

Section 0.0: Read Me First

Table of Contents

0.1 Introduction.....	2
0.2 Disclaimer	2
0.3 Overview.....	3
0.3.1 Who Should Read These Specifications	3
0.3.2 Electronic Data Interchange	3
0.3.3 Future Updates	3
0.3.4 Navigator	4

0.1 Introduction

This document is the concise definition and explanation of the use of the EAN.UCC System standards within Automatic Data Capture (ADC) technologies, and supersedes all previous ADC technical documents provided and/or published by either EAN International, the Uniform Code Council, Inc.[®] (UCC[™]), or other national bodies. The document takes immediate effect as the agreed technical basis for the standards. Every organisation using EAN.UCC System standards is requested to conform fully to the *General EAN.UCC Specifications*.

These specifications were jointly developed by EAN International and the UCC and emphasise the commitment of both organisations to global standards. All future development of the EAN.UCC System will be incorporated by updates to this document.

0.2 Disclaimer

Whilst every effort has been made to ensure that the EAN.UCC System standards contained in the document are correct, EAN International, the Uniform Code Council, Inc.[®] (UCC[™]), and any other party involved in the creation of the document hereby state that the document is provided without warranty, either expressed or implied, of accuracy or fitness for purpose, and hereby disclaim any liability, direct or indirect, for damages or loss relating to the use of the document. The document may be modified from time to time, subject to developments in technology, changes to the standards, or new legal requirements.

The document contains links that lead to information maintained by third parties. EAN International, the UCC, and any other party involved in the creation of the document do not warrant the accuracy or fitness of purpose of such third party resources.

Your statutory rights are not affected.

EAN International
Rue Royale, 145
Brussels
B-1000
Belgium

email: info@ean-int.org

Uniform Code Council, Inc.
Princeton Pike Corporate Center
1009 Lenox Drive, Suite 202
Lawrenceville, NJ, 08648
USA

email: info@uc-council.org

0.3 Overview

0.3.1 Who Should Read These Specifications

Technical experts working with the EAN.UCC System should read these specifications. They provide a global reference document covering all technical aspects of the EAN.UCC System. Their primary objective is to define the international standard upon which individual EAN Member Organisations and the Uniform Code Council (UCC™) can develop user documentation.

0.3.2 Electronic Data Interchange

The use of Electronic Data Interchange (EDI) is an integral part of the EAN.UCC System philosophy. Full details on the EDI standards are contained in EANCOM®. EANCOM is an implementation guideline of the EDIFACT standards (Electronic Data Interchange For Administration, Commerce and Transport) developed under the auspices of the United Nations.

0.3.3 Future Updates

The EAN.UCC System embodies an open architecture approach. It has been carefully designed for modular expansion with minimal disruption to existing applications. Enterprise Resource Planning (ERP) and other supply chain application software drive implementation of the system. New, user driven, applications can be expected, and this document will be updated accordingly.

The maintenance of these specifications will be the joint responsibility of EAN International and the Uniform Code Council (UCC™) and will incorporate the four principles of the EAN.UCC System:

1. Open Standards: The goal is a single, open, business led, integrated system of identification and information transfer technology standards that enables effective supply chain management in any company, in any industry, anywhere in the world.
2. Differentiation: The system is founded on rules-based standards that, when followed, ensure globally unique and discrete identification of such things as products, handling units, assets, and locations. The system includes standard ways to transfer EAN.UCC System identification numbers as well as relevant data related to these numbers.
3. Transparency: EAN.UCC System identification numbers must be relevant and applicable to any supply chain, independent of who assigns, receives, and processes the standards. This should enable only one way to perform any given function. New features should only be introduced to the standard if they enable new applications or better ways to perform existing functions.
4. Non-Significance: Global uniqueness of EAN.UCC System identification is guaranteed only when the standard number is taken as a whole and processed in its entirety. Fixed attributes of an item or service should be looked up from a computer or other data source by entering the item or service's EAN.UCC System identification number as a reference.

0.3.4 Navigator

These specifications have been developed as a reference document aimed primarily at EAN Member Organisations and the Uniform Code Council (UCC™) (who also produce local language user manuals) and system engineers developing software based upon EAN.UCC System standards. All aspects of the EAN.UCC System are summarised in Section 1.0, which is recommended for those wishing to become familiar with the EAN.UCC System logic and terminology.

The sub-sections of Section 2.0 provide detailed rules for implementing the EAN.UCC System in business applications. These rules represent the requirements that must be met by trading partners to meet the international standards.

Each application section mandates the use of system features defined elsewhere in this document, such as Check Digits, Element Strings, data carriers, and bar code symbol placement.

The application sections are:

Section 2.1, Trade Items

This section defines the international standard for the identification of trade items, which are any item (product or service) upon which there is a need to retrieve pre-defined information and that may be priced or ordered or invoiced at any point in any supply chain.

Section 2.2, Logistic Units

This section defines the international standard for the identification of logistic units, which are items of any composition established for transport and/or storage that need to be managed through the supply chain.

Section 2.3, Assets

This section defines the international standard for the identification of Returnable Assets and Individual Assets.

Section 2.4, Locations

This section defines the international standard for using EAN.UCC Global Location Numbers (GLNs) in bar code applications.

Section 2.5, Service Relationships

This section defines the international standard for the identification of service relationships.

Section 2.6, Special Applications

This section defines the international standard for identification of, for example, coupons, Refund Receipts, internal applications, and other special applications.

Section 1.0:

Basics and Principles of the EAN.UCC System

Table of Contents

1.1 Introduction.....	3
1.2 EAN.UCC Company Prefix	4
1.2.1 Acquisitions and Mergers.....	4
1.2.2 Partial Purchase.....	4
1.2.3 Split or Spin-Off	4
1.3 The Data Structures.....	6
1.3.1 Global Trade Item Number (GTIN™).....	6
1.3.2 SSCC (Serial Shipping Container Code).....	8
1.3.3 EAN.UCC Global Location Number (GLN).....	8
1.3.4 EAN.UCC Global Returnable Asset Identifier (GRAI)	9
1.3.5 EAN.UCC Global Individual Asset Identifier (GIAI).....	9
1.3.6 EAN.UCC Global Service Relation Number (GSRN)	9
1.3.7 Components of the Data Structures	10
1.4 The Data Carriers.....	11
1.5 The Data Standard	12
1.6 The Areas of System Application.....	15
1.6.1 Area 1: Identification of Trade Items.....	15
1.6.2 Area 2: Identification of Logistic Units	15
1.6.3 Area 3: Identification of Assets	16
1.6.4 Area 4: Identification of locations	16

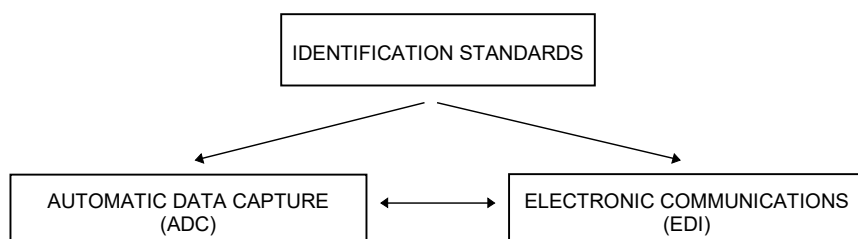
1.6.5 Area 5: Identification of Service Relationships.....16

1.6.6 Area 6: Special System Applications 16

1.7 Automatic Processing of Decoded Data.....17

1.1 Introduction

The EAN.UCC System originated in the United States and was established in 1973 by the Uniform Product Code Council, now known as the Uniform Code Council, Inc.[®] (UCC[™]). The UCC adopted a 12-digit identification number, and the first ID numbers and bar code symbols in open trade were being scanned in 1974. Following the success of this U.P.C. System, the European Article Numbering Association, now known as EAN International, was established in 1977 to develop a compatible system for use outside North America. The EAN System was designed as a superset of the UCC System and principally uses 13-digit numbers. As a consequence of using certain bar code symbols and data structures, the EAN.UCC System has expanded. Today full global compatibility is achieved through the use of the GTIN Format, a 14-digit reference field in computer files that can store data structures to ensure a trade item identification number is unique worldwide.



The EAN.UCC System provides for the use of unambiguous numbers to identify goods, services, assets, and locations worldwide. These numbers can be represented in bar code symbols to enable their electronic reading wherever required in business processes. The system is designed to overcome the limitations of using company, organisation, or sector specific coding systems, and to make trading much more efficient and responsive to customers.

These identification numbers are also used in Electronic Data Interchange (EDI). This document only provides information about the EAN.UCC System's Automatic Data Capture (ADC) standards. For information about EDI, please refer to the EANCOM[®] manual, the EAN.UCC XML standards or the appropriate national standard.

In addition to providing unique identification numbers, the EAN.UCC System provides for supplementary information, such as best before dates, serial numbers, and batch numbers, which can appear in bar code symbol form. Currently, bar code symbols are used as the data carriers, but other technologies, such as radio frequency tags, might be added in the future. Changes take place only after wide consultation and are subject to a significant migration period.

By following the principles and design of the EAN.UCC System, users can design applications to process EAN.UCC System data automatically. The system logic guarantees that data captured from EAN.UCC endorsed bar code symbols produces unambiguous electronic messages, and processing can be fully pre-programmed.

The EAN.UCC System is designed for use in any industry or trade sector, and any changes to the system are introduced so as not to negatively affect current users.

1.2 EAN.UCC Company Prefix

The EAN.UCC Company Prefix is the part of the EAN International and Uniform Code Council (UCC™) data structures. It consists of an EAN.UCC Prefix, which is co-administered by EAN International and the UCC, and a Company Number, which is assigned by an EAN Member Organisation or the UCC.

An EAN.UCC Company Prefix gives access to all the applications using EAN.UCC System identification standards (e.g., identification of traded items or services, locations, logistic units, returnable containers). The EAN.UCC Company Prefix is a component of each data structure described in Section 2.0 except for EAN/UCC-8.

When a company changes legal status as a result of an acquisition, merger, partial purchase, split, or "spin-off" the following guidelines apply. Adaptation to the following guidelines could be done by the EAN Member Organisation or UCC if the law of the country makes it absolutely necessary. Companies should notify their EAN Member Organisation or the UCC to facilitate a smooth transition.

1.2.1 Acquisitions and Mergers

If a company changes legal status as the result of an acquisition or merger, its EAN Member Organisation must be notified.

Existing stocks on hand which are numbered before acquisitions or mergers, keep the same Global Trade Item Numbers™ (GTINs™). Products that are produced after the acquisition or merger may keep the GTIN allocated before the acquisition or merger.

A company should be careful when centralising the allocation of all numbers under one EAN.UCC Company Prefix, thus changing the GTIN of the existing products, which are otherwise unchanged. Centralising the allocation of all numbers under a single EAN.UCC Company Prefix should be an exception, as it results in additional work and data file maintenance for customers.

1.2.2 Partial Purchase

When a company buys a division, a brand name, or a range of items from another company, it may keep the numbers previously allocated by the selling company. The rules concerning the use of the seller's Global Trade Item Numbers™ (GTINs™) should be taken into consideration when drawing up the purchase contract.

However, at the earliest opportunity, the buyer should phase in new numbers, from its own range of numbers, for items whose brand name it has acquired. The buyer will be able to do this, for example, when packaging is redesigned or reprinted, even if the normal rule would be to keep the old number. Trading partners must be notified in advance if an identification number changes.

During a company sale, and for four years following, the selling company must not reallocate the original numbers to other items.

