone number of a contact at the Customer company who can answer questions.
- The due date for the Supplier to reply indicating the Supplier’s intended date of compliance.
- The due date for submission of a sample label for evaluation.
- The due date to begin labeling.
- A requirement that this specification be kept in a file or binder along with a copy of the GTL standard and accessible to the people applying the labels, the people quality checking the label, and the people supporting the computer system that produces the labels.
- Information about how the Supplier can purchase a copy of the GTL standard.

# *ANNEX J: TEXT DENSITY (NUMBER OF CHARACTERS)*

**Table 16. Lines-Per-Block (LPB) Calculations**

| Lines Per Block | Character Height (Points) | Character Height (Millimeters) | Character Height (Inches) |
|---|---|---|---|
| 1 LPB | 72 pts | 25.4 mm | 1.00 in |
| 2 LPB | 36 pts | 12.7 mm | 0.50 in |
| 3 LPB | 24 pts | 8.4 mm | 0.33 in |
| 4 LPB | 18 pts | 6.4 mm | 0.25 in |
| 5 LPB | 14 pts | 5.1 mm | 0.20 in |
| 6 LPB | 12 pts | 4.3 mm | 0.17 in |
| 7 LPB | 10 pts | 3.6 mm | 0.14 in |
| 8 LPB | 8 pts | 3.2 mm | 0.13 in |
| 10 LPB | 7 pts | 2.5 mm | 0.10 in |

This table is provided as a reference only. Font sizes may vary depending on the software and printer used.

**Table 17. Table of correspondence valid for A6/AIAG 4x6: maximum number of characters by font size**

| Position | Font Size | Length (plus or minus 1) | Number of lines possible |
|---|---|---|---|
| **A1** - Ship From | 12 | 12 | 6 |
| | 18 | 8 | 5 |
| **A2** - Ship To | 20 | 16 | 4 |
| Plant / dock | 26 | 8 | |
| Plant / dock | 28 | 8 | |
| **B1** - Cust.Ref. #1 | 8 | 21 | 5 |
| | 10 | 20 | 4 |
| | 12 | 15 | 3 |
| | 18 | 12 | 2 |
| | 20 | 12 | 2 |
| | 26 | 8 | 2 |
| | 28 | 8 | 1 |
| | 36 | 6 | 1 |
| | 48 | 5 | 1 |
| **B2** - Cust Internal Routing | 18 | 13 | 2 |
| | 20 | 12 | 2 |
| | 26 | 8 | 2 |
| | 28 | 8 | 1 |
| | 36 | 7 | 1 |
| | 48 | 6 | 1 |
| **B3** - Cust.Ref. #2 | 12 | 14 | 3 |
| | 18 | 11 | 2 |
| | 20 | 11 | 2 |
| | 26 | 7 | 2 |
| | 28 | 7 | 1 |
| | 36 | 6 | 1 |
| | 48 | 5 | 1 |
| **C1** - Cust. Part No. | 26 | 27/30 | 1 |
| | 28 | 22 | 1 |
| | 36 | 17 | 1 |
| **D1** - License Plate | 26 | 20 | 1 |
| **D2** - Cust.Ref. #3 | 20 | 10 | 4 |
| | 26 | 9 | 3 |
| | 28 | 7 | 3 |
| | 36 | 6 | 2 |
| | 48 | 5 | 1 |
| | 72 | 4 | 1 |
| **E1**-Supplier Area | 8 | 31 | 8 |
| | 10 | 30 | 7 |
| | 12 | 21 | 6 |
| | 18 | 15 | 5 |
| | 20 | 16 | 4 |
| | 26 | 19 | 3 |
| | 28 | 17 | 3 |
| | 36 | 12 | 2 |
| | 48 | 10 | 1 |
| | 72 | 8 | 1 |

**Notes:**

- The guidelines in Table 7 are based on Arial Narrow Bold text samples populated with equal numbers of the four characters M, W, I and digit 1,
- The values may vary depending on:
  - Printing software,
  - Printer use,
  - Tolerances in sub-block dimensions

