POLICY GLOBAL BARCODE MARKING STANDARDS

ABOUT FLEX

Flex is a leading Electronics Manufacturing Services (EMS) provider focused on delivering complete design, engineering and manufacturing services to automotive, computing, consumer, industrial, infrastructure, medical, clean tech and mobile OEMs. Flex helps customers design, build, ship, and service electronics products through a network of facilities in 30 countries on four continents. This global presence provides design and engineering solutions that are combined with core electronics manufacturing and logistics services, and vertically integrated with components technologies, to optimize customer operations by lowering costs and reducing time to market.

1.0 BACKGROUND/INTRODUCTION

1.1. All manufacturers and suppliers packaging need to have required identification label (bar code and human readable legends.

2.0 PURPOSE

2.1. Flex requires the attachment of an identifying label on all different material packages on all shipments received.

2.2. The intent of this standard is to identify packages with a label that meets specific requirements, including presenting the information on the label in both human readable and bar code forms.

3.0 SCOPE

3.1. This standard covers both shipments made by the supplier to Flex directly (referred to as MRP in this document) and to shipments by the supplier to a 3PL hub for Flex projects (referred to as SIC in this document) in which they maintain title.

3.2. For Flex SMI / BAAN SIC (hubbed) parts and MRP parts, the data fields/content are requirements; however, the supplier may format the label (locations of data fields) based on its internal requirements. Because Flex is not assuming title for the SMI (hubbed) shipments, there are some data fields that can be left blank as the information is not relevant. This is outline below.

3.3. The primary intention of this standard is to facilitate automation within receiving and manufacturing operations using bar code technology. The label should be affixed to all material packages, boxes, cartons, pallets, cases, barrels, reels etc.

3.4. This Document does not require RoHS compliance for now, however Flex is addressing this in the documentation shown in the reference section above.

4.0 DEFINITIONS and ABBREVIATIONS

4.1. Barcode – a machine-readable representation of information in a visual format on a surface.

4.2. Label – a card, strip of paper etc., marked and attached to an object to indicate its name, contents, ownership, designation, etc.

4.3. EIA Standards – The Electronics Industry Association (EIA) standards

4.4. CEA Standards – The Consumer Electronics Association (CEA) Standards

4.5. Code 128 – a very high density alphanumeric bar code. The symbol can be as long as necessary to store the encoded data. It is designed to encode all 128 ASCII characters, and will use the least amount of space for

data of 6 characters or more of any 1-D symbology. Each data character is made up of 11 black or white modules. The stop character, however, is made up of 13 modules. Three bars and three spaces are formed out of these 11 modules. Bar and spaces can vary between 1 and 4 modules wide.

4.6. Code 39 – an alphanumeric bar code (sometimes called Code 3 from 9 or 3 of 9) designed to encode 26 uppercase letters, 10 digits, and 7 special characters. Each data character is made up of 5 black bars and 4 white spaces for a total of 9 elements. Each bar or space is either “wide” or “narrow” and 3 out of 9 elements are always wide.

4.7. ANSI – a standard published by American National Standards Institute.

4.8. ASCII – American Standard Code for Information Interchange is a standard that identifies letters, numbers, and various symbols by code numbers for exchanging data between different computer systems.

4.9. Data Identifier – a specific character, or string of characters, that defines the intended use of the data element that follows.

5.0 REFERENCES

Document Title	Document Number	Document \ Hyperlink
General Specifications on RoHS Compliance for Suppliers.	FBP-RHS001	http://app.flextronics.com/level2declaration/Documentation/FBP-RHS001_revD.pdf
The Electronic Components Industry Association copies are available from, EIA Engineering Publication Office, 2001 Pennsylvania Ave., N.W. Washington, D.C. 2006.	**ECIA** Standard	http://www.eciaonline.org/
The Consumer Electronics Association copies are available from, Global Engineering Documents, World Headquarters, 15 Inverness Way East, Englewood, CO USA 80112-576.	**CEA** Standards	http://www.ce.org/

6.0 POLICY STATEMENT

6.1. All manufacturers and suppliers that provide parts to Flex are required to follow this policy.

7.0 PROCESS FLOW CHART 7.1. N/A

8.0 1-DIMENSIONAL (1D) PROCEDURE

8.1. Barcode Specification: Flex requirement is to use Code 128 on all inbound shipments from suppliers. Code 39 shall be used as an option if supplier does not have Code 128 capability.