1.2.3 Split or Spin-Off

When a company splits into two or more separate companies it is necessary for each EAN.UCC Company Prefix assigned to the original company to be transferred to only one of the new companies. Any company left without an EAN.UCC Company Prefix will need to apply to an EAN Member Organisation or the Uniform Code Council (UCC™) to obtain one. The decision about which of the new companies should take the original EAN.UCC Company Prefixes should be made in such a way as to minimise the number of additional Global Trade Item Numbers™ (GTINs™) required. The decision should be part of the legal arrangements of the new companies.

It is not necessary for existing stocks of items to be renumbered. However, when any of the split or spin-off companies has trade items that are numbered with an EAN.UCC Company Prefix that it no longer holds, the company should renumber those items using its own EAN.UCC Company Prefix

when new labelling or packaging is produced. Customers should be notified well in advance of the changes.

Split or spin-off companies that retain an EAN.UCC Company Prefix must keep a record of the GTINs created that have been allocated to items they no longer own. They must not re-use these GTINs for a period of at least four years after the company that split away owning those items last supplied goods identified by those GTINs. Therefore, the company that did not retain the EAN.UCC Company Prefix has to keep the company that now maintains it informed of the dates on which goods were last supplied using that EAN.UCC Company Prefix or to guarantee a date by which the number change will be made.

1.3 The Data Structures

The EAN.UCC System provides data structures for different applications. The application will determine how the number is to be used, but regardless of application, each number must be used in its entirety and not broken into constituent parts. The data structure guarantees worldwide uniqueness within the relevant area of application.

1.3.1 Global Trade Item Number (GTIN™)

The Global Trade Item Number™ (GTIN™) is used for the unique identification of trade items worldwide.

A trade item is any item (product or service) upon which there is a need to retrieve pre-defined information and that may be priced, or ordered, or invoiced at any point in any supply chain. This includes individual items as well as all their different configurations in different types of packaging.

These data structures provide unique identification when they are right-justified in a 14-digit reference field, called the GTIN Format (see Figure 1.3.1 – 5).

Figure 1.3.1 – 1

EAN/UCC-14 Data Structure

Indicator	GTIN™ of the Items Contained (Without Check Digit)	Check Digit
N ₁	N ₂ N ₃ N ₄ N ₅ N ₆ N ₇ N ₈ N ₉ N ₁₀ N ₁₁ N ₁₂ N ₁₃	N ₁₄

Figure 1.3.1 – 2

EAN/UCC-13 Data Structure

EAN.UCC Company Prefix	Item Reference	Check Digit
N ₁ N ₂ N ₃ N ₄ N ₅ N ₆ N ₇ N ₈ N ₉ N ₁₀ N ₁₁ N ₁₂		N ₁₃

Figure 1.3.1 – 3

UCC-12 Data Structure

UCC Company Prefix	Item Reference	Check Digit
N ₁ N ₂ N ₃ N ₄ N ₅ N ₆ N ₇ N ₈ N ₉ N ₁₀ N ₁₁		N ₁₂

Figure 1.3.1 – 4

EAN/UCC-8 Data Structure

EAN.UCC-8 Prefix	Item Reference	Check Digit
N ₁ N ₂ N ₃ N ₄ N ₅ N ₆ N ₇		N ₈

Figure 1.3.1 - 5

Data Structures	GTIN Format*													
	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆	T ₇	T ₈	T ₉	T ₁₀	T ₁₁	T ₁₂	T ₁₃	T ₁₄
EAN/UCC-14	N ₁	N ₂	N ₃	N ₄	N ₅	N ₆	N ₇	N ₈	N ₉	N ₁₀	N ₁₁	N ₁₂	N ₁₃	N ₁₄
EAN/UCC-13	0	N ₁	N ₂	N ₃	N ₄	N ₅	N ₆	N ₇	N ₈	N ₉	N ₁₀	N ₁₁	N ₁₂	N ₁₃
UCC-12	0	0	N ₁	N ₂	N ₃	N ₄	N ₅	N ₆	N ₇	N ₈	N ₉	N ₁₀	N ₁₁	N ₁₂
EAN/UCC-8	0	0	0	0	0	0	N ₁	N ₂	N ₃	N ₄	N ₅	N ₆	N ₇	N ₈

*T represents the position of each individual digit in a computer file format, N represents the position of each individual digit in a given data structure, and 0 represents a filler digit.

Note: This format is used in business transactions, especially for Electronic Data Interchange (e.g., orders, invoices, price catalogues).

1.3.2 SSCC (Serial Shipping Container Code)

The SSCC is used for the unique identification of logistic units.

Figure 1.3.2 - 1

Extension Digit	EAN.UCC Company Prefix	Serial Reference	Check Digit
N ₁	N ₂ N ₃ N ₄ N ₅ N ₆ N ₇ N ₈ N ₉ N ₁₀ N ₁₁ N ₁₂ N ₁₃ N ₁₄ N ₁₅ N ₁₆ N ₁₇		N ₁₈

N_i' represents a digit

1.3.3 EAN.UCC Global Location Number (GLN)

The EAN.UCC Global Location Number (GLN) is used to uniquely identify a physical, functional, or legal entity.

Figure 1.3.3 – 1

EAN.UCC Company Prefix	Location Reference	Check Digit
N ₁ N ₂ N ₃ N ₄ N ₅ N ₆ N ₇ N ₈ N ₉ N ₁₀ N ₁₁ N ₁₂		N ₁₃

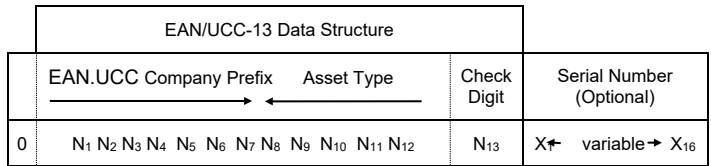
N_i' represents a digit

Note: The GLN uses the same structure as EAN/UCC-13 Identification Numbers for Trade Items, but must be treated as a separate series of numbers.

1.3.4 EAN.UCC Global Returnable Asset Identifier (GRAI)

The GRAI is used to identify a reusable entity that is normally used for transport and storage of goods.

Figure 1.3.4 – 1

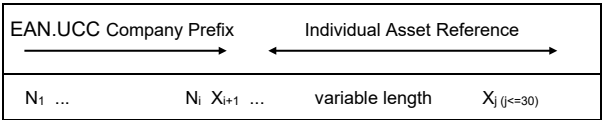


N_i' represents a digit and 'X_i' represents any character contained in [Figure 3.A.3 – 1](#).

1.3.5 EAN.UCC Global Individual Asset Identifier (GIAI)

The GIAI is used to identify uniquely an entity that is part of the inventory of a given company.

Figure 1.3.5 – 1

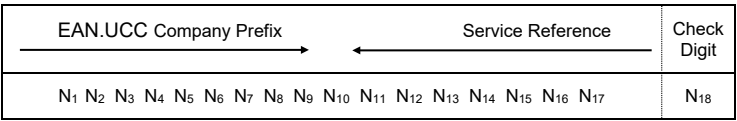


N_i' represents a digit and 'X_i' represents any character contained in [Figure 3.A.3 – 1](#).

1.3.6 EAN.UCC Global Service Relation Number (GSRN)

The GSRN is used to identify the recipient of services in the context of a service relationship.

Figure 1.3.6 – 1



N_i' represents a digit

1.3.7 Components of the Data Structures

The EAN.UCC Prefix is a number with two or more digits, co-administered by EAN International and the Uniform Code Council (UCC™) that denotes the format and meaning of a particular Element String. The main purpose of the EAN.UCC Prefix is to allow decentralisation of the administration of identification numbers.

The EAN.UCC Prefix and the Company Number jointly form the EAN.UCC Company Prefix, which is assigned to each system user by an EAN Member Organisation or the UCC.

EAN.UCC Company Prefixes are assigned to entities that administer the allocation of the EAN.UCC System identification numbers. These entities may be, for example, commercial companies, non-profit organisations, governmental agencies, and business units within organisations. The criteria to qualify for the assignment of an EAN.UCC Company Prefix are established by the EAN Member Organisations and the UCC.

The Item Reference, Serial Reference, Location Reference, Individual Asset Reference, Service Reference, and Asset Type are assigned by system users. Rules for their allocation depend on the particular application. EAN/UCC-8 Identification Numbers are available from EAN Member Organisations or the UCC.

The Indicator in an EAN/UCC-14 Identification Number allows each user to increase the numbering capacity when identifying similar trade units in different packaging configurations.

The Extension digit is used to increase the capacity of the SSCC. It has the value 0 to 9 and has no meaning.

The Check Digit is calculated as explained in [Section 3.A.1](#). It is used to verify that the identification number is correctly composed.

Note: The data structures guarantee unique identification within a particular area of application. Although, for example, trade items may use the same number as locations, each system user must be able to control how data is used according to the EAN.UCC rules.

1.4 The Data Carriers

Bar code symbols are the data carriers used in the EAN.UCC System. Other data carriers may be introduced in the future.

The data that comprises each identification number and any extra information that can be provided using the EAN.UCC System Application Identifiers can be regarded as an Element String, and they can all be represented in the bar code symbols endorsed by EAN International and the Uniform Code Council (UCC™). The EAN.UCC System uses the bar code symbologies described below.

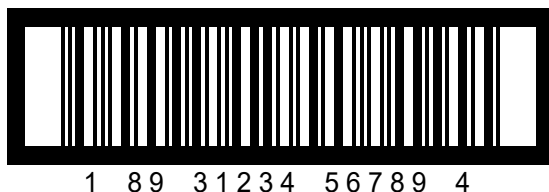
The EAN/UPC Symbology (which includes the UPC-A, UPC-E, EAN-13, and EAN-8 Bar Code Symbols as well as the two- and five-digit Add-On Symbols) is a bar code symbology family that can be read omnidirectionally. It must be used for all items that are scanned at the Point-of-Sale and may be used on other trade items.

Figure 1.4 – 1



The ITF-14 Bar Code Symbol (Interleaved 2-of-5) is restricted to use on trade items not passing through the Point-of-Sale. This symbology is better suited for direct printing on corrugated fibreboard.

Figure 1.4 – 2



UCC/EAN-128 is a variant of Code 128. Its use is exclusively licensed by EAN International and the UCC™. This extremely flexible symbology is used for the representation of Element Strings using EAN.UCC System Application Identifiers. It is not intended to be read on items passing through the Point-of-Sale.

Figure 1.4 – 3



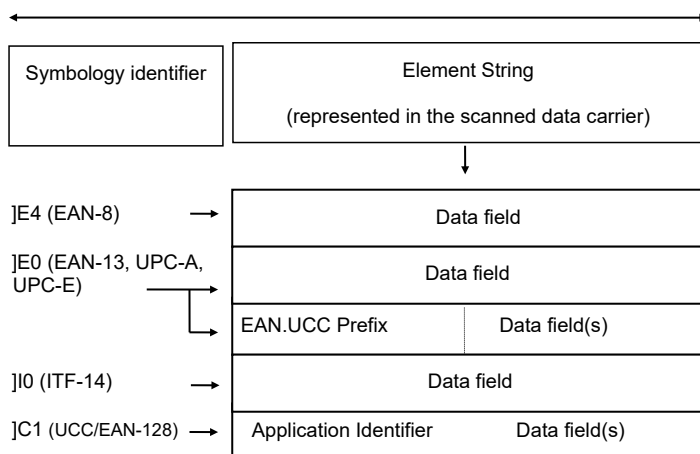
1.5 The Data Standard

The EAN.UCC System provides various types of standardised data in the form of Element Strings. An Element String is data of a particular structure and meaning that is represented in an EAN.UCC System endorsed data carrier. It may be:

- An EAN/UCC-8, UCC-12, EAN/UCC-13, or EAN/UCC-14 Identification Number
- An EAN.UCC Prefix and data field(s) for special use with the EAN-13 or UPC-A Bar Code Symbol in a particular environment
- An Application Identifier and data field(s)

A full string consists of the symbology identifier (see [Section 5.0.3](#)) followed by one or more Element Strings. The symbology identifier is generated by the reading device and transmitted together with the Element String(s). The symbology identifier ensures that systems distinguish between EAN.UCC System data structures and other non-EAN/UCC System data structures. Figure 1.5 – 1 shows how Element Strings are incorporated in the full string transmitted from a bar code reader to the appropriate software.

