

An \_\_\_\_\_  
**American Furniture  
Manufacturers Association  
(AFMA) Convention**

**For  
Bar Code Labeling**

Developed through the work of AFMA's Bar Code Task Group. Special appreciation is due to those individuals responsible for the development and promotion of this work. Individuals actively involved in this development and promotion include:

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## Bar Code Label Convention

### Introduction

The American Furniture Manufacturers Association (AFMA) believes that utilization of automatic identification technologies can significantly improve the efficiency and accuracy of the handling of products by the furniture industry and its customers, suppliers, and other trading partners. Of these, bar code technology is the most widely used and readily available; its use within the furniture industry has existed for several years.

Many of the companies within AFMA have received requests from their customers for bar code labels on the products that they buy. In 1989, with the encouragement and support of its members American Furniture Manufacturers Association (AFMA), the National Home Furnishings Association (NHFA), and the International Sleep Products Association (ISPA) joined with the belief that the distribution channel for products and services within the furnishings industry had sufficiently matured to support the development, voluntary acceptance, and implementation of standards that would facilitate the movement of materials and information between trading partners.

In May, 1989 AFMA/NHFA published its *Bar Code Marking Standard for the Furnishings Industry* identifying the format for bar code markings to be used between trading partners. AFMA/NHFA has recommended a format of either marking in accordance with a format compatible with developing national guidelines (ANS MH10.8M-1993), namely the use of formats identified with FACT Data Identifiers (DIs) and in the Code 39 symbology or alternately with UPC marking.

In 1989 AFMA/NHFA retained the services of Q.E.D. Systems to assist members in the implementation of bar code marking. Members with questions relating to this document, the *Bar Code Marking Standard for the Furnishings Industry*, UPC coding and marking, ANS MH10.8M-1993 marking, FACT Data Identifiers (DIs), Code 39, Check Characters, issues of implementation, or equipment selection are encouraged to contact the AFMA/NHFA Data Collection Consultant, Craig K. Harmon, President, Q.E.D. Systems, P.O. Box 2524, Cedar Rapids, IA 52406-2524 Telephone: 319.364.0212; Telefax: 319.365.8814.

In January, 1991 AFMA/NHFA re-released its *Bar Code Marking Standard for the Furnishings Industry*, in view AFMA requested and FACT approved new data identifiers as well as recent publications of American National Standards relating to Bar Code Print Quality and Bar Code Symbols on Unit Loads and Transport Packages.

In September, 1993 the AFMA Bar Code Standards Committee met and concluded that with the efforts put forth by the Uniform Code Council (UCC) to meet the needs of the commercial and industrial market segments (including furniture) and the increased importance that electronic data interchange (EDI) was playing in trading partner relationships, the bar code requirements for the furniture industry should be more closely cabined with specific reference to the use of UCC/EAN structures in EDI documents such as the ANSI ASC X12 856 (Ship Notice/Manifest). The Bar Code Label Convention addresses that cabining and alignment.

### Why EAN/UCC Standards with Code 128 Instead of Code 39?

Since 1980 three basic techniques of product bar code marking have existed:

- The use of Code 39 with Customer Part Numbers
- The use of Code 39 with Supplier Part Numbers
- The use of the standards of the Uniform Code Council (UCC) and EAN International (EAN).

Until 1991, the focus of UCC had been that of the retail industry, and the grocery industry in particular. In 1991 the UCC began to commit its resources to the assistance of the industrial and commercial marketplaces. This effort culminated in the issuance of the UCC's Industrial and Commercial Guidelines in 1992.

These Guidelines were developed with several specific goals AFMA hoped to achieve through its revision of the guidelines:

- The need to adopt an efficient product identification/ bar code system that can easily and precisely identify a product and its quantity with one bar code scan.
- As traditional boundaries between the furniture industry and other markets continue to fade both domestically and internationally, the need to adopt a product identification/bar code system that would be common to the wider global user community.
- The need for a product identification/bar code system that would seamlessly integrate with the disciplines of EDI and standardized business forms.

Some important benefits were immediately derived from :

- A clear, concise, publication that explains how product identification and bar coding should be handled in the furniture wholesale distribution marketplace.
- A direct, mutually supportive, relationship with the Uniform Code Council. In addition to its well-known role as assignor of manufacturer identification numbers throughout the retail, commercial and industrial sectors, the UCC maintains the U.P.C. numbering system, bar code and symbol quality standards, as well as providing vital research and development and educational programs to ensure success in implementing their systems.
- A product numbering system and a bar code standard that is understood and supported globally through UCC's ongoing relationship with EAN International (EAN).
- A bar code standard allowing product identification and product quantity to be read with one scan of the bar code reader.
- A product numbering and bar code system that can be smoothly integrated into the dual productivity disciplines of EDI and standardized business forms.

A "win-win" scenario indeed.

The following is a summary of the guidelines detailed in the *Furniture Industry Implementation Guideline For Bar Code Technology Bar Code Label Convention* and the *UCC Industrial and Commercial Guidelines*.

- All products, down to the consumer sales unit, need to be assigned a U.P.C. product identification number and bar code marked with the appropriate symbology.
- For purpose of manufacturing numbering, U.P.C. product identification numbers consist of a six digit manufacturer identification number assigned by the Uniform Code Council and a five digit product number assigned by the Manufacturer.
- For purpose of customer data collection, EAN/U.P.C. product identification numbers should be considered as an twelve-digit EAN/U.P.C. base number, plus check digit (in the case of U.P.C., the left-most position is always a zero "0").
- Single sales units shall be bar code marked utilizing the U.P.C.-A Symbology and/or Interleaved Two of Five Symbology (ITF-14) with a Packaging Indicator (PI) of "0" as appropriate.
- Overpacks are to be encoded with the U.P.C. Shipping Container Symbology (Interleaved 2 of 5 Bar Code) using the first digit as a package level indicator. A matrix of quantity by product and assigned package level indicator level must be made available to distributors and customers.
- The EAN/UCC-128 Symbology should be used for supplemental information such as destination postal code, container license plate (U.P.C. Serial Shipping Container Symbol), purchase order number, serial number, date of manufacturer, or quantity as appropriate.

Depending on your position in the corporation, an awareness of these highlights may be as much technical detail as you personally need on a short term basis. However, in the long term, a thorough review of the *American Furniture Manufacturers Association Implementation Guideline For Bar Code Technology Bar Code Label Convention* and the *UCC Industrial and Commercial Guidelines*, continuing education and staff training, and a top-down corporate commitment is required to ensure the development and implementation of a successful product identification and bar coding strategy.

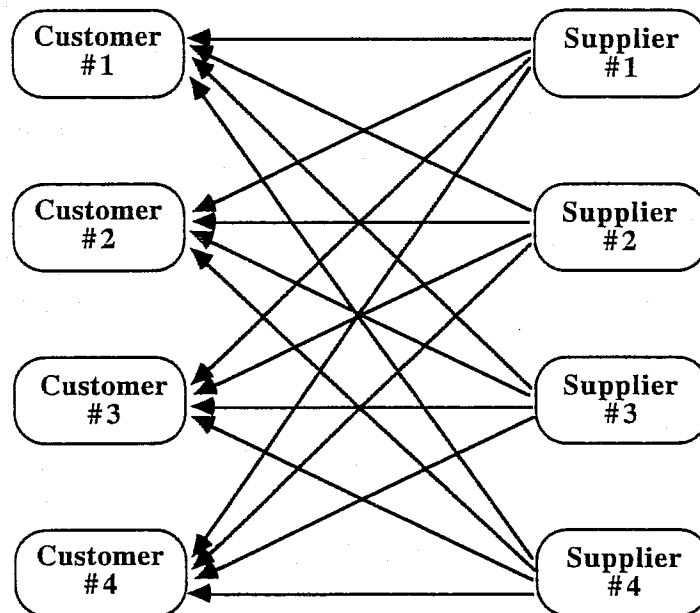
**Supplier vs. Customer Product Codes**

Two types of product coding structures are typical. The first product code is one that is for general trade. General trade products are those where multiple customers receive the same product. The second variety of product code is one that is unique to a specific customer, i.e., a custom product.

Manufacturers with product destined for the general trade should mark their products with the manufacturer's product code. Either the manufacturer's product code or the customer's product code could appear on custom product. Mutual agreement between the trading partners should dictate which product code to use for custom product.

Some customers may request unique marking of product shipped to that customer. If the product is unique to that customer, such requests are reasonable. Suppliers should endeavor to provide bar code markings consistent with reasonable industry standards. Suppliers should communicate their part numbers and supplier identification to their customers. ANS X12 EDI (Transaction Set 832 - Price/Sales Catalog) or UN/EDIFACT (Message PRICAT - Price-Sales Catalog) may best serve this trading partner communication. Customers requesting customer-specific marking of general trade should become aware of the supplier's cost of marking product specifically for that customer. These costs include the additional cost for handling, labels, ribbon, amortization of equipment, label application, and profit margin. Since in all likelihood the customer is not known for general trade product at the point of packaging, supplier product codes are the only cost effective method of bar code marking.

The figure below shows an example of the problems associated with customer-specific marking. Each of the four suppliers sells one product to each of the four customers. If the trading channel uses supplier product codes, there are four codes. If the trading channel uses customer product codes, there are 16 codes. Customers who have an internal number to identify the product may establish an alias to identify that product. The database can have two indices, supplier code and internal code (alias). The input of either number can access and update the status of the physical product. The use of supplier product codes, internally and within the trade channel, limits the number of codes to the number of products in the channel. Establishing customer aliases doubles the number of codes. The use of customer product codes arithmetically raises the number of codes used within the channel linearly by the number of customers within the channel.



### ***Why Would a Supplier Not Wish to Use the Customer's Part Number?***

The most cost effective point at which to mark a product is on the production line. At any other point in the distribution of the product, containers must be opened and labeling then applied to the individual items as well as the shipping container. The point at which the customer is known is at order fulfillment, not at the packaging line. Some, though very few organizations manufacturer items to order, but most in this century will continue to build to stock. To use the customer's part number when marking product, concludes that marking will occur only when the customer is known. To wait until the customer is known, in most cases, denies the supplier the opportunity to take advantage of machine-readable markings between the packaging line and order fulfillment. Marking product at order fulfillment means a post-production process which is far more costly than marking product on the packaging line.

### ***Why Would a Customer Not Wish to Use the Supplier's Part Number?***

Supplier part numbers historically have been variable length, alphanumeric, with embedded significant special characters. Customers know what they call an inbound product, they ordered it. However, they may not know how the supplier identifies this product. Regrettably most EDI conventions first implement the Purchase Order (850) not the Catalog (832); therefore the customer orders based on their stock keeping unit (SKU) code, not the supplier's. Customer part numbers can be cross-referenced to supplier part numbers in other EDI documents such as ANSI ASC X12 856 (Ship Notice/ Manifest) or UN/EDIFACT Despatch Advice (DESADV).

To employ supplier part numbers may mean that the product database to support incoming product must support a product code length equal to the longest part number of any supplier. Therefore, all product code fields would need to be equal in length to the longest part number; and while memory may be cheap, memory management is not cheap. Additionally, supplier A may have one part number and supplier B the same part number. Without some way to uniquely identify the manufacturer, confusion may develop between the part number of supplier A and that of supplier B. If customers were going to use supplier part numbers the suppliers' part numbers would need to uniquely identify the supplier as well as the product.