8.1.1. Code 128 check digits Provided

8.1.2. Supports full ASCII 128 character set

8.1.3. Allow the use of different prefixes / suffixes for better use of customer part identification (turnkey, consigned other)

8.1.4. Allow the use of different prefixes / suffixes for better use of customer part identification (turnkey, consigned other)

8.1.5. Code 39 with no check digits

8.1.6. The minimum height of bar code shall be 0.5 inches (13 mm)

8.1.7. The minimum height of the human readable interpretation shall be 0.2 inch (5mm) 8.1.8.

Narrow bar width, X dimension: 0.01 inches (0.254 mm) preferred.

8.1.9. Wide to narrow bar ratio: 2.5 to 3.0 preferred.

8.1.10. Leading and trailing quiet zone (the quiet zone is an area of completely white space to the left and the right of each bar code) of 0.25 inches is preferred and 0.17 inches is minimum.

8.2. **Label Format**: *Figure 1* illustrates standard bar code label format that will enable users to encode information required by automating receiving and manufacturing systems. The label also provides sufficient information for manual system to operate effectively.

8.2.1. For Flex MRP parts, the supplier must comply with this label format.

8.2.2. For Flex SMI parts (Hubbed), the supplier can use a label format of their preference; however, the data fields and content as defined below are applicable.

8.2.3. For Supplier Hubbed (SMI/SIC) parts, it is Flex intent to minimize our liability, and assure that the products in the Hub remains generic and useable by other customers. As such nothing in this document is intended to customize these products in such a way that it is no longer a commodity product.

Figure 1

Name	EAN, UPC	ITF	CODE39	CODABAR	CODE128
Symbol					
Character type	• Numeric values (0 to 9) only	• Numeric values (0 to 9) only	• Numeric values (0 to 9) • Alphabet • Symbol (-, ., space, $, /, +, %) • Start/stop character (*: asterisk)	• Numeric values (0 to 9) • Symbol (-, $, /, +) • Start/stop character (a to d)	• All ASCI codes [• Numeric values (0 to 9) • Alphabet, upper case/lower case • Symbol • Control character ([CR], [STX], etc.)]
Features	• Standardized as the distribution code.	• Allows a bar code size smaller than other bar code types with the same digits.	• Availability of alphabet and symbol allows indication of article numbers.	• Possible to indicate some alphabets and symbols.	• Supports all types of characters. • Allows the minimum size of bar code for indication with the numeric values only. (more than 12 digits)
Printable digits	13 digits or 8 digits	Even digits only	Any digits	Any digits	Any digits
Bar structure	• Four bar sizes • No start/stop character • Indicates one character with two bars and two spaces.	• Two bar sizes • No start/stop character • Indicates one character with five bars (or five spaces).	• Two bar sizes • Uses asterisk * for start/stop character. • Indicates one character with five bars and four spaces.	• Two bar sizes • Uses a to d for start/stop character. • Indicates one character with four bars and three spaces.	• Four bar sizes • Three types of start/stop characters. Each type supports its own character type. • Indicates one character with three bars and three spaces.
Application performance	• World universal code • Marked on most daily goods • Book industry	• Standardized as the distribution code.	• Widely used as the industrial bar code. • Automobile Industry Action Group (AIAG) • Electronic Industries Alliance (EIA)	• Blood bank • Slip of door-to-door delivery service (Japan)	• Starts to be used as EAN-128 in each industry. • Distribution business industry • Food industry • Medical industry

8.3. **Label Data Elements**: *(Figure 2)* This section defined all sixteen (16) of the data fields on the label and the Data Identifier (prefix). This section is followed by different tables outlining which are required based on if the item is MRP or SMI (Supplier Hubbed) and also depending on marking level.