Figure 1.5 – 1
Transmitted Full String



Note: The full string may contain several Element Strings.

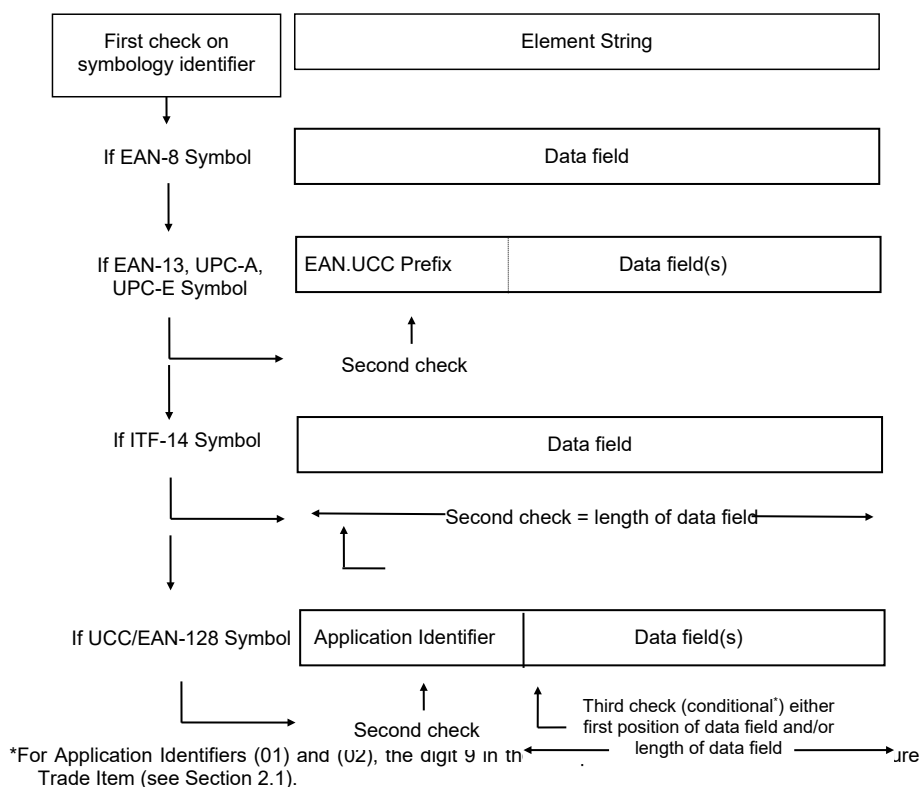
Each Element String, whether consisting of one or several data fields, will have unique meaning, because it is unambiguous and does not depend on other read or stored data, or human intervention. Element Strings must not be used for purposes other than those assigned to them, or this uniqueness will be lost.

The Element Strings of the EAN.UCC System will be used mainly for recording transactions in goods handling and business applications. Some Element Strings will be applied for administrative purposes in specific environments (e.g., hospitals). The use of specific Element Strings in system applications is subject to standards and recommendations. Their logical association is described in Sections 4.0 and 7.0.

The Element Strings are composed of an Application Identifier and one or more data fields. The Application Identifier denotes the content and structure of the respective data fields. Full details are contained in Section 3.0. The meaning of the Element Strings is determined by a sequence of checks carried out on the information in the transmitted full string (see Figure 1.5 – 2). See Section 5.0 for details on symbology identifiers.

Figure 1.5 – 2

Analysis of the Significance of an Element String Represented in a Data Carrier



EAN.UCC Prefixes are shown in Figures 1.5 – 3 and 1.5 - 4.

Figure 1.5 – 3

Synopsis of EAN.UCC Prefixes	
EAN.UCC Prefixes	Significance
000 - 019	UCC™ data structure*
02	UCC Variable Measure Trade Item identification for restricted distribution
030 - 039	UCC data structure
04	UCC item numbering for restricted distribution within a company
05	UCC coupon identification
060 - 099	UCC data structure
100 - 139	UCC data using EAN/UCC-13 Data Structure
140 - 199	Reserve
20 - 29	EAN numbering for restricted distribution within a geographic region
300 - 969	EAN data structure
970 - 976	Reserve
977	ISSN standard numbering (serial publications)
978	ISBN standard numbering (books)
979	ISBN or ISMN standard numbering
980	EAN identification of Refund Receipts
981-982	EAN coupon identification for common currency areas
983 - 989	Reserved for further EAN coupon identification
99	EAN coupon identification

* Starting from EAN.UCC Company Prefix 00 00100 to avoid collision with EAN/UCC-8 Identification Numbers.

Note: These prefixes all assume an EAN/UCC-13 Data Structure. When UCC identification numbers are carried by UCC-12 (UPC) Bar Code Symbols, the prefixes 00 to 09 will appear as the single figures 0 to 9.

Figure 1.5 – 4

Synopsis of EAN/UCC-8 Prefixes	
EAN/UCC-8 Prefixes	Significance
0	Velocity Codes
10 - 13	UCC data structure
140 - 199	Reserve
2	EAN.UCC numbering for use within a company
300 - 969	EAN data structure
97 - 99	Reserve

1.6 The Areas of System Application

To ensure that Element Strings are used and interpreted correctly together, they must only be used in the appropriate areas of application. In this way, each Element String will always have the same meaning, enabling automatic processing.

Element Strings containing identification numbers provide unique identification within a particular area of application. Each area of application must be distinguished within a database using qualifiers, different fields, or even different files.

~~1.1.1~~1.6.1 Area 1: Identification of Trade Items

Formatted: Bullets and Numbering

A trade item is any item (product or service) upon which there is a need to retrieve pre-defined information and that may be priced, or ordered, or invoiced at any point in any supply chain (see [Section 2.1](#)). This definition covers services and products, from raw materials through to end user products, all of which have pre-defined characteristics.

EAN/UCC-8, UCC-12, EAN/UCC-13, and EAN/UCC-14 Identification Numbers are all used to identify trade items. These data structures provide unique identification when they are right-justified in a 14-digit reference field, called the GTIN Format (see Figure 1.3.1 – 5). If the item is of variable measure, its identity will need to be completed by measure information, or in some instances, price information. Other variable information about trade items (e.g., production, packaging, expiration dates, lot numbers, serial numbers) is also available as standardised Element Strings.

Each trade item is allocated a unique identification number, which remains the same as long as it is being traded. The same identification number is used for all of these same items. The numbers must be used in their entirety within computer systems and must not be used in parts.

1.6.2 Area 2: Identification of Logistic Units

Logistic units are units which store or transport any combination of trade items and which need to be identified and managed through the supply chain (see [Section 2.2](#)). Each individual unit is allocated a unique serial number, the SSCC (Serial Shipping Container Code), which must be different for every logistic unit. Even if the logistic units contain identical trade items, they still require different SSCCs.

Attributes relating to logistic units (e.g., gross weight, outside dimensions) are also standardised Element Strings. Standardised Element Strings are available to identify the contents of logistic units that contain a single type of trade item.

1.6.3 Area 3: Identification of Assets

The EAN.UCC Global Returnable Asset Identifier (GRAI) or EAN.UCC Global Individual Asset Identifier (GIAI) can be used to identify specific assets or types of assets within an asset register (see [Section 2.3](#)).

1.6.4 Area 4: Identification of locations

The EAN/UCC-13 Data Structure is used to identify locations, and each location is given a unique EAN.UCC Global Location Number (GLN) (see [Section 2.4](#)).

The identification of physical, functional, or legal entities is required:

- For EDI messages
- When providing transport information on logistic units
- To enable bar code symbol identification of actual locations (e.g., goods inward, warehouse shelving)

1.6.5 Area 5: Identification of Service Relationships

The EAN.UCC Global Service Relation Number (GSRN) is used to uniquely identify a receiver of agreed upon services from a particular service provider (See [Section 2.5](#)). The GSRN can identify the user as a participant (or member) in a programme or scheme. However, it never constitutes a person's personal identification number because it is always related to a given service arrangement.

1.6.6 Area 6: Special System Applications

Special system applications are standardised Element Strings that may be used for company internal and special applications that are not covered by the main application areas (see [Section 2.6](#)).

1.7 Automatic Processing of Decoded Data

The purpose of entering data from a bar code scanner into a system is to record a transaction. Transaction data are electronic messages that will be processed according to the meaning of the data transferred. This is possible without any manual intervention.

Although each Element String has only one meaning, correct interpretation of the electronic message depends on the type of transaction. This implies that the transaction type, although not part of the EAN.UCC System standards, should be considered an integral part of EAN.UCC System data processing. Consequently, the electronic message will be derived from:

- The transaction type
- The identification of the bar code symbol
- The data decoded from a bar code symbol, including the Application Identifier(s) or other data identifier(s)

An Electronic Data Interchange (EDI) message has clearly defined components to enable automatic processing, and in the same way, data from a bar code scanner forms a message with a pre-defined structure. Such messages may simply identify an item, but some will also contain data that supplements the identification.

In order to provide unambiguous and complete messages, it is necessary to define which Element Strings are required to form a valid electronic message. Valid electronic messages are determined by the systems components and by business practices (system user applications), which together generate the system's logic. System users assembling these electronic messages need an unambiguous way of characterising the Element Strings, which do not have explicit Application Identifiers.

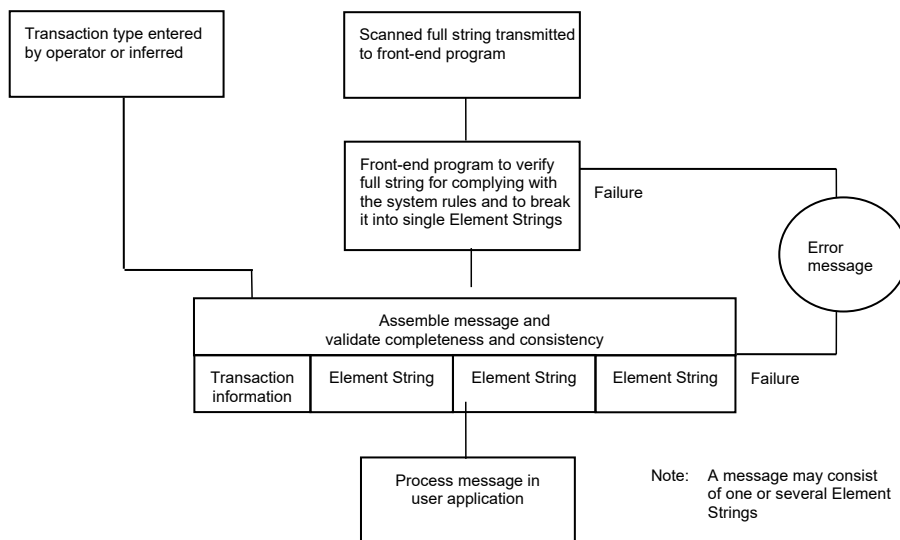
The EAN.UCC System provides standardised data, which, when carried by EAN.UCC System bar code symbols, can be captured, correctly analysed, and processed automatically. The steps in this procedure are:

- The bar code reader reads the bar code symbol and transmits the full string of data to the front-end processing program.
- The front-end program breaks the full string into Element Strings and transmits them to the analysing program.
- The analysing program assembles the Element Strings from one or more full strings, any manually entered data, and the transaction information collected from the operator or inferred, then validates the correctness of the set and transmits the set of data to the application for processing.
- The application uses the transaction information, the Element Strings, and a database to process the information correctly.