# *ANNEX K: PRECISION AND ROUNDING*

| PRECISION AND ROUNDING RULE | INTERPRETATION |
|---|---|
| When determining if a measurement falls within the specifications of this standard, the measurement shall be used only at the level of precision stated in the standard. | **PRECISION** is the degree of exactness with which a quantity is stated. That is, it is the number of significant digits (usually decimal places).<br><br>**ROUNDING** is the process used to reduce the precision with which a number is stated (that is, decrease the number of decimal places). Rounding is done in order to compare two numbers at the same level of precision. |
| Any measurement made with greater precision (that is, more decimal places) than that used in the document shall be rounded. | For example, if the specification for the size of an item is stated with one decimal place, any measurement of that item should be rounded to a single decimal place. |
| The rule used for rounding shall be: add 5 to the digit to the immediate RIGHT of the level of precision required, then drop (truncate) the extra digits -- those beyond the required level of precision. | As an example:<br><br>Assume the document states that a dimension has a measurement value of 0.6. Then the required precision is one decimal place.<br><br>If the measurement device used shows it to be a value of 0.6465, is that measurement "in spec"?<br><br>If one (1) digit of decimal precision is required, the measurement shall be rounded to a single decimal place, as follows:<br><br>1. Add 0.05 (2 digits) to the measurement: (0.6465 + 0.05 = 0.6965)<br><br>2. Drop the digits past (to the right of) the decimal required:<br><br>0.6965 yields 0.6, which is within specifications.<br><br>Note that the measurement (0.6465) would be "out of spec" if the standard specification had stated 0.64, since rounding to two decimal places would have given 0.65 (0.6465 + 0.005 = 0.6515 >> 0.65). |

As another example, assume the instrument used can measure to a certain number of decimal places of precision:

**Table 18. Rounding and Acceptable Measurements**

| Specification States | Rounding Factor | Acceptable Measurements on a.... | | |
|---|---|---|---|---|
| | | 2-DIGIT READING | 3-DIGIT READING | 4-DIGIT READING |
| 1 | 0.5 | 0.50 to 1.49 | 0.500 to 1.499 | 0.5000 to 1.4999 |
| 1.0 | 0.05 | 0.95 to 1.04 | 0.950 to 1.049 | 0.9500 to 1.0499 |
| 1.00 | 0.005 | 1.00 only | 0.995 to 1.004 | 0.9950 to 1.0049 |
| 1.000 | 0.0005 | cannot be used | 1.000 only | 0.9950 to 1.0040 |

# *ANNEX L: METRIC (MM) AND INCH CONVERSION REFERENCE*

**Table 19 Conversion Table MM to Inches and Inches to MM**

| mm | | inch | | inch | | mm |
|---|---|---|---|---|---|---|
| 0.5 mm | = | 0.019 inch | | 0. 5 inch | = | 12.699 mm |
| 1.0 mm | = | 0.039 inch | | 1.0 inch | = | 25.399 mm |
| 1.5 mm | = | 0.059 inch | | 1.5 inch | = | 38.099 mm |
| 2.0 mm | = | 0.078 inch | | 2.0 inch | = | 50.799 mm |
| 2.5 mm | = | 0.098 inch | | 2.5 inch | = | 63.499 mm |
| 3.0 mm | = | 0.118 inch | | 3.0 inch | = | 76.199 mm |
| 3.5 mm | = | 0.137 inch | | 3.5 inch | = | 88.899 mm |
| 4.0 mm | = | 0.157 inch | | 4.0 inch | = | 101.599 mm |
| 4.5 mm | = | 0.177 inch | | 4.5 inch | = | 114.300 mm |
| 5.0 mm | = | 0.196 inch | | 5.0 inch | = | 126.999 mm |
| 5.5 mm | = | 0.216 inch | | 5.5 inch | = | 139.699 mm |
| 6.0 mm | = | 0.236 inch | | 6.0 inch | = | 152.399 mm |
| 6.5 mm | = | 0.255 inch | | 6.5 inch | = | 165.100 mm |
| 7.0 mm | = | 0.275 inch | | 7.0 inch | = | 177.799 mm |
| 7.5 mm | = | 0.295 inch | | 7.5 inch | = | 190.499 mm |
| 8.0 mm | = | 0.314 inch | | 8.0 inch | = | 203.199 mm |
| 8.5 mm | = | 0.334 inch | | 8.5 inch | = | 215.900 mm |
| 9.0 mm | = | 0.354 inch | | 9.0 inch | = | 228.600 mm |
| 9.5 mm | = | 0.374 inch | | 9.5 inch | = | 241.299 mm |
| 10.0 mm | = | 0.393 inch | | 10.0 inch | = | 253.999 mm |