8.3.1. The ship from: Supplier name, shipping address in human readable form.

8.3.1.1. Including the Supplier ID is optional for SMI (hubbed) parts and MRP parts.

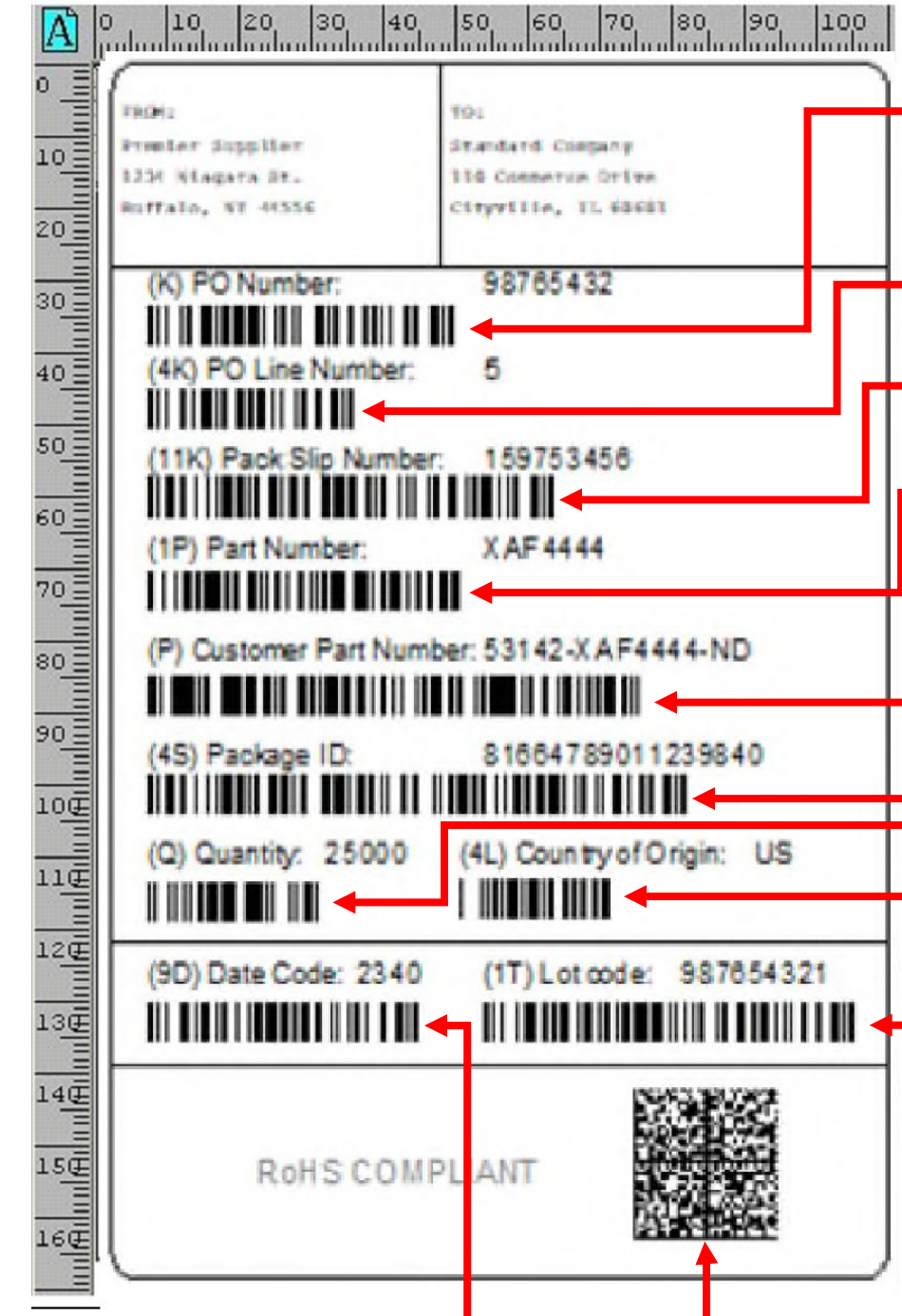
8.3.1.2. Supplier will need to contact purchasing to obtain supplier ID