The most desirable product codes for all trading partners are fixed-length, numeric, check-digit protected product codes which includes the identity of the manufacturer. That system already exists; it is called U.P.C. and EAN.

### ***Alphanumeric vs. Numeric Product Codes***

Coding structures can be either numeric or alphanumeric. The rationale for most alphanumeric structures is to establish some form of intelligence within the coding structure (Significant Coding). This intelligence may provide a specific meaning for a character string in given positions. Alternately, the intelligence may require more than the 10 possibilities for any given character position available with numeric coding. Oftentimes, the claim is that this intelligence provides human understanding of the elements of the code. Most alphanumeric systems have good intentions. As time passes, the needs of the enterprise violate these "coding systems." Invariably, instead of violating the coding system, the enterprise increases the length of the field by one or more positions. It is such practices that give rise to product codes of such a length as to be unreasonable. Such modification requires all persons within the enterprise, working with product codes, to re-learn the structure.

The coding structures designed for the 21st Century will be codes which reference a computer database. Companies using alphanumeric part numbers may not need to abandon them. People may still care to use them. Many contemporary systems now employ codes which reference a computer database. The intelligence of the code exists within the computer system. Computer databases can contain alternate part numbers, or "aliases." A numeric code "key" can provide the benefits of numeric coding without requiring any change to information exchanged between humans. Coding therefore may be non-significant. A common form of non-significant coding is that of sequential numbering. When manually entered, fewer errors occur with keying numeric structures than with alphanumeric structures. Keyboards for numeric entry are simpler, easier to use, and less costly. Processing of numeric strings of data is more efficient for computer systems than are alphanumeric strings of data.

### ***Fixed Length vs. Variable Length Product Codes***

Computer systems which utilize variable length product codes (product codes from numerous suppliers) must establish data field lengths that can support the longest code which may be input to the computer. Oftentimes, the maximum field length supports only one or a few products. Efficiency in memory management suffers when a majority of the data fields must support unused character positions. Editing fixed length fields, to ensure the correct number of characters were entered, is easier than editing variable length fields. Data manipulation of fixed length fields by computer systems is more efficient than variable length fields.

### ***Determining When Product Codes Should Change***

Product code changes should occur only when the change in a product is significant. If a change involves minor differences, and the new product is a replacement of the old, and the production of the old product ceases, the product code does not change. However, if the customer expects to be able to distinguish the new product from the old (such as a new version of software) and order accordingly, the enterprise should assign a new product code to the product.

### ***Duplicate Product Codes Among Multiple Suppliers***

Product codes may not be unique. Several suppliers may use the same code for different product. This can create major problems for distribution and end-user systems. To ensure uniqueness, the product code should include the identification of the supplier. Each industry conceivably could establish an agency to administer supplier identification schemes for their industry. This would presume that vertical industries truly exist and that there would be no cross-over of product between industries. At this point in time, there are few, if any, vertical industries. Electronics suppliers ship to health care product manufacturers, automotive industry manufacturers, computer system manufacturers, and to other electronic industry manufacturers. The same multi-industry shipments also exist in chemical, primary metals, office products, computer products, media/supplies, sanitary products, furniture/furnishings, taping, adhesives, institutional foods, telecommunications, and graphics. To establish independent industry supplier identification agencies would represent unnecessary and costly dupl. Such duplication of effort and expense will only drive up the cost of distribution in all industries. The most widely accepted supplier identification agencies in North America, Europe, Asia-Pacific, South America, and Africa are the Uniform Code Council (UCC) and the EAN International affiliates.

### ***Product Code Recommendations for the 21st Century***

- Unique Product Code,
- Supplier Product Code,
- Numeric Product Code,
- Non-significant Product Code,
- Fixed Length Product Code, and
- Product Code Includes Unique Identity of Manufacturer.

### ***The Uniform Code Council's Standards for Identification of General Trade Products***

The UCC is a not-for-profit organization responsible for the administration of the Universal Product Code (U.P.C.) initially designed to serve the retail and distribution environments, the UCC system enables unique identification on a global basis for industries providing products for general distribution. Based on the requirements of its global constituency, the UCC and its international counterpart, EAN International (EAN), jointly released expanded sets of Application Identifiers (AIs) in 1990 and 1991, thereby permitting encodation of a wider range of secondary information within EAN/UCC-128 applications.

The EAN/U.P.C. system is the identification standard for general trade products where the same product in the same packaging is sold to multiple trading partners in multiple industries. FACT Data Identifiers (DIs) are analogous to the AIs and have been implemented by the automotive and other industries for internal use and where unique product is manufactured for and shipped to a specific customer. It is expected that both standards will coexist for the near term.

Those implementing data collection standards should seriously consider what information is known when various coding structures are assigned, e.g., a batch number is known at the packaging line where a purchase order number is not known until order fulfillment. Further, a supplier's part number is known at the packaging line while a customer's part number is not known until order fulfillment, except where the product is manufactured in a unit-level-specific build-to-order environment. Customer receiving areas would like each product received to have the customer's part number on the product. This may, in effect, either deny the supplier the opportunity to use the machine-readable coding within their own pre-order fulfillment operations or increase the cost for labeling product with the customer's part number. Information cross-referencing supplier and customer part numbers may be best served through the use of an electronic data interchange purchase order or price/sales catalog process.

All industries should carefully consider the efficiencies and data format simplicity of the EAN/U.P.C./ITF-14 Primary Identification coding structures. The exchange of customer part numbers via electronic data interchange and machine-readable data encoded with the supplier's part number should be carefully considered by any standards development work anticipating a recommendation for customer part numbers on individual products. New standards for products which are supplied to multiple customers in multiple industries should carefully weigh the benefit of the EAN/UCC-128 AIs for Product Specific Secondary Symbols. Existing standards for products which are supplied to multiple customers in multiple industries should seriously consider a migration to EAN/UCC-128 AIs for Product Specific Secondary Symbols.

Uniform Code Council (UCC) and EAN International (EAN) coding provide for bar code symbols which serve the purposes of primary and secondary identification.

***EAN/UCC Primary Product Identification***

*Primary identification* is a coding structure which identifies the supplier of the product and a code for item identification. Primary identification at the item level has been achieved in industries which support the EAN/UCC standards through either a 12-digit U.P.C. symbol or a 13-digit EAN symbol. Primary identification at the multi-pack level has been achieved in these industries through a 14-digit Interleaved 2 of 5 symbol (ITF-14) for standard count multi-packs of the same product.

The fixed length, numeric U.P.C., EAN, and ITF-14 structures have become bar code standards in many industries where the same product is shipped to many customers in multiple industry sectors. If the manufacturer ships product in grocery, mass merchant, general merchandise, home improvement, or any other retail distribution channel the EAN/UCC standards may be used for both primary identification and secondary identification. Increasingly, the industrial and commercial (non-retail) channels are adopting EAN/UCC standards.

The EAN/UCC standards for item and shipping container identification emphasize the *supplier's product number*, so product ID may be consistent and independent of the receiving trading partner and the industry or industries in which they participate. With very few exceptions, such as "Ship To:" and "Purchase Order Number" AIs, customer-specific information is looked up or cross referenced at the receiving end. This enables the supplier to mark one way for all trading partners.

***UCC Secondary Product Identification***

The Uniform Code Council (UCC) developed a Code 128-based serialized shipping container standard and supplementary identification coding architecture. This standard and associated architecture includes all-numeric qualifiers — Application Identifiers (AIs) — analogous to the alphanumeric FACT DI approach. The Application Identifiers (AIs) are an integral part of the EAN/U.P.C. structure. The EAN/UCC Application Identifier standard provides for non-numeric fields where required (such as, customer purchaser order number).

EAN/UCC *secondary identification* is a coding format which identifies additional product or order information. Secondary identification information is printed in EAN/UCC-128 (A subset of Code 128) containing all numeric Application Identifiers (AIs) which define the structure, format, and intended use of the data which follows. *Product specific information* is information known at the time of manufacturer and includes serial number, lot/batch number, and expiration date. *Order specific information* is information known at the time of order fulfillment and includes purchase order number, ship to location, carrier-assigned PRO number, and Serialized Shipping Container Code.

The fixed-length, numeric U.P.C., EAN, and ITF-14 symbols for primary product identification have become the bar code standards in many industries shipping the same product to many customers in multiple industries. Since their introduction in 1990, EAN/UCC-128 AIs for secondary identification have become the standard for a number of industries currently using U.P.C. and EAN for primary product identification.

## Purpose

The purpose of this bar code standard is to provide a label which can be used throughout the furniture industry for shipping, receiving, inventory control, and other applications. This label is designed to use data which is known either at the time of manufacturer or at the time of packaging, and that is relevant through the use of the product.

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

It is the intention of the American Furniture Manufacturers Association (AFMA) to support all rules and regulations pertaining to the transportation and handling of hazardous materials. AFMA supports all regulations contained in the Code of Federal Regulations, Title 49, Part 100 through 177.

## Normative References

AIM Uniform Symbology Specification Interleaved 2-of-5<sup>1</sup>  
AIM Uniform Symbology Specification Code 128<sup>1</sup>  
AIM Symbology Identifier Guidelines<sup>1</sup>  
American National Standard for Information Systems - Bar Code Print Quality - Guideline ANSI X-3.182<sup>2</sup>  
Application Specification for EAN/UCC-128 Serial Shipping Container Code<sup>3</sup>  
D-U-N-S® Number Users' Guide<sup>4</sup>  
EAN Article Numbering and Symbol Marking<sup>5</sup>  
EAN Specifications for Numbering and Symbol Marking Despatch Units<sup>5</sup>  
FACT Data Application Identifier Standard ANS FACT-1<sup>2</sup>  
MIL-L-61002, Labels, Pressure Sensitive Adhesive, for Bar Codes and Other Marking<sup>6</sup>  
MIL-STD-105D, 1963, Sampling Procedures and Tables for Inspection by Attributes<sup>6</sup>  
UCC Universal Product Code: Industrial and Commercial Guidelines<sup>3</sup>  
EAN/UCC Application Identifier Standard<sup>3</sup>  
U.P.C. Shipping Container Code and Symbol Specification Manual<sup>3</sup>  
U.P.C. Symbol Location Guidelines Manual<sup>3</sup>  
U.P.C. Symbol Specification Manual<sup>3</sup>

<sup>1</sup>Available from AIM USA, 634 Alpha Drive, Pittsburgh, PA 15238-2802

<sup>2</sup>Available from American National Standards Institute, 11 West 42nd St., New York, New York 10036

<sup>3</sup>Available from Uniform Code Council, 8163 Old Yankee Road, Dayton, Ohio 45458

<sup>4</sup>Available from Dun & Bradstreet, 1 Diamond Hill Rd., Murray Hill, NJ 07974

<sup>5</sup>Available from EAN International, Rue Royale 29, B-1000 Brussels, Belgium

<sup>6</sup>Available from Government Printing Office, Washington, DC 20402

For product which is sold to multiple customers, this AFMA convention recommends the use of EAN/UCC standards. Part of the UCC standard is a manufacturer ID code. This code is assigned to all members of UCC. Information for joining the UCC can be received by contacting the Uniform Code Council, 8163 Old Yankee Road • Suite J, Dayton, Ohio 45458 Telephone: 513.435.3870 • Telefax: 513.435.4749.