# *ANNEX M: NORMATIVE REFERENCES*

Normative references are cited at the appropriate places in the text and the publications are listed hereafter.

ANS X12, Data Element 355

ANSI X12.3, *Data element dictionary, Code List 355: Unit of Measure*

D-U-N-S® Number Users Guide

ISO 15394, *Packaging — Bar code and two-dimensional symbols for shipping, transport and receiving labels*

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

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

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

ISO/IEC 15418, *Information technology — Automatic identification and data capture techniques — GS1 Application Identifiers and ASC MH10 Data Identifiers and maintenance*

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 — PDF417 bar code symbology specification*

ISO/IEC 15459-1, *Information technology — Unique identifiers — Part 1: Unique identifiers for transport units*

ISO/IEC 15459-2, *Information technology — Unique identifiers — Part 2: Registration procedures*

ISO/IEC 16022, *Information technology — Automatic identification and data capture techniques — Data Matrix bar code symbology specification*

ISO/IEC 18004, *Information technology — Automatic identification and data capture techniques — QR Code bar code symbology specification*

ISO/IEC 19762-1, *Information technology — Automatic identification and data capture (AIDC) techniques — Harmonized vocabulary — Part 1: General terms relating to AIDC*

ISO/IEC 19762-2, *Information technology — Automatic identification and data capture (AIDC) techniques — Harmonized vocabulary — Part 2: Optically readable media (ORM)*

ANS MH10.8.2, *Data Identifiers and Application Identifiers*

ISO 216 – Writing Papers and Certain Classes of Printed Matters – Trimmed Sizes – A and B series

ISO 2955 – Information processing – Representation of International Systems and other units in Systems with Limited Character Sets

ISO 7000 -Graphical symbols for use on equipment - Index and synopsis

ISO 7001- Graphical symbols - Public information symbols

ISO 3166-1– International Standard for Codes for the Representation of Names of Countries

Odette Number User Guide (Not released for publication)

Additional North American references:

AIAG B-10 Trading Partner Label Implementation Standard (B-10 02.00 03/00)

AIAG B-14 Standard for Use of Two-Dimensional Symbols with AIAG Trading Partner Labels (B-14 01.00 12/97)

Contact the organizations listed below for information on the references listed in this document:

**AIAG documents:**

***Automotive Industry Action Group***
26200 Lahser Road, Suite 200
Southfield, MI 48034
Customer Service: 248-358-3003
Fax: 248-358-9760
Internet website: http://www.aiag.org

**DUNS & Documents:**

***Dun & Bradstreet***
One Diamond Hill Road
Murray Hill, NJ 07974-1218
Phone: 908.665.5000
Fax: 908.665.5803
Internet website: http://www.dnb.com

**ANSI, CEN and ISO documents:**

Internet website:
http://www.ansi.org
http://www.cenorm.be
http://www.iso.ch
http://www.autoid.org
ISO documents are also available through
all National Standards organizations

**Europe:**

***Odette International Limited***
Forbes House
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London SW1X 7DS
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Phone: +44 207 344 9227
Fax: +44 207 245 6093
http://www.Odette.org
(or contact your National Odette Organization)

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