8.3.2. The ship to: Flex shipping address, in human readable form.
8.3.3. Manufacturer packing slip number in bar coded and human readable form.
8.3.4. Purchase order number, in bar coded and human readable form. Data identifier (prefix) for this data field is 14K for purchase order with line number and K for purchase order without line number.
8.3.5. Flex part number, in bar coded and human readable form. Data identifier (prefix) for this data field is P.
8.3.6. Manufacturer Part Number in bar coded and human readable form. Data identifier (prefix) for this data field is 1P.
8.3.7. Quantity, in bar coded and human readable form. Data identifier (prefix) for this data field is Q for quantity and 7Q for quantity plus measure.
8.3.8. Date Code Marking per EIA standard 476, in bar coded and human readable form. Data identifier (prefix) for this data field is 9D.
8.3.8.1. This code is determined by supplier in accordance with EIA standard 476 which provides for date code format of YYWW where YY is the year (e.g., 97 for 1997) and WW is the week of the year in which product was manufactured (e.g., 12 designates the 12th week of 1997)
8.3.8.2. For components that do not use date code it is not required.
8.3.8.3. In the event multiple date codes are consolidated inside a master carton, pallet or shipper box, this field can be blank.
8.3.9. LOT / Batch number unique to the supplier will be necessary for material traceability purposes for FDA/GMP or Bellcore compliance. Number of characters is limited to 11 maximum. This should be in bar coded and human readable form. Data identifier (prefix) for this data field is 1T for lot number and Z for lot number with expire date.
8.3.10. Supplier Package ID, unique to the supplier in bar coded and human readable form. Data identifier (prefix) for this data field depends on the type of shipment, see below :

3S – Single order, single item, single transport package
4S – Single order, single item, multiple transport packages
5S – Single order, multiple items, single transport package
6S – Multiple orders, single item
7S – Multiple orders, multiple items

8.3.11. The Package Count (the package count should be indicated as the form X of Y, where X is the number of package and Y is the total number of packages), in human readable form.
8.3.12. The Package Weight (weight shown should be accompanied by unit of measure), in human readable form.
8.3.13. Country Of Origin (COO), in bar coded and human readable form. This to indicate the Country where the parts were manufactured. Data identifier (prefix) for this data field is 4L and the Country is indicated as a two letter code from the ISO3166 country code list.
8.3.14. Purchase order line number, in bar coded and human readable form. Data identifier (prefix) for this data field is 4K.
8.3.15. Packing Slip Number, in bar coded and human readable form. Data identifier (prefix) for this data field is 11K.
8.3.16. Moisture Sensitive Level (not required for non moisture sensitive items), in bar coded and human readable form. Data identifier (prefix) for this data field is 13E and the Level is indicated as a one or two character code from the J-STD-020 standard code list.

Figure 2 – Indicative Sample



Purchase order (without line #) K is the prefix, Eg. K98765432

Purchase order (with line #) 14K is the prefix. Eg. 14K98765432

Purchase order line number (4K prefix)

Packing Slip Number (11K prefix)

Manufacturer Part Number (1P prefix)

Customer Part Number (P prefix)

Package ID (3S, 4S, 5S, 6S or 7S are the prefixes)

Quantity (Q is the prefix)

(7Q is the prefix for Quantity with unit of measure eg. 7Q2000pcs)

Country Of Origin (4L is the prefix)

Lot Code (1T is the prefix for Lot Code without Expiry Date)

(Z is the prefix for Lot Code with Expiry Date eg. Z+<LotCode>+YYYYMMDD)

Date Code (9D is the prefix eg. 9DYYWW))

2D Barcode

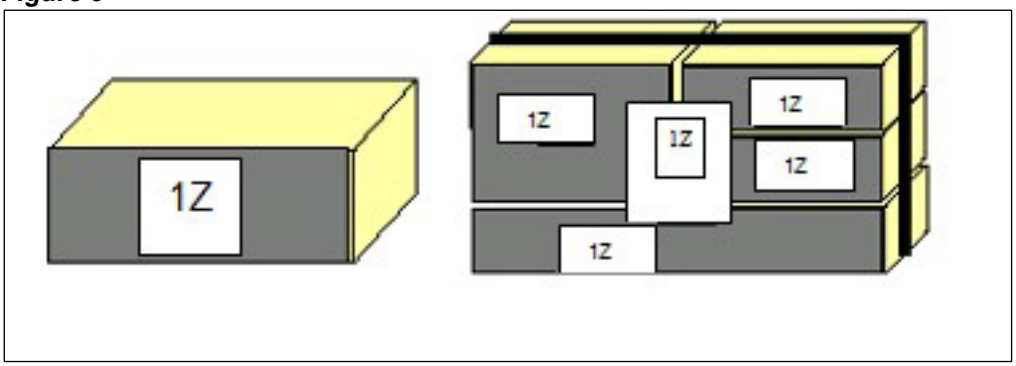
8.4. Label Information

8.4.1. Outer Box / Shipment Label: When complete marking is required, it should be arranged in accordance with the model below. If shipment packaging contains more than one order number or order line number; a separate agreement has to be made between shipper and Consignee. Table 1 (Below) contains the required data for Outer box / Shipment label. Figure 3 shows the label placement.