The above steps will be repeated as needed at each point in the supply chain.

This process is represented in Figure 1.7 – 1.

Figure 1.7 – 1



Note: In principle, all Element Strings provide their information independent of context. When the Element Strings are shown in a bar code symbol applied to an item, the information in the Element Strings is about the item itself. In this way, transactions about items can be recorded as the items are scanned. When printed in a document (e.g., in a product catalogue), the information enables the automatic entry of data for a business transaction, such as an order. For example, the Element String AI (01) will be shown in the same bar code symbol whether physically marked on an item or printed in a catalogue.

Section 2.0:

Areas of System Application

Table of Contents

2.0.1 Six Areas of System Application	1

2.0.1 Six Areas of System Application

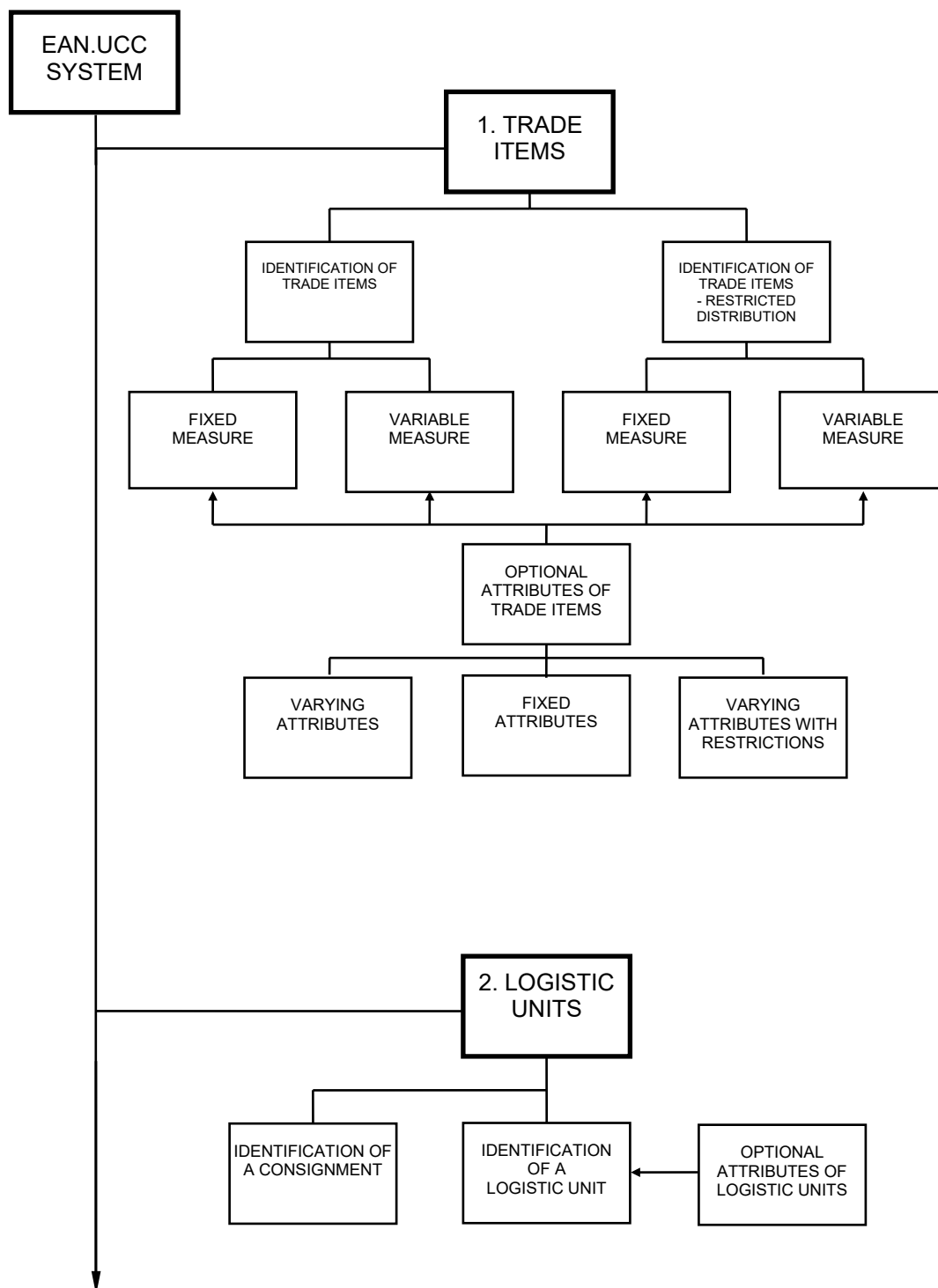
The EAN.UCC System is a method of identification comprising a standard numbering system and standardised identification data for unambiguous worldwide use. Represented in data carriers (currently bar code symbols), the identification system is used for Automatic Data Capture and electronic data processing of such things as goods, documents, and physical locations.

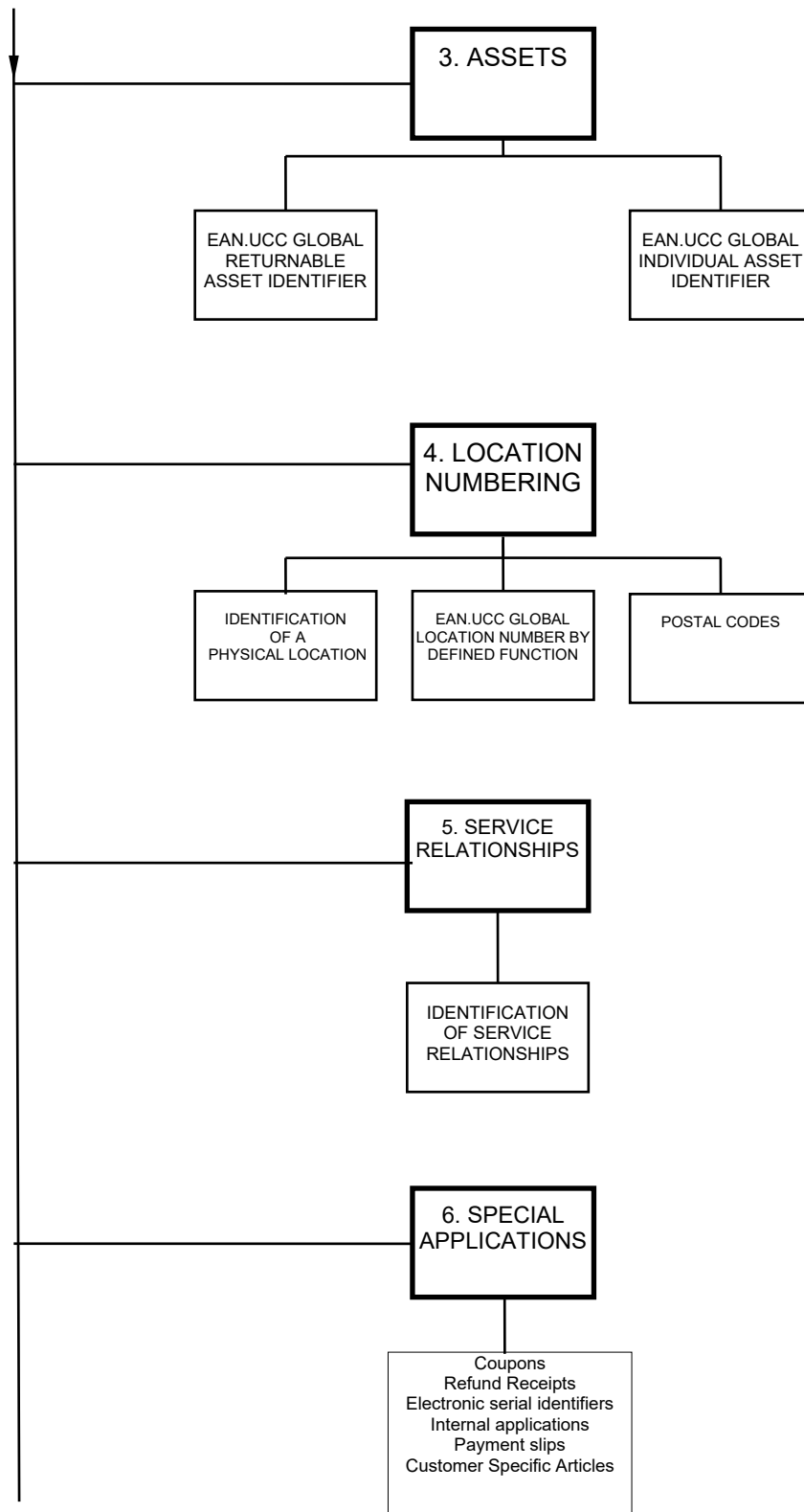
The rules and regulations for proper use of the numbering system and its Element Strings apply to six areas of system application, which are outlined in Figure 2.0.1 – 1. These rules and regulations must be observed by all system users to ensure the integrity of the EAN.UCC System.

System users are continually developing real business applications for the EAN.UCC System. It is neither possible nor desirable to outline all the real world solutions that are based upon the use of EAN.UCC System standards. However, all elements of the EAN.UCC System have been developed to meet user requests while keeping in mind the EAN International and Uniform Code Council, Inc.[®] (UCC[™]) objective to improve the efficiency of integrated logistics and contribute added value to partners and consumers.

Unique and unambiguous identification is guaranteed only within each area of application. The six areas of application supported by these standards should only be applied in instances that fit the application as defined. In the future, when new requirements arise, system application areas will be developed to meet those requirements.