This document is intended to provide furnishings industry manufacturers with guidelines for the implementation of symbol marking within the furnishings industries. Comments and questions relating to this document may be addressed to Joe Logan, American Furniture Manufacturers Association, P.O. Box HP-7 • 233 South Wrenn, High Point, North Carolina 27260 Telephone: 919.884.5000; Telefax: 919.884.5303.

### Definitions

There are many terms and definitions associated with bar code symbology that have special meaning to this industry. The following are definitions of terms specific to this document. Definitions of other related terms used in this document can be found in the documents referenced in Normative References, above.

alphanumeric - A character set that contains alphabetic characters (letters), numeric digits (numbers) and usually other characters such as punctuation marks.

ANSI - The American National Standards Institute.

ANSI ASC X12 - American National Standard Institute's X12 Accredited Standards Committee's standards for electronic data interchange (EDI).

Application Identifier (AI) - A EAN/UCC specified character (or string of characters) that defines the general category or intended use of the data that follows. Note: When printed in human readable form Application Identifiers are always shown bracketed in parentheses.

autodiscrimination - The capability of a reader to automatically recognize and decode multiple bar code symbologies.

bar code symbol - An array of rectangular bars and spaces which are arranged in a predetermined pattern following specific rules to represent elements of data that are referred to as characters. A bar code symbol typically contains a leading quiet zone, start character, data character(s) including a check character (if any), stop character, and a trailing quiet zone.

bearer bars - Bars surrounding an ITF-14 symbol to prevent misreads.

carrier - In a transaction, the party that provides freight transportation services.

character - In a bar code symbol, the smallest group of elements which represents one or more numbers, letters, punctuation marks, or other information.

check character - A calculated character often included within a bar code symbol whose value is used for performing a mathematical check of the validity of the decoded data.

Code 39 - (also known as "Code 3 of 9") The symbology as specified by AIM Uniform Symbology Specification Code 39.

Code 128 - For the purposes of this standard, Code 128 shall mean the symbology as specified by AIM Uniform Symbology Specification Code 128.

consumer unit - Smallest unit normally intended to be sold to the end customer.

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

Data Identifier (DI) - A specified character string which defines the specific intended use of the data that immediately follows. The identifier shall be an alphabetic character or an alphabetic character preceded by up to three numeric characters as defined by ANS FACT-1, Data Identifier Standard. A character (or set of characters) within a bar code symbol that defines the general category or specific use of the data that is encoded in the same bar code symbol. The data that follows the Data Identifier is a single piece of information.

D-U-N-S® - Data Universal Number System, assigned by Dun & Bradstreet.

EAN International - The International Article Numbering Association.

EAN symbology - for the purposes of this standard, EAN symbology shall mean the symbology as specified by the International Article Numbering Association, EAN International.

EAN/UCC-128 - For the purposes of this standard, EAN/UCC-128 shall mean the symbology and format as specified by the Uniform Code Council. EAN/UCC-128 (or EAN/UCC-128) is distinguished from other Code 128 symbols with a FNC1 special character in the first character position following the start code.

electronic data interchange (EDI) - For the purposes of this document, EDI shall mean the computer to computer communication of data which permits the receiver to perform the function of a standard business transaction and is in a standard data format. Basically, EDI is the electronic transmission of standard business documents, e.g., purchase orders.

highlighting lines - Horizontal divider lines placed above and below the package identification building block. Highlighting lines are easily distinguishable from the horizontal separator lines used to separate other building blocks. This visual difference may be the result of using a thicker line, of using a double or triple line, or other similar method chosen by the labeler.

Interleaved 2-of-5 (ITF) - For the purposes of this standard, ITF (also known as 1-2/5) shall mean the symbology as specified by AIM Uniform Symbology Specification Interleaved 2-of-5. ITF-14 is the 14-digit EAN/UCC implementation of ITF for container marking. ITF-14 consists of a leading one-digit Packaging Indicator (PI), the 12-digit EAN/U.P.C. base number, and a one-digit modulus 10 check digit.

labeler - A term to identify the organization responsible for the labeling of a UL/TP.

license plate - See "Unique Package Identification"

magnification - Different sizes of bar code symbols, stated as a percent or decimal equivalent of a standard size.

manufacturer - Actual producer or fabricator of an item; not necessarily the supplier in a transaction.

package - See Transport Package and also Unit Load.

Packaging Indicator (PI) - The first digit of an ITF-14 symbol used to signify level of packaging. Commonly used PIs are "3" to indicate "inner pack," "5" to indicate "shipping container," and "5" to indicate "pallet."

primary identification - Identification of the specific product (by EAN/U.P.C number).

quiet zone - The required clear area preceding and following a bar code symbol.

SCAC - Standard Carrier Alpha Code assigned by the National Motor Freight Traffic Association which identifies each carrier with a 2 to 4 alphabetic character code for use to identify a particular carrier for transportation data processing purposes.

secondary identification - Product- or order-specific additional information presented in bar code form on a label, e.g. Product-specific - lot, batch, serial number, manufacture date or Order-specific - purchase order number or ship-to postal code.

serial number - A unique number that is not repeated. Serial numbers are identified here as product serial numbers.

Serial Shipping Container Symbol - An EAN/U.P.C. bar code symbol providing unique identification of a single shipped container. A unique container "license plate."

"ship-from" - On a transport label, the address of the location where the freight carrier will return the shipment if the package is undeliverable.

"ship-to" - The address of the location where a freight carrier will deliver the freight.

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

symbology - A defined method of representing numeric, alphanumeric, or special characters using bars and spaces that are able to be machine-read. A specific type of bar code.

trading partners - All members within the channels of distribution within an industry (suppliers, carriers, customers and intermediaries).

transport package - A package intended for the transportation and handling of one or more articles, smaller packages, or bulk material.

UCC - The Uniform Code Council.

UL/TP - Unit Load or Transport Package.

U.P.C. symbology - For the purposes of this standard, U.P.C. (also known as "Universal Product Code") shall mean the symbology as specified by the Uniform Code Council.

unique package identification - A universally accepted and defined supplier identification and a package "license plate" that, together, uniquely identify the package to all trading partners.

unit load - One or more transport packages or other items held together by means such as pallet, slip sheet, 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 narrow elements dictated by the application, or symbology specification, or both.

### Application Flow

The AFMA bar code label can be used throughout the process of manufacturing, distribution, resale, and use of furniture industry product. The following narrative gives examples of the types of applications that could use the AFMA bar code label. Any one company might not use all of these applications; other possible uses for the label exist as well.

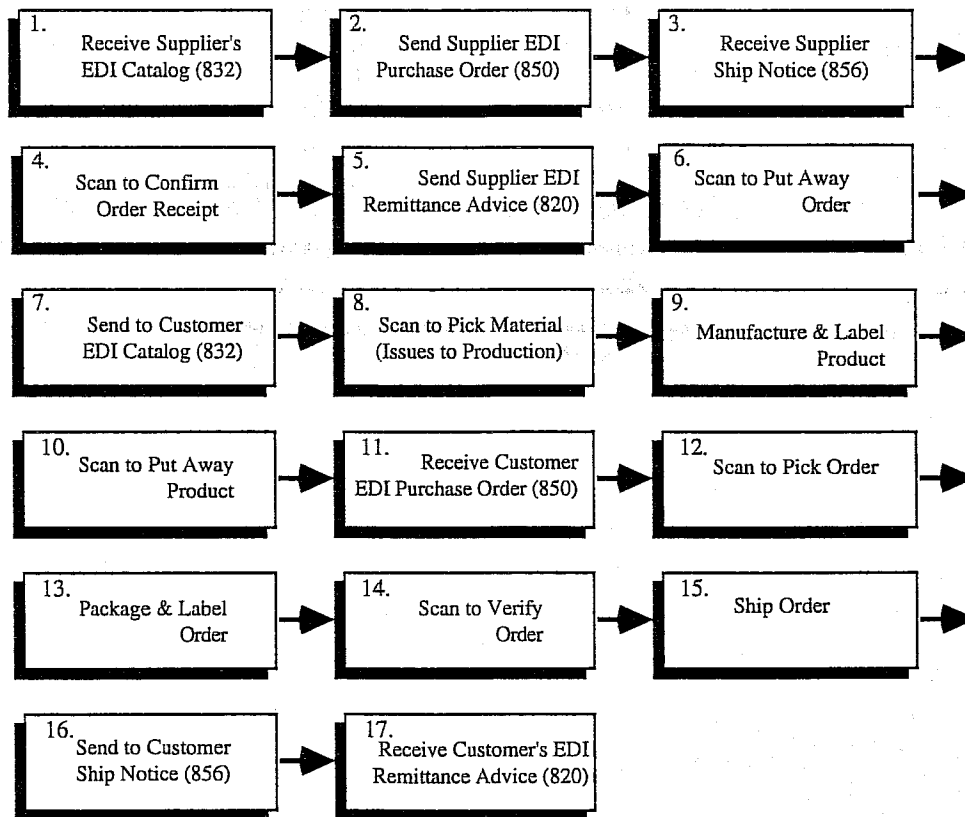
Once a product is manufactured and packaged into a shipping container, the AFMA bar code shipping label is applied. For the purposes of this example, the product is being packaged in a multi-pack shipping container. The label contains the identity of the supplier, product code, container license plate (unique package identification), and quantity. As the shipping container is filled, the label is scanned and the data is recorded, providing a permanent record of the packaging date, product, container license plate, and product serial numbers within (if applicable). The information is passed to the inventory control system, which is updated with the location and quantity of products within the warehouse.

When an order is prepared for shipment, the warehouse personnel scan the products and warehouse location as they pick the order. The bar code scanner confirms the product being picked is the correct one, and adjusts the inventory level. As the truck is loaded, the container license plate is scanned again, providing full traceability of the product for the supplier. A ship notice/manifest (ASC X12 856) is transmitted to the customer from the data scanned as the truck is loaded.

The order is then delivered to the customer. The customer can scan the product codes and quantity to verify receipt or alternately the container license plate, matching this license plate with that transmitted in the ship notice/manifest (ASC X12 856). The customer's system then matches receipt of the shipment to the 856 and Purchase Order. Exceptions are then reconciled, payment is approved, and payment can then be made via electronic funds transfer (EFT). After the products are received, the customer moves the product to a warehouse, scans the product number and warehouse location which updates the inventory control system.

The convention will not address all information required for internal purposes such as manufacturing processes.

### Application Flow Summary



## Product Identification and Tracking

There are two applications which fall under the category of product identification. The first is to identify a specific product to facilitate "product serial number" tracking. The second is the need to identify a container and its contents.

The product identification labels relate to the supplier of the product, and are expressed in the supplier's terms. These labels are meaningful from the time the product is manufactured until it is re-sold or converted into a new product.

If serial number tracking is desired, the unique container label license plate and supplier ID portions of the label is the minimum information required. Multiple serial numbers are related to the container license plate as the serial numbers are packaged into the container bearing the license plate.