Table 1

		Required for Supplier Hubbed Parts (SIC)	Required For Flex Owned Parts (MRP)
1	Supplier name, Shipping Address and Supplier ID	Yes	Yes
2	Ship To Address	Yes	Yes
3	Packaging Slip Number	Yes	Yes
4	Purchase Order Number	Optional	Yes
5	Flex Part Number	Optional	Yes
6	Manufacturer Part Number	Yes	Yes
7	Description	Optional	Optional
8	Quantity	Yes	Yes
9	Date Code	Yes	Yes
10	Lot / Batch Number	Yes	Yes
11	Supplier Package ID	Yes	Yes
12	Package Count	Yes	Yes
13	Package Weight	Yes	Yes
14	**Country Of Origin**	**Yes**	**Yes**

Figure 3



8.4.2. Inner Box Label

8.4.2.1. The product packing label should follow the standards mention above.

8.4.2.2. For the inner box label the below figure *(Figure 4)* and table *(Table 2)* show the data requirements for both SMI and MRP parts.

8.4.2.3. All inner container require:

8.4.2.3.1. Date code.

8.4.2.3.2. lot / batch number and

8.4.2.3.3. Component Revision Level for Flex customized materials or components. This should be in human readable form.

8.4.2.4. For the difference between inner box label and shipment label location, refer to figure 4 below.

Figure 4

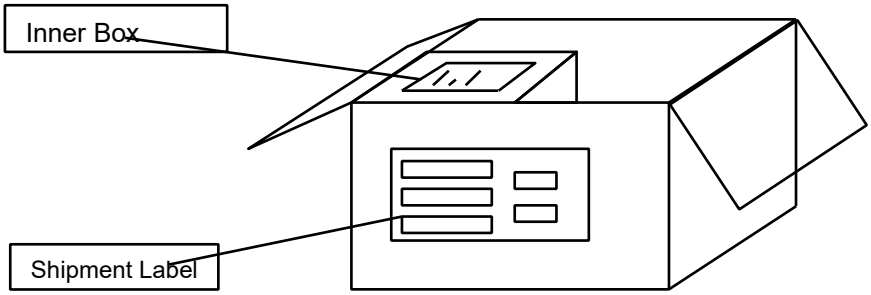


Table 2

TABLE 2		Required For Supplier Hubbed Part (SIC)	Required For Flex Parts (MRP)
1	Purchase Order Number	Optional	Yes
2	Flex Part Number	Optional	Yes
3	Manufacturer Part Number	Yes	Yes
4	Description	Yes	Yes
5	Quantity	Yes	Yes
6	Date Code	Yes	Yes
7	Lot / Batch Number	Yes	Yes
8	Corporate Trademark / Manufacturer Name	Yes	Yes
9	Country of Origin	Optional	Yes
10	**Component Revision Level per 8.4.2.3.3**	Yes	Yes

8.4.3. **Inner Pack General Labeling Instructions**

8.4.3.1. When components are purchased from Distribution, Brokerage, Flex sites, or Customers, factory sealed packages should not be opened unless specifically required by purchasing site or additional liability may be incurred

8.4.3.2. Shipping company should label product to the smallest possible factory package size, without making components Non-Cancelable Non-returnable (NCNR) or incurring liability.

8.4.3.3. In the event quality inspection is required prior to shipping for parts being purchased from Distribution or Flex, Shipper must follow guidelines for quality inspection and re-packing of components, which may require vacuum sealed packing.