Figure 2.0.1 – 1

Areas of System Application



Section 2.1:

Numbering and Symbol Marking of Trade Items

Table of Contents

2.1.1 Introduction	4
2.1.1.1 Definitions and Principles	4
2.1.1.2 Types of Trade Items	5
2.1.1.2.1 Physical or Non-Physical Trade Items	5
2.1.1.2.2 Open or Restricted Distribution	5
2.1.1.2.3 Fixed or Variable Measure	5
2.1.1.2.4 Retail or Non-Retail	5
2.1.1.2.5 Books and Serial Publications	5
2.1.1.2.6 Single Item or Grouping of Items	5
2.1.1.2.7 Single Trade Items Composed of Several Physical Parts.....	6
2.1.1.2.8 Quality of Substrate	6
2.1.1.2.9 Size of the Package	6
2.1.2 Identification of Trade Items	7
2.1.2.1 Fixed Measure Trade Items	7
2.1.2.1.1 General Numbering and Symbol Marking Rules	7
2.1.2.1.2 Trade Items Scanned at the Point-of-Sale.....	7
2.1.2.1.3 When is an EAN/UCC-8 Identification Number Appropriate?.....	8
2.1.2.1.4 When is a UPC-E Bar Code Symbol Appropriate?	8
2.1.2.1.5 Books, Paperbacks, Serials, and Printed Sheet Music	9
2.1.2.1.6 Groupings of Trade Items Not Crossing a Point-of-Sale	13
2.1.2.1.7 Identification of a Trade Item Composed of Several Parts	15
2.1.2.2 Variable Measure Trade Items Not Crossing a Point-of-Sale	16
2.1.2.2.1 General Numbering and Symbol Marking Rules	16
2.1.2.2.2 Trade Measures Required to Complete the Identification of Variable Measure Trade Items.....	16
2.1.2.2.3 Types of Variable Measure Items.....	18

2.1.2.2.4 Examples of Numbering and Symbol Marking of Variable Measure Trade Items	18
2.1.2.3 Fixed Measure Trade Items - Restricted Distribution	24
2.1.2.3.1 Definition	24
2.1.2.3.2 Company Internal Numbering – EAN.UCC-8 Prefix 0 or 2	24
2.1.2.3.3 Numbering in a Geographic Area Defined by the EAN Member Organisation – EAN.UCC Prefixes 20 to 29	24
2.1.2.3.4 Company Internal Numbering - EAN.UCC Prefix 04	25
2.1.2.3.5 Company Internal Numbering - EAN.UCC Prefix 00 (LAC and RZSC)	25
2.1.2.4 Variable Measure Trade Items - Restricted Circulation	26
2.1.2.4.1 Definition	26
2.1.2.4.2 Identification of Variable Measure Trade Items	26
2.1.3 Attributes of Trade Items	27
2.1.3.1 General Considerations	27
2.1.3.1.1 Types of Trade Item Attributes	27
2.1.3.1.2 Symbol Marking of Trade Item Attributes	27
2.1.3.2 Varying Trade Item Attributes	27
2.1.3.2.1 Batch or Lot Number: AI (10)	27
2.1.3.2.2 Dates	28
2.1.3.2.3 Serial Number: AI (21)	28
2.1.3.2.4 Secondary Data for Specific Health Industry Products: AI (22)	28
2.1.3.2.5 Lot Number (Transitional Use): AI (23n)	28
2.1.3.2.6 Secondary Serial Number: AI (250)	29
2.1.3.2.7 Reference to Source Entity: AI (251)	29
2.1.3.2.8 Logistic Measures for Variable Measure Trade Items: AI (33nn), (34nn), (35nn), (36nn)	29
2.1.3.2.9 Kilograms Per Square Metre: AI (337n)	29
2.1.3.2.10 Country of Origin of a Trade Item: AI (422)	29
2.1.3.2.11 Country of Initial Processing: AI (423)	29
2.1.3.2.12 Country of Processing: AI (424)	29
2.1.3.2.13 Country of Disassembly: AI (425)	29
2.1.3.2.14 Country Covering Full Process Chain: AI (426)	29
2.1.3.2.15 Approval Number of Processor: AI (703s)	30

2.1.3.3 Fixed Trade Item Attributes	31
2.1.3.3.1 Additional Product Identification Assigned by the Manufacturer: AI (240).....	31
2.1.3.3.2 Customer Part Number: AI (241)	31
2.1.3.4 Varying Trade Item Attributes with Restrictions	32
2.1.3.4.1 Serial Number for Serial Publications - Two-Digit Add-On Symbol	32
2.1.3.4.2 Supplementary Information for Books, Paperbacks, and Printed Sheet Music - Two-Digit and Five-Digit Add-On Symbol	32
2.1.3.4.3 Product Variant: AI (20).....	32
2.1.3.4.4 Price Per Unit of Measure: AI (8005).....	32
2.1.4 Allocating the Numbers	33
2.1.4.1 General Rules	33
2.1.4.2 Introduction of New Products	33
2.1.4.3 Lead Time for Re-Using a GTIN™	33
2.1.4.4 Data Alignment.....	33
2.1.4.5 Pre-Priced Merchandise	34
2.1.4.6 Trade Item Variants	34
2.1.4.6.1 Promotional Variants	34
2.1.4.6.2 Product Changes.....	34
2.1.4.6.3 Trade Item Variants for Groupings	35

2.1.1 Introduction

2.1.1.1 Definitions and Principles

A trade item is any item (product or service) upon which there is a need to retrieve pre-defined information and that may be priced, or ordered, or invoiced at any point in any supply chain. This definition covers services and products, from raw materials through to end user products, all of which may have pre-defined characteristics.

The identification and bar code symbol marking of trade items enables the automation of the Point-of-Sale (through Price Look Up (PLU) files), of goods receiving, inventory management, automatic re-ordering, sales analysis, and a wide range of other business applications.

The EAN/UCC-8, UCC-12, EAN/UCC-13, and EAN/UCC-14 Identification Numbers are used to identify trade items. Each can be considered a Global Trade Item Number™ (GTIN™) when stored in the GTIN Format, a 14-digit reference field.

Figure 2.1.1.1 – 1

Data Structures	Storage in the GTIN Format													
	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆	T ₇	T ₈	T ₉	T ₁₀	T ₁₁	T ₁₂	T ₁₃	T ₁₄
EAN/UCC-14	N ₁	N ₂	N ₃	N ₄	N ₅	N ₆	N ₇	N ₈	N ₉	N ₁₀	N ₁₁	N ₁₂	N ₁₃	N ₁₄
EAN/UCC-13	0	N ₁	N ₂	N ₃	N ₄	N ₅	N ₆	N ₇	N ₈	N ₉	N ₁₀	N ₁₁	N ₁₂	N ₁₃
UCC-12	0	0	N ₁	N ₂	N ₃	N ₄	N ₅	N ₆	N ₇	N ₈	N ₉	N ₁₀	N ₁₁	N ₁₂
EAN/UCC-8	0	0	0	0	0	0	N ₁	N ₂	N ₃	N ₄	N ₅	N ₆	N ₇	N ₈

If the item is of variable measure, the respective measure or price information will often be of critical importance to business applications. Attributes relating to trade items (e.g., dates, lot number) are also available as standardised Element Strings.

Each trade item that is different from another in design and/or content is allocated a unique identification number, which remains the same as long as it is traded. The same identification number is given to all trade items sharing key characteristics. Such numbers must be treated in their entirety throughout the supply chain.

Basic principles for the identification of trade items include:

- Each trade item that is different from another must be allocated a separate, unique GTIN.
- The GTIN does not carry any information related to the trade item. The brand owner responsible for assigning the GTIN must communicate this information by Electronic Data Interchange (EDI) or other means to all business partners.
- An assigned GTIN must never be changed as long as the item is not modified so that it needs to be discriminated from the initial trade item for ordering, stocking, or billing. Exceptions to this rule may occur only when regulatory or legal requirements mandate a change.

2.1.1.2 Types of Trade Items

Trade items cover a broad variety of things that may carry a bar code symbol and a GTIN™. Different standard solutions apply depending on the nature of the item and the scope of the users' applications. The following sections determine the identification and symbol marking rules applicable to a particular trade item.

2.1.1.2.1 Physical or Non-Physical Trade Items

Non-physical trade items are usually called services. Services may be identified with standard numbers for open trade applications or in restricted distribution environments.

2.1.1.2.2 Open or Restricted Distribution

The main benefit of the EAN.UCC System for trade items is that it provides a unique and unambiguous identification number for every trade item, which is applicable worldwide in open environments. In addition, the system provides for other number series that may be exclusively used for restricted distribution (e.g., national use, company internal use). Restricted distribution identification numbers are available to EAN Member Organisations and Uniform Code Council, Inc.® (UCC™) members to help them develop solutions applicable within their territory.

2.1.1.2.3 Fixed or Variable Measure

Fixed Measure Trade Items are those that are always produced in the same version and composition (e.g., type, size, weight, contents, design). Like a Fixed Measure Trade Item, a Variable Measure Trade Item is an entity with pre-defined characteristics, such as the nature of the product or its contents. Unlike a Fixed Measure Trade Item, a Variable Measure Trade Item has at least one characteristic that varies whilst other characteristics of the trade item remain the same. The variable characteristic may be weight, dimension, number of items contained, or volume information. The complete identification of a Variable Measure Trade Item consists of both an identification number and information about the variable data.

2.1.1.2.4 Retail or Non-Retail

Scanning at the Point-of-Sale is a major application of the EAN.UCC System, and trade items that are intended to cross a Point-of-Sale are subject to specific rules.

2.1.1.2.5 Books and Serial Publications

Published material (newspapers, magazines, and books) requires special consideration due to the following factors:

- A solution for published material should address the requirement to process returns (sorting and counting) to wholesalers and publishers. This implies the reading of a supplementary number that is not required for item identification.
- The international systems, ISSN and ISBN, already handle the numbering of publications and books.
- Because of the large number of titles involved and the problems of creating and updating Price Look Up (PLU) files, price may be encoded within the Global Trade Item Number™ (GTIN™).

2.1.1.2.6 Single Item or Grouping of Items

A trade item may be a single, non-breakable unit or a standard and stable grouping of a series of single items. Such groupings of items may be present in a wide variety of physical forms, such as a fibreboard case, a covered or banded pallet, a film wrapped tray, or a crate with bottles. Trade items consisting of a single unit are identified with a Global Trade Item Number™ (GTIN™). Standard groupings of identical or different units, each identified with a GTIN, are identified with a separate GTIN.

2.1.1.2.7 Single Trade Items Composed of Several Physical Parts

Because of its physical nature, a trade item may be packed in separate physical parcels. For example, furniture equipment may be composed of several pieces (e.g., a sofa and two armchairs, which cannot be ordered or sold separately). A specific standard solution is available to identify and symbol mark each component of a trade item composed of several physical parts.

2.1.1.2.8 Quality of Substrate

The choice of the data carrier (bar code symbology) used to symbol mark a trade item depends on the nature of the item and on the environment in which the bar code symbol will be scanned. It also depends on the quality of the substrate on which the bar code symbol will be marked.

2.1.1.2.9 Size of the Package

The space available on a package to symbol mark a trade item may be limited. Standard solutions that emphasise strictly defined rules are available to handle these situations.

2.1.2 Identification of Trade Items

2.1.2.1 Fixed Measure Trade Items

2.1.2.1.1 General Numbering and Symbol Marking Rules

Fixed Measure Trade Items are those that are always produced in the same version and composition (e.g., type, size, weight, contents, design). The identification number identifies the item unambiguously. Every trade item that is different from another in any respect is assigned a separate Global Trade Item Number™ (GTIN™). The EAN.UCC Prefixes 000 to 019, 030 to 039, 060 to 099, 100 to 139, 300 to 969, and 977 to 979 are used for all GTINs described in this section.

Figure 2.1.2.1.1 – 1 shows the options available when numbering and symbol marking Fixed Measure Trade Items.

Figure 2.1.2.1.1 – 1

Data Structure	Bar Code Symbol	Reference to Element Strings in Section 3.0	Comments
EAN/UCC-8	EAN-8	Section 3.3.1	Only for small items
UCC-12	UPC-E	Section 3.2.1	Only for small items
UCC-12	UPC-A	Section 3.2.1	For all items
EAN/UCC-13	EAN-13	Section 3.2.1	For all items
UCC-12	ITF-14	Section 3.5.1	Not for Point-of-Sale
EAN/UCC-13	ITF-14	Section 3.5.1	Not for Point-of-Sale
EAN/UCC-14	ITF-14	Section 3.5.2	Not for Point-of-Sale
UCC-12	UCC/EAN-128 (AI 01)	Section 3.6.2	Not for Point-of-Sale
EAN/UCC-13	UCC/EAN-128 (AI 01)	Section 3.6.2	Not for Point-of-Sale
EAN/UCC-14	UCC/EAN-128 (AI 01)	Section 3.6.2	Not for Point-of-Sale

Any bar code symbol that is intended for General Distribution Scanning (including unattended, fixed mount scanning environments, where items are scanned automatically as they pass by on a conveyor) should be a minimum of 32 mm (1.25 in.) in height and be printed at the higher end of the permissible X-dimension range.