The minimum information needed to identify a container and its contents are:

- unique package identification (license plate)
- product code
- serial numbers within (if applicable)
- destination postal code
- supplier ID
- quantity
- purchase order number
- carrier reference number

## Label Data Content

The ANSI MH10 SBC-8 group is a working subcommittee of ANSI. The effort begun by the ANSI group has evolved into the ANSI MH10.8M group. Its document is used as the basis for the AFMA convention. The AFMA convention is consistent with the June 1, 1993 version of the ANSI MH10.8M standard. The ANSI MH10.8M standard details three segments to the standard label (the carrier segment, customer segment, and supplier segment). This convention applies to each of these three segments. It is recommended that for "general trade product" (the same product sold to multiple customers) and custom product EAN/UCC conventions should be used. Product identification for general trade product is recommended to be EAN/U.P.C. at the item level and ITF-14 at the standard multi-pack level. Secondary identification (e.g., purchase order number, release number, lot/batch/serial number, ship to postal code) for general trade product should follow the EAN/UCC-128 Application Identifier conventions. All of the EAN/UCC-128 conventions are specific subsets of Code 128 where a Function 1 Code (FNC 1) always appears in the first symbol position after the start code.

### • Container License Plate (Unique Package Identification)

Following EAN/UCC conventions, the label license plate is a 20-digit code structure. The first two digits of the structure are the Application Identifier (AI) "00" identifying a serialized shipping container. The third digit can assume a value of "0" to identify a "Shipping Case," "1" to identify a "Pallet," or "2" to identify a "Container Larger Than a Pallet." The following seven digits are the EAN/UCC assigned supplier identification code (for UCC purposes the first of these seven digits is always a zero "0"). The nine digits following the supplier ID is a sequential number serving as the unique identification of the container. The 20th digit is a modulus 10 check digit of the preceding 19 digits. This 20-digit license plate is encoded in EAN/UCC-128.

### • Supplier ID

The supplier identification is the 7 digit EAN/UCC supplier ID included within the serialized shipping container symbol license plate described above.

### • Product Code

The product code shall be a unique identification assigned by the supplier to identify a specific product. The product code and item code are combined in U.P.C. and EAN-13 formats. For individual consumer units this code and symbol shall be the 12-digit U.P.C. or 13-digit EAN product codes. For multi-packs of the same product this code and symbol shall be the 14-digit EAN/UCC multi-pack code and symbol encoded in a 14-digit Interleaved 2 of 5 symbology (ITF-14).

### • Additional Product Identification

Where trading partners find it mutually beneficial for the supplier to provide the catalog number, series, suites, options, and other product specific information, the Application Identifier "240" can be used to identify this encoded information. The supplier and customer should mutually agree to the format and the content of the Additional Product Identification (AI "240"). Where Additional Product Identification combines multiple options, series, etc., individual fields should be delimited by the slash ("/") character. Additional Product Identification can be alphanumeric up to 30 characters (including delimiters) and is printed in EAN/UCC-128.

- **Quantity**

The quantity is implied as "1" when coded in 12-digit U.P.C. or 13-digit EAN. When coded in the 14-digit Interleaved 2 of 5 symbol (ITF-14) the quantity is implied by the first digit of the ITF-14 code (Packaging Indicator). The meaning of the Packaging Identifier must be communicated to receiving trading partners for each product. The American National Standards Institute's Accredited Standards Committee for electronic data interchange (ASC X12) Transaction Set 832 may be used for this purpose.

- **Product Serial Number**

A product serial number is the unique number, assigned to the lifetime of a product, to uniquely identify that product from any like product. The Application Identifier used shall be "21" and the symbol printed in EAN/UCC-128.

- **Purchase Order Number**

The purchase order number is that number assigned by the customer to identify a purchasing transaction. The purchase order number shall use the EAN/UCC Application Identifier "400" followed by up to 22 alphanumeric characters representing the purchase order number. The purchase order number is encoded in EAN/UCC-128. Where a specific line item reference is required from within the purchase order, the delimiter character to precede the line item reference is the plus ("+") character. If purchase order number, line item reference number, and release number are to be encoded, the delimiter character to precede the release number is the slash ("/") character.

- **Release Number**

The release number is that number assigned by the customer to identify a release against a pre-negotiated purchasing agreement. The release number shall use the EAN/UCC Application Identifier "401" followed by up to 30 alphanumeric characters representing the release number. Alternatively, this field could also be used to identify requisition numbers, if necessary. The release number is encoded in EAN/UCC-128.

- **Destination Postal Code**

The destination postal code is the postal code to identify where the carrier is to deliver the transport package or unit load. The destination postal code shall use the EAN/UCC Application Identifier "420" followed by up to 9 alphanumeric characters representing the postal code of the destination, when the destination is within the same postal authority as is the shipper. The destination postal code, when shipments are made across postal authorities (international), shall use the EAN/UCC Application Identifier "421" followed by a 3-digit ISO 3166 Country Code, followed by up to 9 alphanumeric characters representing the postal code of the destination. The destination postal code is encoded in EAN/UCC-128.

- **Carrier PRO (PROgressive) Number**

The carrier PRO number is the tracking number assigned by the carrier to the shipment. Note that when shippers uniformly use the serialized shipping container symbol (EAN/UCC label license plate) carrier PRO numbers may no longer be necessary. The carrier PRO number shall use the EAN/UCC Application Identifier "95" followed by the National Motor Freight Transportation Association (NMFTA) assigned Standard Carrier Alpha Code (SCAC) to identify the carrier, followed by the carrier assigned PRO number. The carrier PRO number is encoded in EAN/UCC-128.

## Label Format and Specification

### ANSI Label Overview

The AFMA bar code label convention is based upon and derived from the American National Standard MH10.8M-1993 for Materials Handling - Bar Code Symbols on Unit Loads and Transport Packages. Label dimensions, label placement on the package or unit load (shipping unit), bar code symbology, and bar code building block size shall conform to the referenced ANSI standard. It should also be noted that the ANSI standard, while not expected to significantly change, is in draft form and may be revised prior to being adopted as an official American National Standard.

Each label conforming to the referenced ANSI standard may consist of up to three segments which shall be stacked vertically in the following sequence. Where such vertical stacking is not possible due to the size of the container placement of segments may exist on different panels of the container, e.g., carriers may prefer the carrier segment on the natural top of the container. It may be possible to place the carrier segment on the top of the container and the other two segments on one vertical panel.

- A. Carrier Segment
- B. Customer Segment
- C. Supplier Segment

To conform with this convention, all segments of the label shall conform to the referenced ANSI standard.

### Specifications

The following label specification refers only to a bar code label or the addition of bar code information to an existing label. The standards and specifications do not supersede or replace any applicable safety or regulatory marking requirements.

Each label segment is composed of one or more building blocks which are standardized units of space in which information is presented. The building blocks are stacked vertically within each segment and should be separated for each other by a horizontal line. The height of each building block shall be 1.0 inch  $\pm$ 0.2 inch. Within each label segment may exist one double-high (2.0 inch  $\pm$ 0.4 inch) building block and one half-height (0.5 inch  $\pm$ 0.1 inch) building block. The building block width shall be determined by the printer used for the label and shall also be constrained by the maximum bar code length of 50 characters for EAN/UCC structures. The maximum width of a building block (label width) shall not exceed 6.5 inches. Where possible the building block (label width) should not exceed 4.0 inches.

Each building block may contain a single bar code field with human-readable interpretation ("bar code block"), text information ("text block"), other machine readable information ("discretionary block"), or may be blank. A bar code building block shall contain only 1 bar code symbol.

The bar code label shall conform with the following additional detailed specifications:

**Text Dimensions**

Human Readable Interpretation	3 lines per block minimum height
Text Only Blocks	6 lines per block minimum height
Title Lines	6 lines per block

**Text Style**

All upper case letters

**Symbology and Dimensions**

Height (EAN/UCC Standards)	0.5 inch minimum or the applicable dimensions identified for U.P.C. and ITF-14. In the case of the UCC Serialized Shipping Container Symbol the minimum height is 1.25".
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X Dimension  
(EAN/UCC Standards)

0.010 to 0.017 inch minimum or the applicable dimensions identified for U.P.C., ITF-14 and the UCC Serialized Shipping Container Symbol

Quiet Zones

0.25 inch minimum

**Symbol Placement**

See Figure 10

**Label Width**

4" wide label recommended

**Bar Code Print Quality**

Measured in conformance with ANS X3.182-1990

"B" Target Quality • "C" Minimum Quality

Direct printing on corrugated may show an overall profile grade of "D" and remain acceptable

0.010 inch measurement aperture for ITF-14 and EAN/UCC-128 (U.P.C. 0.006 inch measurement aperture). If one aperture is selected, choose 0.006 inch.

Measurement Wavelength 670nm ± 10nm

**Field Identifiers**

EAN/UCC Application Identifier Standard

The following Application Identifiers are referenced in this convention

- 00 Serialized Shipping Container Symbol (Label License Plate)
- U.P.C. Supplier ID and Product Code (individual consumer units)
- ITF-14 Supplier ID and Product Code with Packaging Indicator (multi-packs of the same product) Packaging Indicator shows relative level of packaging (quantity)
- 21 Product Serial Number assigned by supplier
- 240 Additional Product Identification (Catalog #, Options, etc.)
- 400 Purchase Order Number assigned by customer
- 401 Release Number assigned by customer
- 420 Destination Postal Code within a single postal authority
- 421 Destination Postal Code across postal authorities preceded by three-digit ISO 3166 Country Code
- 95 Carrier PRO Number preceded by SCAC
- 96 Carrier Container Identification preceded by SCAC

### ***Supplier Segment***

This segment of the label contains those fields that are known when the product is packaged. To better manage inventories, material needs to be labeled at time of packaging. Supplier segments can be on individual consumer units or multi-packs of identical product. A bar code label should be affixed to each container. The types of containers supplier segments would be attached to follow below.

#### **Consumer Unit**

A bar code consumer unit label should be affixed to each container that is consumed as an individual unit. The supplier segment of the consumer unit label shall consist of the following building blocks in the following sequence:

EAN/UCC Formats (See Figure 3)

- U.P.C. or EAN
- Additional Product ID (if appropriate)
- Serial Number (if appropriate)

The recommended label locations on various types of packages are shown in Fig. 10.

#### **Multi-pack Container of Identical Product**

A bar code multi-pack label should be affixed to each multi-pack container that is made up of identical product. Multi-pack container labels should be used in addition to the Consumer Unit label. To ease scanning, the multi-pack label should be printed on two adjacent vertical panels of the container. Once the multi-pack's unitization is broken, the multi-pack label should be destroyed. The supplier segment of the multi-pack label shall consist of the following building blocks in the following sequence:

EAN/UCC Formats (See Figure 5)

- Serialized Shipping Container Symbol (if appropriate)
- Product Dating or Batch Number (if appropriate)
- Additional Product ID (if appropriate)
- ITF-14 symbol

The recommended label locations on various types of packages are shown in Fig. 10.

#### **Multi-pack Container of Mixed Product**

A bar code mixed multi-pack label should be affixed to each multi-pack container that is made up of mixed product. Mixed multi-pack container labels should be used in addition to multi-pack labels for identical product and the Consumer Unit label. To ease scanning, the mixed multi-pack label should be printed on two adjacent vertical panels of the container. Once the mixed multi-pack's unitization is broken, the mixed multi-pack label should be destroyed. The supplier segment of the mixed multi-pack label shall consist of the following building blocks in the following sequence:

EAN/UCC Formats (See Figure 6)

- Serialized Shipping Container Symbol

#### **Customer Segment**

Since product is often unitized into shipping containers, re-labeling of consumer units at time of shipment is not practical. Customer segments may be appropriate for multi-packs, however.