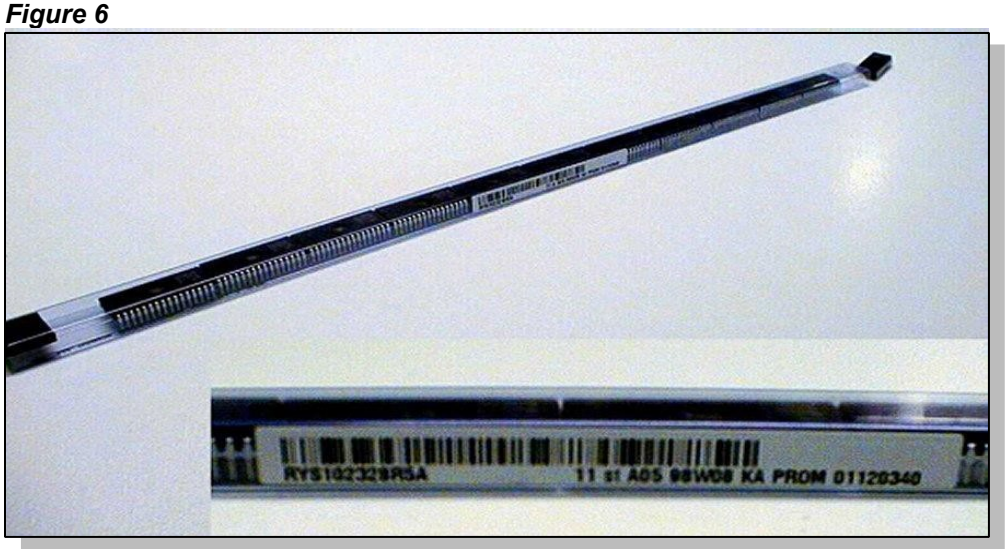
8.4.3.4. Labeling from original manufacturers should include manufacturing part number, lot number and date code for all inner packs. Certain Flex facilities have additional bar code labeling requirements for inner pack bags/reels/spools. When requested by any Flex facility, their documented special labeling requirements must be complied with.

8.4.3.5. Tape and Reel, Tubes and Trays label content guidelines: There are presently no international standard or user guidelines available for tape, sticks, and reel labeling (inner packaging used for insertions of components into mounting machines). The basic information content of the label as below *(Table 2)* is therefore a strong recommendation that should be duly noted by the supplier. The size and layout of the label is proposed by the supplier and approved by Flex .

Note: For Dimensions of labels please refer to Code 128 specifications in figure 1.

Component Sticks: On component sticks the label shall be placed in the centre of the tube according to the below picture. *(Figure 6)*

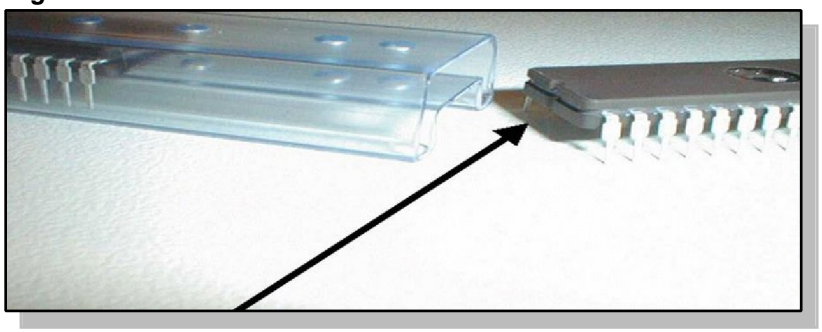
Figure 6



Orientation of Components in Sticks *(Figure 7)*

It is important that the label is placed correctly; otherwise the operator cannot read it in the mounting machine. Refer to Table 2 (section 8.4.2.4) for label contents.