2.1.2.1.2 Trade Items Scanned at the Point-of-Sale

A trade item that is intended to cross the Point-of-Sale in a retail outlet must carry a bar code symbol of the EAN/UPC Symbolology family. Therefore, these trade items support only EAN/UCC-8, UCC-12, or EAN/UCC-13 Identification Numbers.

Some Point-of-Sale scanning systems may be able to handle symbolologies other than the EAN/UPC Symbolology. However in an open environment, it is not possible to predict the type of scanner that will be used. Therefore, items intended for scanning at a Point-of-Sale in a retail outlet must be marked with a bar code symbol of the EAN/UPC Symbolology family.

Although a sunrise date of January, 2005, has been set for the global use of the EAN/UCC-13 Identification Number, a UCC-12 (UPC) Identification Number carried by a UPC-A or UPC-E Bar Code Symbol is normally required for items sold at the Point-of-Sale in the United States and Canada. This is because many North American users cannot yet accommodate EAN/UCC-13 Identification Numbers in their [12-digit] database files.

2.1.2.1.3 When is an EAN/UCC-8 Identification Number Appropriate?

The EAN/UCC-8 Identification Number is available for items whose packaging does not include enough available space to permit the use of an EAN-13 or UPC-A Symbol. EAN/UCC-8 Identification Numbers are individually assigned by EAN Member Organisations and the Uniform Code Council (UCC) on request (see Figure 2.1.2.1.3 – 1).

Figure 2.1.2.1.3 – 1

EAN/UCC-8 Data Structure	EAN/UCC-8 Prefix							Item Reference							Check Digit
	N ₁	N ₂	N ₃	N ₄	N ₅	N ₆	N ₇	N ₁	N ₂	N ₃	N ₄	N ₅	N ₆	N ₇	N ₈

The following guidelines should be observed:

Before deciding to use an EAN/UCC-8 Identification Number as opposed to an EAN/UCC-13 ID Number or UCC-12 ID Number, companies, working jointly with their printer, should consider options such as:

- Whether the bar code can be reduced in size (e.g., printed at a lower X-dimension, taking into account the minimum bar code symbol print quality requirements (See Section 5.4))
- Whether the label or artwork can reasonably be changed to enable the printer's recommended size of a EAN-13 or UPC-A Bar Code Symbol to be included (e.g., redesigning the label increasing the label size, especially when the existing label is small in comparison with the pack area, or using an additional label). The label includes the total printed design surface, whether or not it is separately affixed.
- Whether a truncated bar code symbol can be used. A truncated bar code symbol (normal length, but reduced in height) may only be used if there is absolutely no possibility of printing a full size bar code symbol. Truncation removes the omni-directional scanning capability. A bar code symbol with excessive truncation will not be of any practical use. Users considering this option should consult their customers to see if an acceptable compromise can be reached.

Pack size constraints allow several possible options:

- The use of an EAN/UCC-8 Identification Number is authorised when the EAN-13 or UPC-A Bar Code Symbol in the size required as a result of print quality studies exceeds either 25% of the printed label area or 12.5% of the total printable area.
- The use of an EAN/UCC-8 Identification Number is authorised when either the largest side of the printed label is less than 40 cm² or the total printable area is less than 80 cm².
- The use of an EAN/UCC-8 Identification Number is authorised on cylindrical products with a diameter less than 3 cm.

2.1.2.1.4 When is a UPC-E Bar Code Symbol Appropriate?

Only UCC Company Prefixes beginning with zero can be used to construct UPC-E Bar Code Symbols. Distribution of UCC Company Prefixes in this range is restricted to proven need only (e.g., for items whose packaging does not include enough available space to permit the use of any other

bar code symbol). Companies with these prefixes are encouraged to manage their finite resource carefully.

Technical details for the UPC-E Bar Code Symbol and UCC-12 Identification Numbers are described in [Section 3.A.2](#).

2.1.2.1.5 Books, Paperbacks, Serials, and Printed Sheet Music

2.1.2.1.5.1 General Principles Adopted in the Solutions Provided

When identifying books, paperbacks, serials, and printed sheet music, companies can choose between an existing international numbering system, such as ISBN, ISMN, or ISSN, and the EAN/UCC-13 Data Structure (or UCC-12 Data Structure in the United States and Canada). EAN International makes available, through these specifications, a general framework of solutions for books, paperbacks, serials, and printed sheet music, which should be considered by EAN Member Organisations working in liaison with publishers and trade associations.

The numbering and symbol marking rules for books, paperbacks, serials, and printed sheet music sold in the United States and Canada are available from the Uniform Code Council, Inc.® (UCC).

2.1.2.1.5.2 Identification of Books, Paperbacks, and Printed Sheet Music

When identifying books, paperbacks, and printed sheet music, a company should first attempt to identify them in the same manner as any other trade item: by use of the EAN/UCC-13 or UCC-12 Data Structure.

The second option is to use the ISBN or ISMN numbering systems. The EAN.UCC Prefix 978 is used to encode the ISBN number assigned to a particular item without its Check Digit. The EAN.UCC Prefix 979 is used for encoding either the ISBN or the ISMN of a particular item without its Check Digit.

Figure 2.1.2.1.5.2 – 1

EAN.UCC Prefix	ISBN (Without its Check Digit)	Check Digit
9 7 8	N ₄ N ₅ N ₆ N ₇ N ₈ N ₉ N ₁₀ N ₁₁ N ₁₂	N ₁₃

EAN.UCC Prefix	ISBN or ISMN (Without its Check Digit)	Check Digit
9 7 9	N ₄ N ₅ N ₆ N ₇ N ₈ N ₉ N ₁₀ N ₁₁ N ₁₂	N ₁₃

Note: For ISMN the N₄ (which is represented by "M" in the ISMN) takes the value 0 (zero). N₅ to N₁₂ are the first eight digits of the ISMN number.

2.1.2.1.5.3 Symbol Marking of Books, Paperbacks, and Printed Sheet Music

Books, paperbacks, and printed sheet music should be marked with an EAN-13, UPC-A, or UPC-E Bar Code Symbol that complies with the print quality specifications applicable to all EAN.UCC System bar code symbols. In addition, the main bar code symbols on books, paperbacks, and printed sheet music are subject to the following constraints:

- They must not be reduced in height.
- They must appear on the outside cover of the book (to facilitate payment) and inside the cover for books that are subject to return.

2.1.2.1.5.4 Supplementary Information for Books, Paperbacks, and Printed Sheet Music

Some publishers may wish to communicate additional information in a bar code symbol in order to meet their internal requirements. For example, publishers may wish to include an edition variant (e.g., unchanged reprint, price increase), which is not distinguished by the ISBN, ISMN, EAN/UCC-13 ID Number, or UCC-12 ID Number. The EAN.UCC System provides an additional two- or five-digit symbol, called an Add-On Symbol, can be included on the item just to the right of the main bar code symbol.

Add-On Symbols involve the following constraints:

- They should not contain information that must appear in the item's EAN/UCC-13 ID Number (or UCC-12 ID Number).
- The reading of the Add-On Symbol by the retailer's Point-of-Sale system is optional.
- The use of the Add-On Symbol is the responsibility of each publisher.

2.1.2.1.5.5 Identification of Serial Publications

When identifying serial publications, companies should first attempt to identify them in the same manner as any other trade item: using the EAN/UCC-13 or UCC-12 Data Structure.

The second option involves using a special EAN.UCC Company Prefix (assigned by an EAN Member Organisation within its territory), the publication number, and the price of the publication (provided that the national legislation allows this). With this option, the price is placed in clearly defined positions and is directly usable in the country of publication. However, as soon as the item leaves the country, the price has no direct significance and the GTIN must be interpreted in a general way, without being broken down internally.

The third option is to make use of the ISSN numbering system. The EAN.UCC Prefix 977 is used for encoding the ISSN number assigned to a particular item without its Check Digit.

Figure 2.1.2.1.5.5 – 1

EAN.UCC Prefix	ISSN (Without its Check Digit)	Variant	Check Digit
9 7 7	N ₄ N ₅ N ₆ N ₇ N ₈ N ₉ N ₁₀	N ₁₁ N ₁₂	N ₁₃

The variant digits, N₁₁ and N₁₂ may be used to express variants of the same title for issues with a different price or to identify different issues of a daily within one week. Normal title takes value 00

Two-Digit Add-On Symbol

Serial publications are identified using one of the three solutions previously described. A two-digit serial number encoded in a two-digit Add-On Symbol is also available. The system for assigning the serial number is at the discretion of each EAN Member Organisation or the Uniform Code Council, Inc.® (UCC™).

EAN International and the UCC recommend the use of the following number assignment:

- Dailies (or more generally publications with several issues a week): The publications of each day of the week are considered separate trade items that must be identified with a separate identification number represented in an Add-On Symbol. The two-digit serial number should only be used to represent the applicable week, which, together with the EAN/UCC-13 or UCC-12 ID Number, establishes the day within the year.
- Weeklies: Number of the week (01 – 53)
- Bi-weeklies: Number of the first week of the respective period (01 – 53)
- Monthlies: Number of the month (01 – 12)
- Bi-monthlies: Number of the first month of the respective period (01 – 12)
- Quarterlies: Number of the first month of the respective period (01 – 12)
- Seasonal period: First digit = last digit of the year; second digit = 1 spring, 2 summer, 3 autumn, 4 winter
- Bi-annual period: First digit = last digit of the year; second digit = number of the first season of the respective period
- Annuals: First digit = last digit of the year; second digit = 5
- Special intervals: Consecutively numbered from 01 to 99

The serial number is carried by a two-digit Add-On Symbol that is placed to the right of the symbol and parallel to it. The Add-On Symbol must comply with the print quality specifications applicable to all EAN.UCC System bar code symbols. For example, the X-dimension applied to the main bar code symbol must also be applied to the Add-On Symbol.

2.1.5.7 Five-Digit Serial Number

Serial publications can also use a five-digit serial number carried by a five-digit Add-On Symbol. The reading of the Add-On Symbol at a Point-of-Sale is optional. The Add-On Symbol must not be used to encode information that should be contained within the Global Trade Item Number™ (GTIN™). The Add-On Symbol provides additional information about a particular publication of a printed item, and it is the publisher's responsibility to define the numbering scheme. When using a five-digit Add-On Symbol, a two-digit Add-On Symbol cannot also be used.

Information that can be encoded in the five-digit Add-On Symbol includes the actual date of issue, in order to differentiate between successive issues.

The five-digit Add-On Symbol is placed to the right of the main bar code symbol and parallel to it. The Add-On Symbol must comply with the print quality specifications applicable to all EAN.UCC System bar code symbols. For example, the X-dimension applied to the main symbol also must be applied to the Add-On Symbol.

2.1.2.1.6 Groupings of Trade Items Not Crossing a Point-of-Sale

2.1.2.1.6.1 General Identification Rules for Groupings of Trade Items

Every trade item that is different from another in any respect is assigned a unique Global Trade Item Number™ (GTIN™). This includes groupings of trade items, which are also considered a single trade item.

For example each of the packaging types in Figure 2.1.2.1.6.1 – 1, if traded, is assigned a separate GTIN.