A bar code customer segment label may be affixed to each multi-pack container. Customer segment labels may be used in addition to the Consumer Unit and multi-pack labels. To ease scanning, the customer segment label should be printed on two adjacent vertical panels of the container. The customer segment shall be directly above the supplier segment of the multi-pack label and shall consist of the following building blocks in the following sequence:

EAN/UCC Formats (See Figure 6)

- Purchase Order Number (if required)
- Other customer formats not recommended

The recommended label locations on various types of packages are shown in Fig. 10.

***Carrier Segment***

The top segment is the carrier segment. This segment is to assist the carrier in the timely and accurate delivery of the container. A bar code shipping (carrier) label should be affixed to each multi-pack container. Carrier container labels should be used in addition to multi-pack container labels and Consumer Unit labels. The carrier segment is the top-most segment and shall consist of the following building blocks in the following sequence:

EAN/UCC Formats (See Figure 8 and 9)

- Ship From address
- Ship To address
- Destination Postal Code
- Carrier PRO Number (if appropriate). Note that when shippers uniformly use the serialized shipping container symbol (EAN/UCC label license plate) carrier PRO numbers may no longer be necessary. When this occurs the serialized shipping container symbol may appear in this location.

The recommended label locations on various types of packages are shown in Fig. 10.

### EDI License Plate Label

Consumer unit identification with U.P.C. and a serial number symbol is sufficient to uniquely identify a product and link it to its corresponding EDI document. ITF-14 and a Serialized Shipping Container Symbol are sufficient to uniquely identify a standard count multi-pack of identical items and to link it to its corresponding EDI document. A serialized shipping container symbol and destination postal code are sufficient to identify a shipping unit and to link it to its corresponding EDI document. The minimum information necessary on a Shipping Label, where both trading partners have functionally integrated (sender's application software to recipient's application software) is the Ship From, Ship To, and Serial Shipping Container Symbol (license plate). This minimum data is shown in Figure 1.



Figure 1. Minimum Data EDI Shipping Label (NOT TO SCALE)

Some trading partners' EDI may not be fully integrated, or they may not have EDI capability at all. In these cases product specific information may be necessary on the container. Where trading partners are not functionally integrated with EDI, U.P.C./EAN and Additional Product Identification are recommended, in addition to the data elements identified in Figure 1, U.P.C./EAN and Additional Product Identification are recommended. This label is shown in Figure 2.

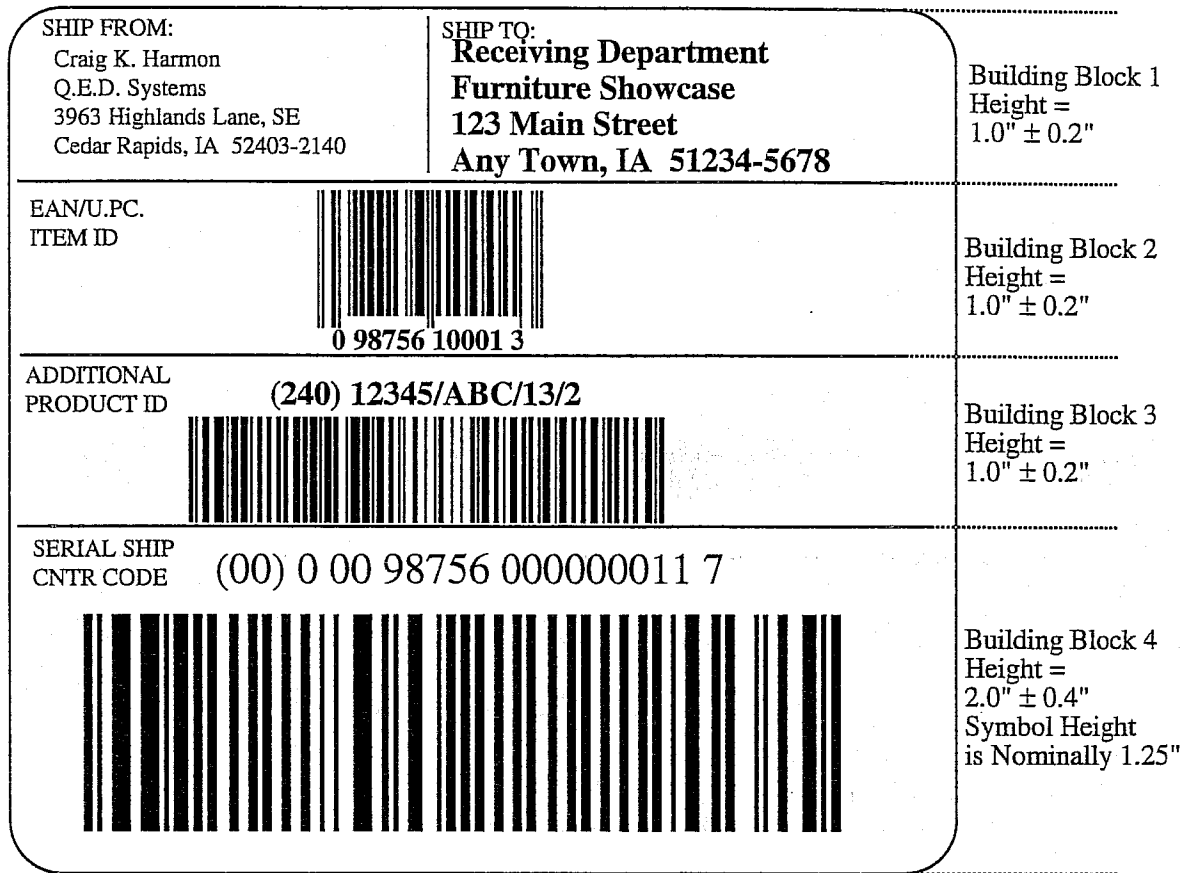


Figure 2. Minimum Data non-EDI Shipping Label (NOT TO SCALE)

At each level of packaging and at shipment this pairing of bar code data must also be included in the EDI transmission. The EDI transmission most commonly used between a supplier and customer is ship notice/manifest (856). The EDI transmission most commonly used between a shipper and a motor carrier is bill of lading (204). The following tables show the relationship between the bar code information and the EDI transaction.

**Ship Notice/Manifest (856)**

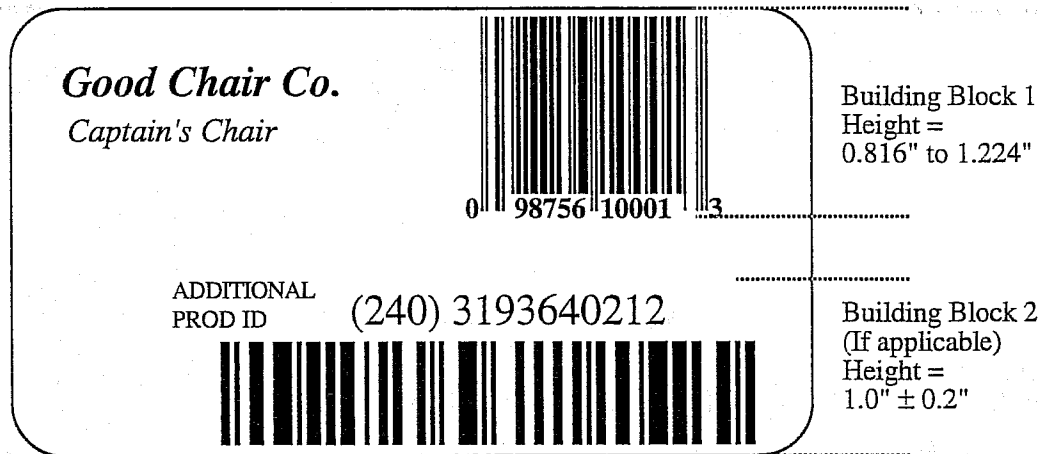
The data elements in the ship notice corresponding to the data on the shipping label are found in the MAN, LIN, SN1, SLN, and REF segments.

Bar Code Data Element	UCC	Seg	ANSI Data Element	Value
License Plate	00	MAN	88 Marks/Numbers Qual	GM = UCC Serial Shipping Container Code Format (EAN/UCC-128)
		CLD/REF	Load Detail/Reference Number	LA = UCC Serial Shipping Container Code Format (EAN/UCC-128)
Case Code	ITF-14	MAN	88 Marks/Numbers Qual Shipping Container Code	UC = 14-digit U.P.C. (Interleaved 2 of 5)
Product Code	U.P.C./EAN	LIN	235 Product ID Qual	UP = 12-digit U.P.C. EN = 13-digit EAN
Additional Product ID	240	LIN	235 Product ID Qual	CA=Catalog Number CM = NRMA Color Code GC=Grade Code PA=Pattern Number PQ=Product ID Attribute Code SF=Surface Finish ST=Style Number
P.O. Number	400	PRF	324 P.O. Number	buyers P.O. number
Release Number	401	PRF	328 Release Number	buyers Release Number
PRO Number	95	REF	128 Ref. # Qualifier	CN = PRO number
		REF	127 Reference Number	carrier assigned number
Ship To	Text	N1	98 Entity Identifier Code	ST = Ship To
			93 Name	free form name
		N2	93 Name	free form name
		N3	166 Address Info	address information
		N4	19 City Name	city name
			156 State/Province Code	2 char state/province code
			116 Postal Code	ZIP code in U.S.
			26 Country Code	ISO 3166 code (3 digit numeric)
Ship From	Text	N1	98 Entity Identifier Code	SF= Ship From
			93 Name	free form name
		N2	93 Name	free form name
		N3	166 Address Info	address information
		N4	19 City Name	city name
			156 State/Province Code	2 char state/province code
			116 Postal Code	ZIP code in U.S.
			26 Country Code	ISO 3166 code (3 digit numeric)

**Consumer Unit Label**

The preferred consumer unit label is the Universal Product Code (U.P.C.) or EAN International (EAN) symbols and additional product identification (if applicable). The U.P.C. and EAN symbols identify both the supplier of the product and the product. The last digit of the code is a modulus 10 check digit of the prior 11 (U.P.C.) or 12 (EAN) digits. Table 1 shows the calculation of a Modulus 10 check digit for both U.P.C. and EAN. For EAN/U.P.C. symbols the magnification should be no smaller than 80%. Table 2 shows the respective sizes of various different magnifications of the U.P.C. Symbol. Where trading partners find it mutually beneficial for the supplier to provide the catalog number, series, suites, options, and other product specific information, the Application Identifier "240" can be used to identify this encoded information, **as an additional symbol to the U.P.C./EAN symbol**. The supplier and customer should mutually agree to the format and the content of the Additional Product Identification (AI "240"). Where Additional Product Identification combines multiple options, series, etc., individual fields should be delimited by the slash ("/") character. Additional Product Identification can be alphanumeric up to 30 characters (including delimiters) and is printed in EAN/UCC-128.