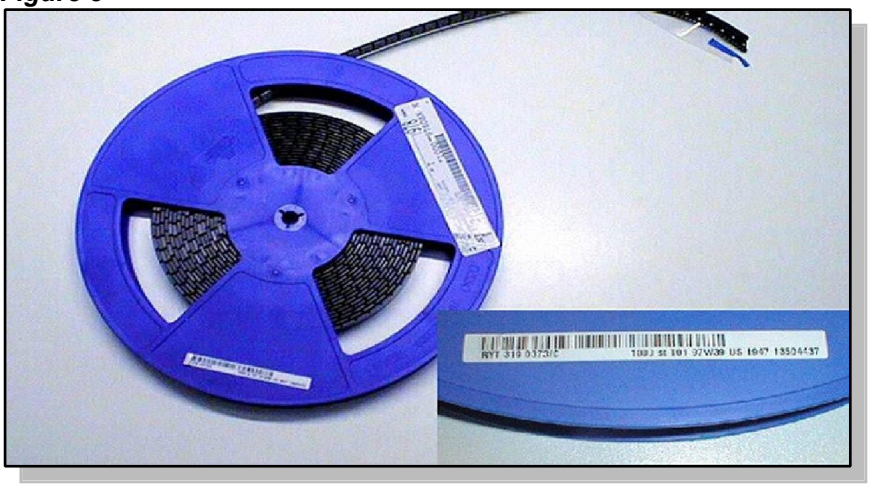
Figure 7



8.4.3.6. **Component Reels:** Component reels shall be marked with the label as far to the right as possible on the reel and with the text outward turned according to *Figure 8*. On certain reels there is no space to mark according to the description. They are then marked, if possible, on prescribed side with optional placing (e.g. on a spoke). If this is not practically possible the reel shall be marked with a label on the opposite side, preferably close to the edge as shown in the picture. Refer to Table 2 (Section 8.4.2.4) for label contents.

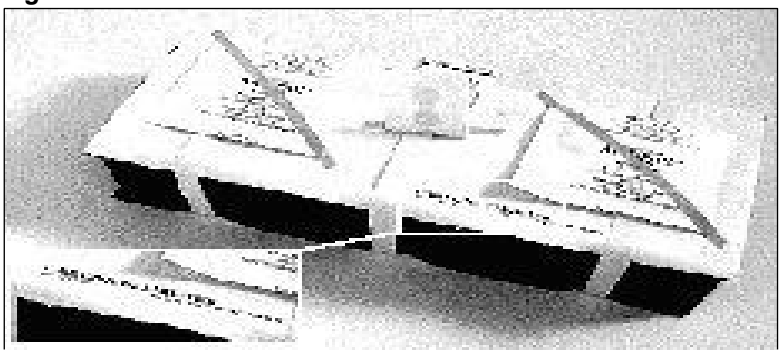
It is important that the label is correctly placed, otherwise the operator cannot read it in the mounting machine.

Figure 8



8.4.3.7. **Trays:** *(Figure 9)* Trays are normally delivered in bundles, with protective material e. g. corrugated cardboard around. Dry-pack is also used. The label is placed on the topside according to the picture. Refer to Table 2 (Section 8.4.2.4) for label contents.

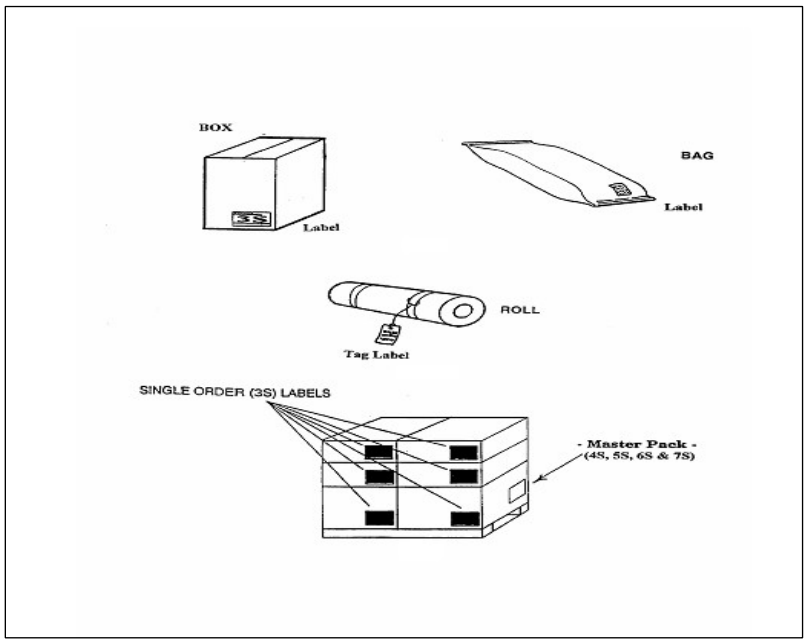
Figure 9



8.4.3.8. **Other Materials:** Material that is not packed as sticks or rolls is marked so that the label is as readable as possible. Placement of the label and size of the label are decided by the size and the form of the packing.