Figure 2.1.2.1.6.1 – 1

Trade Item	Numbering Option to Construct a GTIN			
	EAN/UCC-8	UCC-12	EAN/UCC-13	EAN/UCC-14
Single Product A	X	X	X	
50 x Product A (standard case)		X	X	X
50 x Product A (display case)		X	X	X
100 x Product A (standard case)		X	X	X
Single Product B	X	X	X	
50 x Product A 50 x Product B		X	X	

2.1.2.1.6.2 Identification of Uniform Groupings of Trade Items

A uniform grouping of trade items is a standard and stable grouping of a series of identical units identified by an EAN/UCC-8, UCC-12, EAN/UCC-13, or EAN/UCC-14 Identification Number. If the grouping is itself a trade item, it must be identified with a UCC-12, EAN/UCC-13, or EAN/UCC-14 Identification Number.

2.1.2.1.6.3 Identification of Mixed Groupings of Trade Items

A mixed grouping of trade items is a standard and stable grouping of a series of different units identified by different Global Trade Item Numbers™ (GTINs™). If this mixed grouping is itself a trade item, it must be identified with either a UCC-12 or an EAN/UCC-13 Identification Number.

The EAN/UCC-14 Identification Number is valid for mixed groupings only when the mix is identified with a unique GTIN such as an EAN-8, UCC-12, or EAN-13 Identification Number that is subsequently put into a packaging configuration.

For example:

- GTIN A, GTIN B, and GTIN C (a mixed grouping) are identified by GTIN D.
- GTIN D could then be used to construct an EAN/UCC-14 Identification Number for a traded unit made up of a grouping of trade items identified by GTIN D.

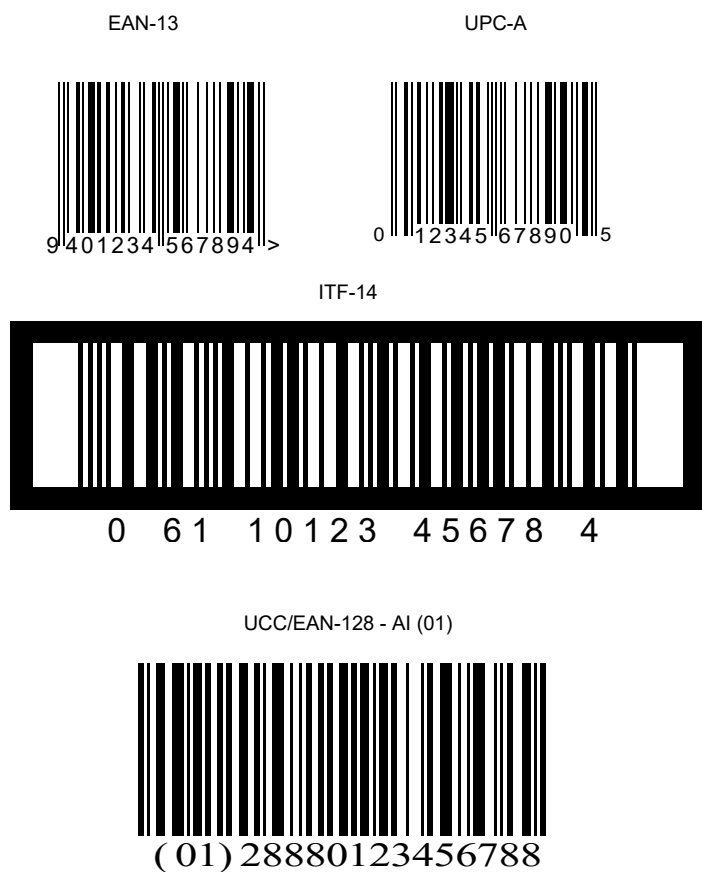
2.1.2.1.6.4 Symbol Marking Groupings of Trade Items

Symbols from the EAN/UPC Symbology family (UPC-A, UPC-E, and EAN-13 Bar Code Symbols) may be used to encode the UCC-12 or EAN/UCC-13 Identification Number of the trade item grouping.

ITF-14 Symbols may be used on groupings of trade items where printing conditions require the application of a less demanding symbology. ITF-14 Symbols can encode the UCC-12, EAN/UCC-13, or EAN/UCC-14 Identification Number of the item.

The UCC/EAN-128 Symbology with Application Identifier (01) may be used to encode a UCC-12, EAN/UCC-13, or EAN/UCC-14 Identification Number that identifies the trade item if the printing conditions allow. The choice of this symbology is particularly relevant if there is a need to encode attribute information in addition to the identification number.

Figure 2.1.2.1.6.4 – 1



2.1.2.1.7 Identification of a Trade Item Composed of Several Parts

The EAN.UCC System provides for an Element String using Application Identifier (8006) (described in [Section 3.6.52](#)) to identify a trade item that does not cross a Point-of-Sale and which, due to its nature, is packed in several physical units. Each individual component is marked with a UCC/EAN-128 Bar Code Symbol carrying the Element String, which consists of the Global Trade Item Number™ (GTIN™) of the trade item, the sequence number of the particular component, and the total number of components of the trade item. If an attribute appears on more than one component, its value must be the same.

The use of the Element String AI (8006) to identify a trade item excludes the application of the Element String AI (01) on the same unit.

This solution is not applicable for trade items crossing a Point-of-Sale using slot scanners.

2.1.2.2 Variable Measure Trade Items Not Crossing a Point-of-Sale

2.1.2.2.1 General Numbering and Symbol Marking Rules

This section concerns trade items not intended to be scanned at the Point-of-Sale.

Trade items may be of variable measure either because the production process does not guarantee consistency in weight, size, or length (e.g., carcasses of meat, whole cheeses) or because the items are created to meet a special order that states a quantity (e.g., textiles ordered by the metre, glass ordered by the square metre).

Only trade items that are sold, ordered, or produced in quantities, which can vary continuously, are covered by the rules outlined in this section. Trade items that are sold in discrete and pre-defined bands (e.g., as a nominal weight) are treated as Fixed Measure Trade Items.

A trade item must be considered to be variable measure if its measure is variable at any point in the supply chain. For example, a supplier may sell and invoice chickens in standardised cases of 15 kg each; therefore the quantity of contained chickens will vary. The customer, a retailer in this example, may need to know the exact number of chickens contained in each case in order to organise the distribution to his stores. In this example, the supplier should source mark the trade item by using a variable measure Global Trade Item Number™ (GTIN™) (see Figure 2.1.2.2.1 – 1) and the variable count Element String (see Section 3.6.20).

The options shown in Figure 2.1.2.2.1 – 1 are available to number and symbol mark Variable Measure Trade Items.

Figure 2.1.2.2.1 – 1

Data Structure	Bar Code Symbol	Reference to Element Strings in Section 3.0	Comments
EAN/UCC-14	ITF-14	Section 3.5.3	Not for Point-of-Sale
EAN/UCC-14	UCC/EAN-128 - AI (01)	Section 3.6.3	Not for Point-of-Sale

The EAN/UCC-14 Identification Number with the Indicator 9 is used to identify a Variable Measure Trade Item. The presence of the variable measure information is mandatory for the complete identification of a particular Variable Measure Trade Item. The digit 9 in the first position is an integral part of the GTIN.

2.1.2.2.2 Trade Measures Required to Complete the Identification of Variable Measure Trade Items

The EAN/UCC-14 Identification Number identifies a Variable Measure Trade Item with respect to its fixed attributes or characteristics. To complete the identification of a Variable Measure Trade Item, the presence of an Element String representing a trade measure is mandatory. Applicable trade measures depend on the nature of the product. They may be a quantity, a weight, or any dimension.

For details on Element Strings for trade measures, see Sections [3.6.20](#) and [3.6.21](#).

2.1.1.1.1.12.1.2.2.1 Variable Count: AI (30)

This Element String is used if the variable measure of the trade item is the number of items contained. In order to generate a short bar code symbol, always enter an even number of digits in the data field count of items by inserting a leading zero. Concatenation of this Element String with the EAN/UC-14 Identification Number of the item enhances the accuracy of the application.

Note: This Element String should never be used to indicate the quantity contained in a Fixed Measure Trade Item. However, if it appears on a Fixed Measure Trade Item, it should not invalidate the trade item identification.

2.1.1.1.1.22.1.2.2.2 Trade Measures: AI (31nn), (32nn), (35nn), (36nn)

These Element Strings are used if the variable measure of the respective trade item is weight, dimension, area, or volume. Only one Element String of a given unit of measure may be applied on a particular item. Several Element Strings containing trade measures are possible on a particular item if the item is available in either unit of measure and if the applicable unit of measure is not distinguished for ordering and billing. This might apply if weight must be expressed in kilograms and pounds.

Note: The fourth (and last) digit of the AI indicates the implied decimal point position. The value 0 means that the measurement is expressed in the basic unit of measure associated with the AI (e.g., kilograms). A value of 1 decreases the measurement by a factor of 10, a value of 2 by a factor of 100, and so on. For example, this enables metric weights to be represented from 999 kilograms to 1/1000 of a milligram.

2.1.1.1.1.32.1.2.2.2.3 Roll Products - Width, Length, Core Diameter, Direction, Splices: AI (8001)

The EAN/UCC-14 Identification Number can denote a basic roll product. The Element String AI (8001) contains the pre-defined variable fields of a roll product. It may be used for those variable roll products where the standard trade measures (AI (31nn), (32nn), (35nn), (36nn)) are not sufficient.

This Element String must never be used together with other Element Strings representing standard trade measures.

Formatted: Bullets and Numbering

Formatted: Bullets and Numbering

2.1.2.2.3 Types of Variable Measure Items

Any trade item of a given composition where the quantity/measure information cannot be pre-determined for any reason is a Variable Measure Trade Item. The most frequent types are shown in Figure 2.1.2.2.3 – 1.

Figure 2.1.2.2.3 – 1

Type	Item Description
A	Items traded in bulk, neither portioned nor pre-packed for retail sale, ordered in any quantity, and that are delivered as non-standardised trade items (e.g., fish, fruit, vegetables, cables, carpets, timber, fabrics) The identification number denotes the item as a trade entity containing any quantity of the given product and, if applicable, the form of packaging. Weight or dimensions complete the identification of the individual unit.
B	Trade items ordered and delivered by piece (wrapped or unwrapped) and invoiced by weight or measure because weight or measure varies due to the nature of the product or due to the manufacturing process (e.g., whole cheese, sides of bacon, beef carcasses, fish, sausages, ham, chicken, cauliflower, motion picture films) The identification number denotes the item as a particular pre-defined entity and, if applicable, denotes the form of packaging. Price or weight or dimensions complete the identification of the individual item.
C	Portioned trade items, pre-packed for sale by weight to the consumer, not standardised in quantity. (e.g., meat, cheese, vegetables, fruit, fillets of fish, sliced poultry, cold cuts) The identification number denotes the item type according to business practice and the form in which it is packed. Price or weight completes the identification of the individual unit.
D	Standardised trade items with selectable dimensions where EAN.UCC System standard numbering does not make sense to cover the multiplicity of all variations (e.g., wooden planks, carpeting) The identification number denotes the pre-defined basic trade item. The applicable dimension(s) completes the identification of the individual unit.
E	Standardised composition of a fixed number of trade items that are Type B or Type C (e.g., a trade item containing 10 chickens (Type B)) The identification number denotes the standardised trade item as an entity and, if applicable, its form of packaging. The total weight of all items contained completes the identification of the particular trade item.

2.1.2.2.4 Examples of Numbering and Symbol Marking of Variable Measure Trade Items

In the examples in the subsections that follow, the following factors apply:

- In order to be illustrative, all examples show the same presentation (e.g., price list, order, delivery, invoice, and recording in a data file).
- UCC/EAN-128 Bar Code Symbols are used.
- The examples are given to demonstrate the correct use of a given Application Identifier when used. When AI (02) is not used, information about the shipment must be received using Electronic Data Interchange (EDI) or other means prior to its physical receipt.