BUILDING BLOCK	DATA FIELD	NUMBER OF ENCODED CHARACTERS					MANDATORY /OPTIONAL
		START STOP	APPLICATION IDENTIFIER	DATA (MAX.)	FNC1 & Mod 103 Check	TOTAL (MAX.)	
1	U.P.C. Symbol	N/A	N/A	12	N/A	12	M
1	Additional Product ID ("240")	2	3	30	2	37	O



**Figure 3.** AFMA Consumer Unit Label

**Table 1**  
**U.P.C./ITF-14/SSCS/EAN-13 Modulus 10**

Position	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
Full Size Version EAN-13								X	X	X	X	X	X	X	X	X	X	X	X	C
12-digit U.P.C. 1st Position = "0"								0	X	X	X	X	X	X	X	X	X	X	X	C
ITF-14 Interleaved 2 of 5							PI	X "0" if UPC	X	X	X	X	X	X	X	X	X	X	X	C
Serial Shipping Container Symbol (EAN/UCC-128)	-	-	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	C

**IMPORTANT:** *Digit positions are numbered from right to left in this algorithm (the check-digit is in the first position).*

- Step 1: Starting from position 2 of the number, add up the values of the digits in even-numbered positions.
- Step 2: Multiply the sum obtained in Step 1 by 3.
- Step 3: Starting from position 3 of the number, add up the values of the digits in odd-numbered positions.
- Step 4: Add the product of Step 2 to the sum of Step 3.
- Step 5: The check digit is the smallest number which when added to the sum of Step 4 produces a multiple of 10.

The following example will illustrate the calculation for a EAN-13 number (427622135746 C):

- Step 1: 4 2 7 6 2 2 1 3 5 7 4 6 C  
2 + 6 + 2 + 3 + 7 + 6 = 26
- Step 2: x 3 = 78
- Step 3: 4 + 7 + 2 + 1 + 5 + 4 = 23
- Step 4: 78 (Step 2) + 23 (Step 3) = 101
- Step 5: 101/10 = 10 with a Remainder of 1 10 - 1 = 9 (Check Digit)

The full EAN-13 number with Check Digit is encoded "4276221357469".

The following example will illustrate the calculation for a U.P.C. number (09875610001) having:

- Manufacturer Identification Number = 098756 (1st Digit "0" is Number System Digit)
- Item Code Number = 10001

- Step 1: 0 0 9 8 7 5 6 1 0 0 0 1 C  
0 + 8 + 5 + 1 + 0 + 1 = 15
- Step 2: x 3 = 45
- Step 3: 0 + 9 + 7 + 6 + 0 + 0 = 22
- Step 4: 45 (Step 2) + 22 (Step 3) = 67
- Step 5: 67/10 = 6 with a Remainder of 7 10 - 7 = 3 (Check Digit)

The full UPC A Symbol with Check Character is encoded "098756100013".

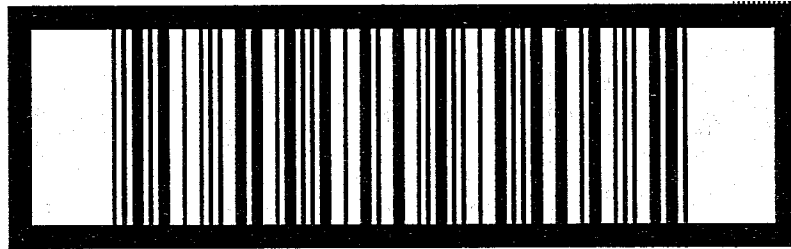
**Table 2**  
**EAN/U.P.C. Symbol Dimensions and Tolerance**

A	B	C	D	E	F
Magnification	Narrow Bar/Space Width "X" Dimension in mils (0.001")	Bar/Space Width Tolerance ( $\pm$ ) in mils (0.001")	UPC-A/EAN-13 Symbol Height with Margins in Inches	UPC-A/EAN-13 Symbol Width with Margins in Inches	UPC-A/EAN-13 with 5-digit add-on Width with Margins in Inches
0.80	10.4	1.4	0.816	1.175	1.750
0.85	11.1	2.0	0.867	1.249	1.859
0.90	11.7	2.7	0.918	1.322	1.969
0.92	12.0	3.0	0.938	1.351	2.013
<b>1.00</b>	<b>13.0</b>	<b>4.0</b>	<b>1.020</b>	<b>1.469</b>	<b>2.188</b>
1.08	14.0	4.4	1.102	1.587	2.363
1.10	14.3	4.6	1.122	1.616	2.406
1.15	15.0	4.9	1.173	1.689	2.516
1.20	15.6	5.2	1.224	1.763	2.625
1.23	16.0	5.4	1.255	1.807	2.691
1.30	16.9	5.8	1.326	1.910	2.844
1.31	17.0	5.8	1.336	1.924	2.866
1.38	17.9	6.3	1.408	2.027	3.019
1.40	18.2	6.4	1.428	2.057	3.063
1.46	19.0	6.8	1.489	2.145	3.194
1.50	19.5	7.0	1.530	2.204	3.281
1.54	20.0	7.2	1.571	2.262	3.369
1.60	20.8	7.6	1.632	2.350	3.500
1.62	21.1	7.7	1.652	2.380	3.544
1.69	22.0	8.2	1.724	2.483	3.697
1.70	22.1	8.2	1.734	2.497	3.719
1.77	23.0	8.7	1.805	2.600	3.872
1.80	23.4	8.8	1.836	2.644	3.938
1.85	24.1	9.1	1.887	2.718	4.047
1.90	24.7	9.4	1.938	2.791	4.156
1.92	25.0	9.6	1.958	2.820	4.200
2.00	26.0	10.1	2.040	2.938	4.375

**Standard Count Multi-pack Label**

The preferred Standard Count Multi-pack label is the U.P.C. Standard Multi-pack symbol encoded in a 14-digit Interleaved 2 of 5 symbol (ITF-14). The ITF-14 symbol identifies the level of packaging (first digit - Packaging Indicator - "PI") and the product (following twelve digits). The last digit of the code is a modulus 10 check digit of the prior 13 digits. The ITF-14 symbols should always appear as the bottom-most building block. When placed on a multi-pack, the ITF-14 symbol should be 1.25" ± 0.125" from the natural bottom of the multi-pack, no closer than 0.75" for either edge of the multi-pack container panel. The building block heights between 1.094" and 0.473" represent "magnifications" between 60% and 25%. For shipping containers the magnification should be no smaller than 62.5%. Magnifications below 62.5% may be used for inner-packs and shelf-packs. Table 3 shows the respective sizes of various different magnifications of the ITF-14 Symbol. Table 4 shows the recommended values for the packaging indicators.

BUILDING BLOCK	DATA FIELD	NUMBER OF ENCODED CHARACTERS				
		START STOP	APPLICATION IDENTIFIER	DATA (MAX.)	TOTAL (MAX.)	MANDATORY /OPTIONAL
1	ITF-14 Symbol	N/A	N/A	14	14	M



Building Block 1  
Height =  
1.131" to 2.153"

**5 00 98756 10001 8**

**Figure 4.** AFMA Standard Count Multi-pack Label for General Trade Product

**Table 3**  
**U.P.C. Shipping Container Symbol (ITF-14)**  
**(Values Below 0.625 Magnification are**  
**Not Sanctioned by the UCC for Shipping Containers)**

Mag <sup>1</sup>	X <sup>2</sup> (inch)	W <sup>3</sup> (inch)	Tolerance (inch)	Quiet Zone (inch)	Bearer Bar (inch)	Symbol Length <sup>4</sup> (inches)	H-R <sup>5</sup> Cl-Cl <sup>6</sup> (inch)	Min Height (inches)	Bearer to HR (inch)	H-R Height (inch)	Σ Symbol Height <sup>7</sup> (inches)
1.20	0.048	0.120	±0.0144	0.480	0.190	7.124	0.180	1.500	0.048	0.225	2.153
1.10	0.044	0.110	±0.0132	0.440	0.190	6.562	0.180	1.375	0.044	0.225	2.024
1.00	0.040	0.100	±0.0120	0.400	0.190	6.000	0.180	1.250	0.040	0.225	1.895
0.90	0.036	0.090	±0.0108	0.360	0.190	5.438	0.180	1.125	0.036	0.225	1.766
0.80	0.032	0.080	±0.0096	0.320	0.190	4.876	0.180	1.000	0.032	0.225	1.637
0.70	0.028	0.070	±0.0080	0.280	0.190	4.314	0.156	0.875	0.028	0.200	1.483
0.625 <sup>8</sup>	0.025	0.063	±0.0050	0.250	0.075	3.663	0.156	0.781	0.025	0.200	1.156
0.60	0.024	0.060	±0.0072	0.250	0.072	3.536	0.156	0.750	0.024	0.200	1.118
0.55	0.022	0.055	±0.0066	0.250	0.066	3.283	0.117	0.688	0.022	0.150	0.992
0.50	0.020	0.050	±0.0060	0.250	0.060	3.030	0.117	0.625	0.020	0.150	0.915
0.45	0.018	0.045	±0.0054	0.250	0.054	2.777	0.117	0.563	0.018	0.150	0.839
0.40	0.016	0.040	±0.0048	0.250	0.048	2.524	0.078	0.500	0.016	0.100	0.712
0.35	0.014	0.035	±0.0042	0.250	0.042	2.271	0.078	0.438	0.014	0.100	0.636
0.30	0.012	0.030	±0.0036	0.250	0.036	2.018	0.078	0.375	0.012	0.100	0.559
0.25	0.010	0.025	±0.0030	0.250	0.030	1.765	0.078	0.313	0.010	0.100	0.483

Notes:

- 1 Mag. = Magnification - A percentage of increase or reduction from a nominal 1.00.
- 2 X = X dimension - The width of the narrow element (bar and space).
- 3 W = Wide element - The width of the wide element (bar and space) calculated at 2.5 times the width of the narrow element (X dimension).
- 4 Symbol Length - Symbol Length includes Quiet Zones and Bearer Bars
- 5 H-R = Human-Readable - The human-readable interpretation of the bar code symbol's data.
- 6 Cl - Cl = Centerline to Centerline - The width of the human-readable characters defined from the center of a human-readable character to the center of an adjacent human-readable character.
- 7 Σ (Total) Symbol Height - The aggregate height of the symbol including the height of the bars and spaces, the bearer bars, human-readable interpretation, and the minimum distance between bearer bars and human-readable.
- 8 The *U.P.C. Shipping Container Code and Symbol Specification Manual (U.P.C. SCS)* recommends that for direct printing on shipping containers the ITF-14 symbols should be printed at a 100% magnification, and in no case should be smaller than the 70% magnification shown in the Table above. Printing on labels is limited to no smaller than 62.5%. Certain industries, including the office products and electrical industry, have a need to print ITF-14 symbols on inner packs and shelf packs that cannot accommodate symbols 3 inches long and 1 inch high. It is for their benefit and those with like interests that magnifications below 62.5% are provided in the Table above. In no case should "shipping containers" be direct-printed below 70% or label printed below the 62.5% magnification recommended by the UCC. The Table above has an anomaly beginning at the magnification of 70% for bar and space tolerance. The *U.P.C. SCS* calculates element tolerance at 0.012" times the magnification factor. However, the *U.P.C. SCS* recommends that in *no* case should the narrow element be smaller than 0.020 inch. For this reason, the tolerances shown for 70% and 62.5% magnification are the narrow element width less the 0.020 inch minimum. Tolerances shown for magnifications below 62.5% are calculated at 0.012" times the magnification factor, which also concurs with the published tolerances in USS I2/5.