8.4.4. **Label placement:** *(Figure 10)* Whenever possible, the label should be affixed to the smaller end of the package or shipping container, which might be facing the aisle if the package is stored on the shelving or racks, to permit easy identification. If a label cannot be affixed because of package or container type, shape or other constraints, the label shall then be affixed to an attached tag.

Figure 10 - Labels Placement - Single Product & Master Pack


BOX
Label
BAG
Label
ROLL
Tag Label
SINGLE ORDER (3S) LABELS
- Master Pack -
(4S, 5S, 6S & 7S)

9.0 2-DIMENSIONAL (2D) PROCEDURE

9.1. **Specification:** The two types of acceptable 2D barcode specifications are **PDF417** and **Data Matrix ECC 200.**

PDF417 (Sample)

Data Matrix ECC200 (Sample)

9.2. **Label Data Elements :** See section 8.3

9.3. **Label Information :** See section 8.4

9.4 **Message Format**

This section defines the formatting for the data content of the 2D barcode. The same message formatting is used for both the Data Matrix and PDF417 barcodes.

9.4.1 **General Structure**

The format is made up of a header, data stream, and trailer, with special character sequences used to identify each part and to separate each piece of data.

- Header (Optional) – A special sequence of characters identifying the start of the message.
- Data Stream – The data encoded in simple text format
- Trailer (Optional) – A special sequence of characters that identifies the end of the message.

Here is an example of how the data would be formatted with the header, data stream, and trailer identified:

HEADER	DATA	TRAILER
[)>|	K98765432|4K5|11K159753456|1PXAF4444|P53142-XAF4444-ND|4S81664789011239804|Q25000|4LUS|9D2340|1T98765432	|

9.4.2 **Special Character**

The “Compliance Indicator” is a sequence of three characters that is used to begin the message.
The other special characters used in the message are the Record Separator, Group Separator, and End of Transmission characters. These are non-printable “Control Characters” and cannot be directly displayed in text format. This document displays them using the representations shown in the “Character” table in the following chart. Included in the chart are the ASCII and HEX values for these characters.

Name	Character	ASCII value	HEX value
Compliance Indicator	[]> *(three characters)*	91, 41, 62	5B, 29, 3E
Record Separator	Not Applicable	Not Applicable	Not Applicable
Group Separator	|	124	7C
End of Transmission	Not Applicable	Not Applicable	Not Applicable

9.4.3 **Header**

This is the first portion of the data that will be encoded into the barcode.

[)>

This sequence of characters identifies to the barcode reader where the message begins.

The header is an optional data element.

9.4.4 **Data Stream**

The data stream makes up the middle portion of the encoded data. Each data element (purchase order number, customer part number, lot code, etc.) will follow the same formatting pattern when encoded. Data elements are separated by the Group Separator special character. Below is an example that shows how a supplier part number would be formatted:

DATA IDENTIFIER	DATA	GROUP SEPERATOR
1P	XAF777A1	|

The data stream is comprised of these segments, each following the same pattern – Data Identifier, Data, Group Separator.
If the data element is the last data element in the data stream, the Group Separator is not required, but if present will not impact usability.

9.4.5 **Trailer**

This the final portion of data that is encoded to let the barcode reader know that the formatted data and message is complete:

| (ie. ASCII value 124)

The Trailer is an optional data element.

10.0 RESPONSIBILITY

9.1. Changes to this procedure can only be made by approval of the Global Procurement Operations Team. Request for changes can be addressed to the team by anyone using this process.

9.2. It is the responsibility of each Site / Regional / Segment Materials to provide the suppliers with latest version of "Supplier Reference Manual – Extract of Global Barcode Marking Standards Policy" – please refer to Appendix A (Section 12.1) .

9.3. It is the Suppliers responsibility to acknowledge and comply with Flex policy on barcode marking standard.

11.0 TRAINING REQUIREMENTS

10.1. Reference to this document for the label format and specification

12.0 DOCUMENT REVIEW AND APPROVAL REQUIREMENTS

11.1. This document need to be reviewed and approval on DMS system.

13.0 ATTACHMENTS/APPENDICES

12.1. Appendix A: Supplier Reference Manual - Extract of Global Barcode Marking Standards Policy.