**Table 4**  
**U.P.C. Shipping Container Symbol Packaging Indicators (PIs)**

PI	Description
"0"	Used to indicate that this container is the consumer unit. This level may, or may not, be a shippable container. May be used to indicate a kit or an alternate pack where the EAN/UPC base number is different from the base number on the units inside this container.
"1"	For those industry segments that have applied PI = 1 for an undetermined quantity, a transition period is required from the point of publishing until January 1, 1995, after which the approved definition will be as follows: "Used to identify an intermediate container above the consumer unit. This level of packaging may, or may not, be a shippable container.
"2"	Used to indicate packaging levels above the consumer unit that may or may not be shippable.
"3"	Used to indicate packaging levels above the consumer unit that may or may not be shippable.
"4"	Used to indicate packaging levels above the consumer unit that may or may not be shippable.
"5"	Used to indicate packaging levels above the consumer unit that may or may not be shippable.
"6"	Used to indicate packaging levels above the consumer unit that may or may not be shippable.
"7"	Used to indicate packaging levels above the consumer unit that may or may not be shippable.
"8"	Used to indicate packaging levels above the consumer unit that may or may not be shippable.
"9"	Used to indicate a container of variable or other than expected quantity. Will require manual key entry of the quantity or scanning a secondary UCC/EAN-128 or ITF symbol, or a concatenated UCC/EAN-128 application identifier.

**Standard Count Multi-pack Label (with Secondary Information)**

The Standard Count Multi-pack label is the U.P.C. Standard Multi-pack symbol encoded in a 14-digit Interleaved 2 of 5 symbol (ITF-14). The ITF-14 symbol identifies the level of packaging (first digit) and the product (following twelve digits). The last digit of the code is a modulus 10 check digit of the prior 13 digits. Within the EAN/UCC structures it is also possible to encode other product specific information on the label in a EAN/UCC-128 symbol, i.e., expiration date, best if used before date, and batch number. This may be used for product which has a shelf life or may be subject to product service notifications (recalls) based on batch number. The ITF-14 symbols should always appear as the bottom-most building block. When placed on a multi-pack, the ITF-14 symbol should be 1.25" ± 0.125" from the natural bottom of the multi-pack, no closer than 0.75" for either edge of the multi-pack container panel. For shipping containers the magnification should be no smaller than 62.5%. Magnifications below 62.5% may be used for inner-packs and shelf-packs.

BUILDING BLOCK	DATA FIELD	NUMBER OF ENCODED CHARACTERS					
		START STOP	APPLICATION IDENTIFIER	DATA (MAX.)	FNC1 & Mod 103 Check	TOTAL (MAX.)	MANDATORY /OPTIONAL
1	Batch Number (10)	2	2	20	2	26	O
1	Best Before Date (15)	2	2	6	2	12	O
1	Expiration Date (17)	2	2	6	2	12	O
2	ITF-14 Symbol	N/A	N/A	14	N/A	14	M



**Figure 5. AFMA Standard Count Multi-pack Label with Batch Number (NOT TO SCALE)**

**Customer Segment (Serial shipping container & Customer Related Information)**

The preferred Customer Segment label is the EAN/UCC Serial shipping container symbol encoded in EAN/UCC-128. The Serial shipping container symbol identifies the symbol format (first two digits), packaging level (third digit), EAN/UCC manufacturer's ID (next seven digits), package license plate (next nine digits), and a modulus 10 check digit of the prior 19 digits. Within the EAN/UCC structures it is also possible to encode other customer/order specific information on the label, e.g., purchase order number. Where a specific line item reference is required from within the purchase order, the delimiter character to precede the line item reference is the plus ("+") character. If purchase order number, line item reference number, and release number are to be encoded, the delimiter character to precede the release number is the slash ("/") character.

The use of the Serial shipping container symbol with EAN/U.P.C. and ITF-14 symbols are as follows:

- EAN/U.P.C. and ITF-14 symbols scanned as items are packed into shipper
- Serial shipping container symbol applied to shipper
- Serial shipping container symbol scanned linking contents to "license plate"
- Serial shipping container and contents transmitted to recipient via X12EDI 856 (Ship Notice)
- Recipient scans Multi-pack, accesses database with license plate, and identifies contents
- Contents can be verified by individually scanning EAN/U.P.C. and ITF-14 symbols

NUMBER OF ENCODED CHARACTERS

BUILDING BLOCK	DATA FIELD	START STOP	APPLICATION IDENTIFIER	DATA (MAX.)	FNC1 & Mod 103 Check	TOTAL (MAX.)	MANDATORY /OPTIONAL
1	Customer P.O. # (400)	2	3	30	2	37	O
2	Serial shipping container (00)		2	2	18	2	26 M

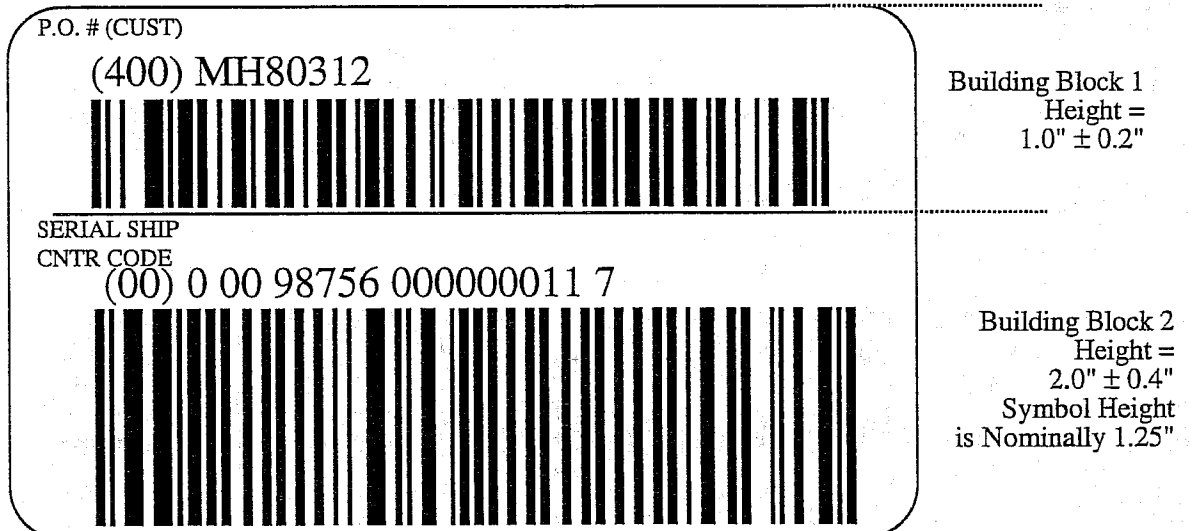


Figure 6. AFMA Serial shipping container Label with Purchase Order Number (Customer Segment)  
(NOT TO SCALE)

### Carrier Segment (Shipping Label)

The preferred Carrier Segment (Shipping) label consists of four building blocks. Building block 1 is the Ship From location in text form. Building block 2 is the Ship To location in text form. The character height of the Ship To location shall be greater than the Ship From character height. Building block 3 is the Destination Postal Code, for U.S. locations — ZIP Code — in either a five- or nine-digit format. Application Identifier (AI) "420" is used when the Ship From and Ship To locations are within the same postal authority. AI "421" is used when the Ship From and Ship To locations are within different postal authorities, i.e., international shipments. International postal codes will be preceded by a three-digit ISO 3166 country code. Building Block 4 is the EAN/UCC Serial shipping container symbol encoded in a EAN/UCC-128 Symbol. The Serial shipping container symbol identifies the symbol format (first two digits), packaging level (third digit), EAN/UCC manufacturer's ID (next seven digits), package license plate (next nine digits), and a modulus 10 check digit of the prior 19 digits.

Figure 7 shows SHIP FROM and SHIP TO in the same horizontal block. Figure 8 shows SHIP FROM and SHIP TO in separate horizontal blocks. Either is acceptable, though the Figure 7 example has 1" less of label length.

BUILDING BLOCK	DATA FIELD	NUMBER OF ENCODED CHARACTERS					
		START STOP	APPLICATION IDENTIFIER	DATA (MAX.)	FNC1 & Mod 103 Check	TOTAL (MAX.)	MANDATORY /OPTIONAL
1	Ship From (Text)	N/A	N/A	N/A	N/A	N/A	M
2	Ship To (Text)	N/A	N/A	N/A	N/A	N/A	M
3	Ship To Postal Code (420)	2	3	9	2	16	M
3	Ship To Postal Code (421)	2	3	12	2	19	M
4	Serial Shipping Container "License Plate" (00)	2	2	18	2	26	M
4	Carrier PRO Number (95)	2	2	20	2	26	O

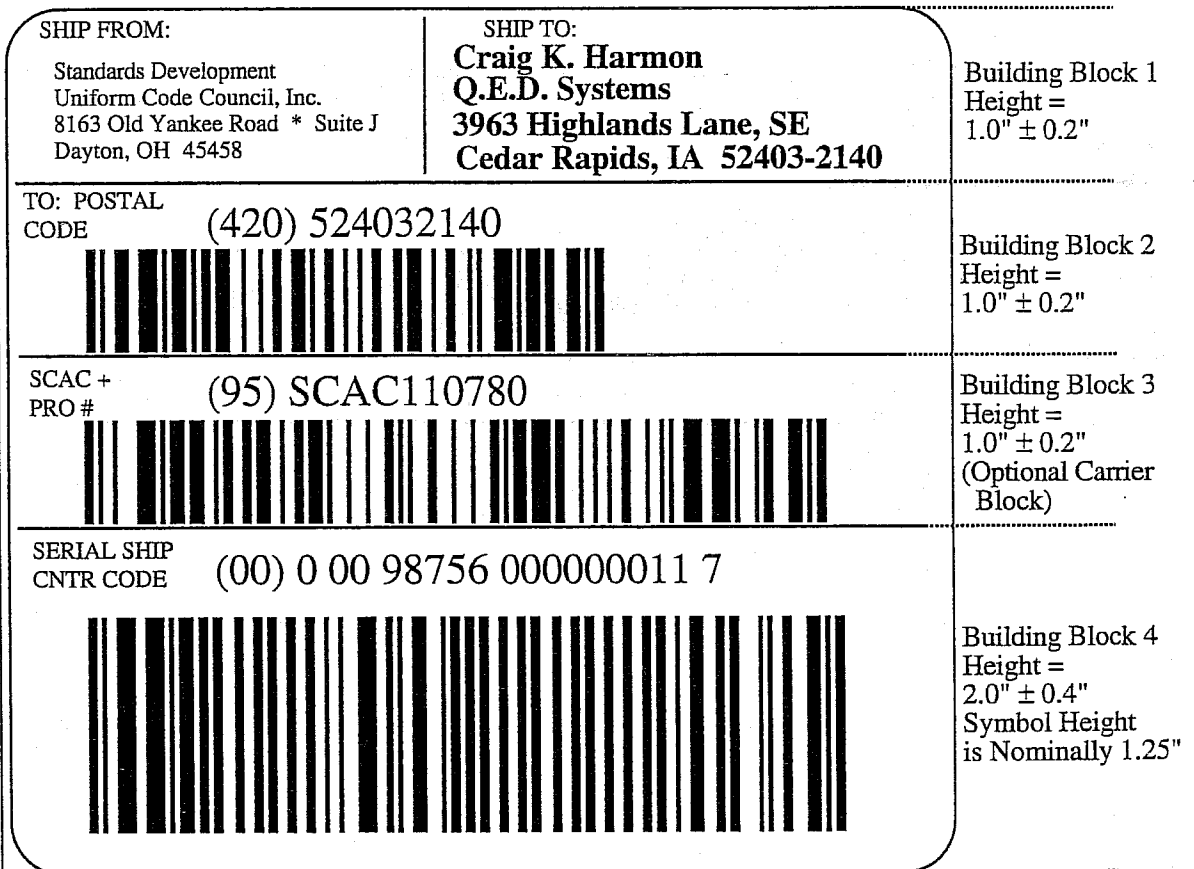


Figure 7. AFMA Shipping (Carrier Segment) Label Using Half Blocks for SHIP FROM and SHIP TO (NOT TO SCALE)









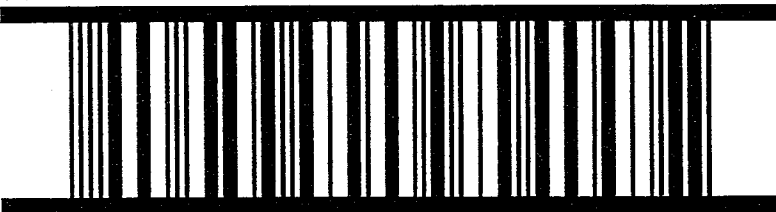
<p>SHIP FROM: Standards Development Uniform Code Council, Inc. 8163 Old Yankee Road * Suite J Dayton, OH 45458</p>	<p>Building Block 1 Height = 1.0" ± 0.2"</p>
<p>SHIP TO: <b>Craig K. Harmon</b> <b>Q.E.D. Systems</b> 3963 Highlands Lane, SE Cedar Rapids, IA 52403-2140</p>	<p>Building Block 2 Height = 1.0" ± 0.2"</p>
<p>TO: POSTAL CODE (420) 524032140</p> 	<p>Building Block 3 Height = 1.0" ± 0.2"</p>
<p>SCAC + PRO # (95) SCAC110780</p> 	<p>Building Block 4 Height = 1.0" ± 0.2" (Optional Carrier Block)</p>
<p>SERIAL SHIP CNTR CODE (00) 0 00 98756 000000011 7</p> 	<p>Building Block 5 Height = 2.0" ± 0.4" Symbol Height is Nominally 1.25"</p>

Figure 8. AFMA Shipping (Carrier Segment) Label Using Full Blocks for SHIP FROM and SHIP TO  
(NOT TO SCALE)

### Example of Carrier, Customer, and Supplier Label Segments

SHIP FROM: Standards Development Uniform Code Council, Inc. 8163 Old Yankee Road * Suite J Dayton, OH 45458		SHIP TO: <b>Craig K. Harmon</b> <b>Q.E.D. Systems</b> <b>3963 Highlands Lane, SE</b> <b>Cedar Rapids, IA 52403-2140</b>	
TO: POSTAL CODE		(420) 524032140	
			
SCAC + PRO #		(95) SCAC110780	
			
SERIAL SHIP CNTR CODE		(00) 0 00 98756 000000011 7	
			
P.O. # CUST		(400) MH80312	
			
BATCH/LOT #		(10) 3571101231	
			
EAN/U.P.C. CNTR CODE			
0 00 98756 10001 3			

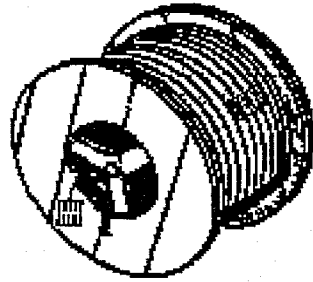
Carrier  
Segment

Customer  
Segment

Supplier  
Segment

Figure 9. AFMA Labels Showing Carrier, Customer, and Supplier Segments  
(NOT TO SCALE)

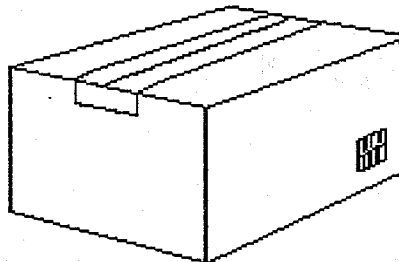
Figure 10. Label placement on various containers



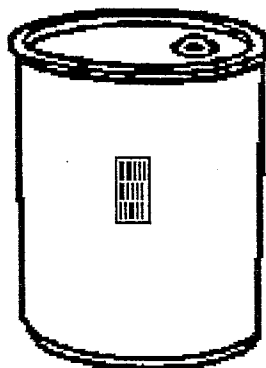
REEL OF CABLE



PALLET with two Unit Load Labels

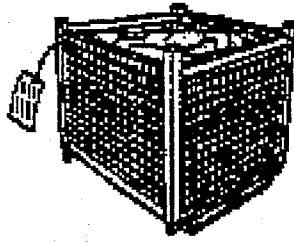


BOX OR CARTON with Transport  
Container Label

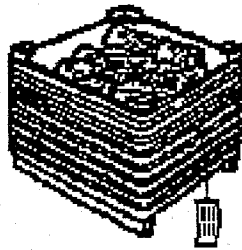


DRUM, BARREL, OR  
CYLINDRICAL CONTAINER

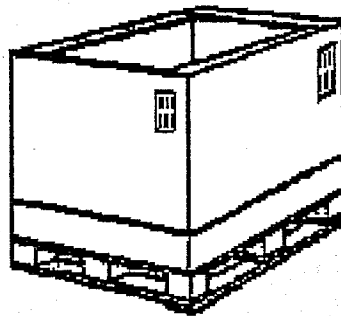
Figure 10. Label placement on various containers (continued)



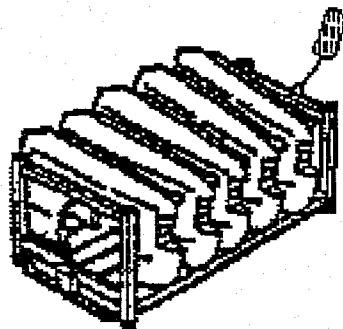
BASKET, WIRE MESH CONTAINER



METAL BIN OR TUB

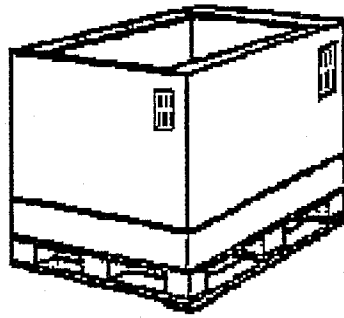


PALLET BOX

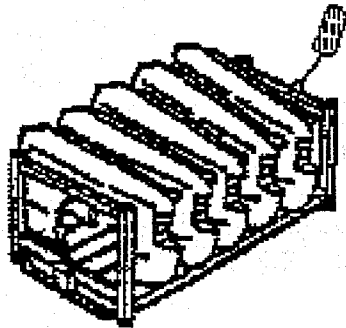


RACK

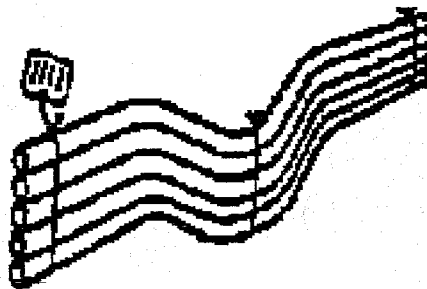
Figure 10. Label placement on various containers (continued)



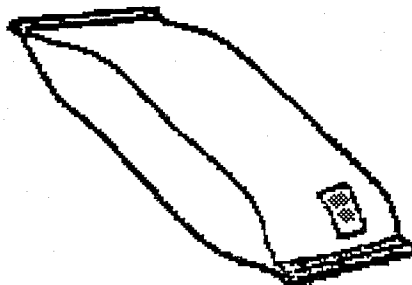
PALLET BOX



RACK



BUNDLE



BAG

## ANSI ASC X12EDI Transaction 856/204 & PDF417

The Unique Package Identifier is an integral element within the AFMA License Plate Labels. The Unique Package Identifier is intended to be scanned at shipping, during transportation, at receiving, and through the distribution of the product. The Unique Package Identifier is then referenced to more comprehensive information about the package which exists in the shipment originator's database or is communicated by the shipment originator to the originator's trading partners via electronic data interchange. In such a scenario the originator's trading partners must have already received and processed this EDI information.

The nature of EDI may find that the receipt of shipment data may lack the timeliness for trading partners to have available that information provided electronically by the originator. Types of business documents typically exchanged by trading partners, which may suffer from such lack of timeliness include Ship Notice/Manifest (ANSI ASC X12 EDI 856) and Motor Carrier Shipment Information (ANSI ASC X12 EDI 204).

To facilitate the timely availability of trading partner shipment and product related data, this standard recommends that in addition to the electronic transmission of data via EDI, the printing of a PDF417 two-dimensional symbol encoding the business documents Ship Notice/Manifest (X12EDI 856) and Motor Carrier Shipment Information (X12EDI 204). The PDF417 symbol should be printed as a supplemental label or included within the packing.

The output of the PDF417 decoder shall be programmed to have the syntax and coding structures identical to the syntax and coding of the appropriate ANSI X12EDI transaction set with version levels and usage consistent with the ANSI X12EDI convention of AFMA.

The following technical specifications for the PDF417 symbol shall be used:

- Nominal X dimension = 0.010 inch (0.25mm)
- Y Dimension =  $\geq 3$  times the X dimension
- Minimum Print Quality Requirement - In accordance with AIM Symbology Specification PDF417
- Minimum Quiet Zone: 0.1 inch (2.54mm)
- Mode Structure = Binary/ASCII
- Minimum Security Level = Minimum security level recommended is one which has the number of error correction codewords approximately equal of 10% of the number of data codewords
- Macro PDF417 = Enabled
- Syntax = ANSI ASC X12 EDI (ISA through IEA)
- Preamble = ">\*R<sub>S</sub>C<sub>R</sub>"
- Compliance Indicator = ">"
- Block Header = "1E\*A\*000000C<sub>R</sub>"
- Data Element Separator = Asterisk (\*) (ASCII Decimal 42)
- Segment Terminator = Carriage Return (C<sub>R</sub>) (ASCII Decimal 13)
- Coding, Versions, and Usage - In accordance with AFMA conventions
- Minimum Number of Rows per Symbol = 3
- Maximum Number of Rows per Symbol = 90
- Minimum Number of Data Columns = 1
- Maximum Number of Data Columns = 30

Where not noted above, the PDF417 symbol(s) used shall be defined by the AIM Symbology Specification PDF417.

It is expected that the appropriate human-readable interpretation of the PDF417 symbol will be included in the appropriate format on the printed and transmitted document, i.e., Manifest (856) and Bill of Lading (204).