2.1.2.2.4.1 Example 1: Traded by Piece

The following example shows the order and delivery of an item traded by piece and invoiced by weight.

- The supplier's catalogue contains one entry: one salami weighing ~ 500 g
- The order for 100 units is delivered in three boxes. Each box is marked with an SSCC and, optionally, with information on the content of the box, expressed as follows:
 - AI (02) indicates the variable measure Global Trade Item Number™ (GTIN™) of the units contained within the box.
 - AI (3101) indicates the total weight of the items contained within the box.
 - AI (37) indicates the count of items contained within the box
- The three boxes may be stored on a pallet that may itself be marked with an SSCC and, optionally, with information on the contents of the pallet, expressed as follows:
 - AI (02) indicates the variable measure GTIN of the units contained within the pallet.
 - AI (3101) indicates the total weight of the items contained within the pallet.
 - AI (37) indicates the count of items contained within the pallet

The invoice refers to the GTIN and quantity delivered and shows the total weight and the price per kilogram. The GTIN and quantity of the invoice match the GTIN and quantity of the order.

Figure 2.1.2.2.4.1 – 1

Process	Description	Element Strings Used / Symbol Marking of the Items
Supplier's catalogue	one Salami ~ 500 g	GTIN 97612345000018
Order	100 salamis	100 x 97612345000018
Delivery	three logistic units Unit 1 = 33 salamis, 16.7 kg Unit 2 = 33 salamis, 16.9 kg Unit 3 = 34 salamis, 17.1 kg	Unit 1: 00 376123450000010008 02 97612345000018 3101 000167 37 33 Unit 2: 00 376123450000010015 02 97612345000018 3101 000169 37 33 Unit 3: 00 376123450000010022 02 97612345000018 3101 000171 37 34
	If delivery is made on a pallet	Pallet: 00 376123450000010039 02 97612345000018 3101 000507 37 0100
Invoice	GTIN of items and the total weight (50.7 kg) + the price per kg	100 x 97612345000018; 50.7 kg x price per kg

Data File Logistic Units	Identification of Logistic Unit (SSCC)	GTIN of Contained Trade Items	Total Trade Weight of Content (grams.)	Number of Units Contained
Either pallet or individual units	376123450000010039	97612345000018	50700	100
	376123450000010008	97612345000018	16700	33
	376123450000010015	97612345000018	16900	33
	376123450000010022	97612345000018	17100	34

Data File Trade Items	GTIN of Trade Item	Total Trade Weight (grams)	Number of Trade Items
One record per identification number	97612345000018	50700	100

2.1.2.2.4.2 Example 2: Traded by Standard Grouping

The following example shows the order and delivery of an item traded by standard grouping and invoiced by weight.

- The supplier's catalogue contains one entry: one case of 20 steaks weighing ~ 200 g each.
- The order is for three cases. Each case delivered is marked with the Global Trade Item Number™ (GTIN™) of a single case followed by the actual weight of the items contained.
- The three cases may be stored on a pallet that may itself be marked with an SSCC and, optionally, with information on the contents of the pallet, expressed as follows:
 - AI (02) indicates the variable measure GTIN of the units contained within the pallet.
 - AI (3102) indicates the total weight of the items contained within the pallet.
 - AI (37) indicates the count of cases contained within the pallet
- The invoice refers to the GTIN and quantity delivered and shows the total weight and the price per kilogram. The GTIN and quantity of the invoice match the GTIN and quantity of the order.

Figure 2.1.2.2.4.2 – 1

Process	Description	Element Strings Used / Symbol Marking of the Items
Supplier's catalogue	One case of 20 steaks ~ 200 g, vacuum packed	GTIN 97612345000117
Order	Three cases	3 x 97612345000117
Delivery	Three trade items Unit 1: weight = 4.150 kg Unit 2: weight = 4.070 kg Unit 3: weight = 3.980 kg	Unit 1: 01 97612345000117 3102 000415 Unit 2: 01 97612345000117 3102 000407 Unit 3: 01 97612345000117 3102 000398
	If delivery is made on a pallet	Pallet: 00 376123450000010091 02 97612345000117 3102 001220 37 03
Invoice	GTIN of items and the total weight (12.20 kg) + the price per kg	3 x 97612345000117; 12.2 kg x price per kg

Data File Logistic Units	Identification of Logistic Unit (SSCC)	GTIN of Contained Trade Items	Total Trade Weight of Content (grams.)	Number of Units Contained
Pallet	376123450000010091	97612345000117	12200	3

Data File Trade Items	GTIN of Trade Item	Total Trade Weight	Number of Trade Items
One Record	97612345000018	12200	3

2.1.2.2.4.3 Example 3: Traded in Bulk

The following example shows an order and delivery of an item traded in bulk.

- The supplier's catalogue contains one entry: cabbage unwrapped sold in bulk by kilogram.
- The order is for 100 kg. It is delivered in two cases. Each case is marked with the Global Trade Item Number™ (GTIN™) of the cabbage followed by the actual weight of the items contained.
- The two cases may be stored on a pallet that may itself be marked with an SSCC.
- The invoice refers to the GTIN as ordered and shows the total weight and the price per kilogram. The delivered weight may be verified as being close to the ordered quantity.

Figure 2.1.2.2.4.3 – 1

Process	Description	Element Strings Used / Symbol Marking of the Items
Supplier's catalogue	Cabbage unwrapped sold in bulk by kilogram	GTIN 97612345000049
Order	100 kg of cabbage	100 kg x 97612345000049
Delivery	Two trade items Unit 1: weight = 42.7 kg Unit 2: weight = 57.6 kg	Unit 1: 01 97612345000049 3101 000427 Unit 2: 01 97612345000049 3101 000576
	If delivery is made on a pallet	Pallet: 00 376123450000010107
Invoice	GTIN of item and the total weight (100.3 kg) + the price per kg	97612345000049 100.3 kg x price per kg

Data File Logistic Units	Identification of Logistic Unit (SSCC)	GTIN of Contained Trade Items	Total Trade Weight of Content (grams)	Number of Units Contained
Pallet	376123450000010107	97612345000049	42700	1
		97612345000049	57600	1

Data File Trade Items	GTIN of Trade Item	Total Trade Weight (grams)	Number of Trade Items
One record per trade item	97612345000049	42700	1
	97612345000049	57600	1

2.1.2.2.4.4 Example 4: Traded by Standard Grouping

The following example shows an order of standardised Variable Measure Trade Items by case that are invoiced by the number of pieces delivered.

- The supplier's catalogue contains one entry: one case of ~ 10 cabbages sold by piece.
- The order is for two cases. Each case delivered is marked with the Global Trade Item Number™ (GTIN™) of a single case followed by the actual count of the items contained.
- The two cases may be stored on a pallet that may itself be marked with an SSCC and, optionally, with information on the contents of the pallet, expressed as follows:
 - AI (02) indicates the variable measure GTIN of the units contained within the pallet.
 - AI (30) indicates the total count of the items contained within the pallet.
 - AI (37) indicates the count of cases contained within the pallet
- The invoice refers to the GTIN as ordered and delivered and the total count of items.

Figure 2.1.2.2.4.4 – 1

Process	Description	Element Strings Used / Symbol Marking of the Items
Supplier's catalogue	Case containing ~10 cabbages sold by pieces	GTIN 97612345000285
Order	Two cases	2 x 97612345000285
Delivery	Unit 1: 11 pieces	Unit 1: 01 97612345000285 30 11
	Unit 2: 12 pieces	Unit 2: 01 97612345000285 30 12
	If delivery is made on a pallet	Pallet: 00 376123450000010138 02 97612345000285 30 23 37 02
Invoice	GTIN of the trade item and the total quantity	2 x 97612345000285 23 pieces x price per piece

Data File Logistic Units	Identification of Logistic Unit (SSCC)	GTIN of Contained Trade Items	Total Number of Pieces Contained in the Trade Item	Number of Units Contained
Pallet	376123450000010138	97612345000285	23	2

Data File Trade Items	GTIN of Trade Item	Total Number of Pieces	Number of Trade Items
One Record	97612345000285	23	2

2.1.2.2.4.5 Example 5: Traded in Bulk

The following example shows a product that can be purchased from a supplier or sold to a customer by any length in metres.

- The supplier's catalogue contains one entry: cable T49 sold in metres.
- The order is for one length of cable of 150 metres. The delivered package is marked with the Global Trade Item Number™ (GTIN™) of the cable followed by the actual length of cable contained.
- The invoice refers to the GTIN as ordered and delivered and the total length.

Figure 2.1.2.2.4.5 – 1

Process	Description	Element Strings Used / Symbol Marking of the Items
Supplier's catalogue	Cable T49 sold in any length in metres	GTIN 97612345000063
Order	One trade item of 150 metres	97612345000063 x 150 metres
Delivery	One trade item, 150 metres	01 97612345000063 3110 000150
Invoice	GTIN of the trade item and the total quantity	1 x 97612345000063 150 x price per metre

Data File Trade Items	GTIN of Trade Item	Total Trade Length (meters)
One record	97612345000063	150

2.1.2.3 Fixed Measure Trade Items - Restricted Distribution

2.1.2.3.1 Definition

This section describes applications where the item identification is defined only in a closed environment. Therefore, the distribution of trade items marked in this way is restricted to a given geographic region or for use within a company. However, within their closed environment these items may be processed along with trade items identified with Global Trade Item Numbers™ (GTINs™) defined for open trade.

Some regulations established by EAN Member Organisations for their country or assigned area should be observed for the allocation of identification numbers for restricted distribution.

When assigned to company internal use, the structure and management of the numbers represented in the Element Strings of this section are the responsibility of the user. Number changes and re-use of expired numbers must be managed by the user based on his requirements.

When centrally administrated within a geographic area, the relevant administration body determines the structure and manages number allocation based on user requirements.

2.1.2.3.2 Company Internal Numbering – EAN.UCC-8 Prefix 0 or 2

This Element String, described in [Section 3.3.2](#), uses an EAN.UCC-8 Prefix of 0 or 2. It provides two million identification numbers, which can be assigned for internal use in a company. When the EAN/UCC-8 Prefix is 0, the Element String is sometimes called a Velocity Code because it is quicker to key enter.

Note 1: In addition to trade item identification, this Element String may be used for any purpose that is supported by the company's equipment supplier (see [Section 2.6.4](#)).

Note 2: In some environments where numbers may have to be key entered, the EAN-8 Bar Code Symbol carrying EAN/UCC-8 Identification Numbers (and the EAN.UCC-8 Prefix 0) may be confused with the numbers carried by a UPC-E Bar Code Symbol. If such a risk exists, it is preferable to use the EAN.UCC-8 Prefix 2 capacity for internal use.

2.1.2.3.3 Numbering in a Geographic Area Defined by the EAN Member Organisation – EAN.UCC Prefixes 20 to 29

The EAN.UCC Prefixes 20 to 29 are reserved for identification purposes within a restricted geographic area. Each EAN Member Organisation or UCC is entitled to assign the prefixes to be used for these Element Strings in its country or assigned area (see [Section 3.2.2](#)):

- For the central administration of the identification of Fixed Measure Trade Items within the country or assigned area of the EAN Member Organisation or UCC.
- For internal numbering of Fixed Measure Trade Items by a particular company within the country or assigned area of the EAN Member Organisation or UCC.

Note 1: Under the control of an individual EAN Member Organisation or the UCC, EAN.UCC Prefixes 20 to 29 may also be used for the identification of Variable Measure Trade Items for restricted geographic distribution and for any other company internal purpose.

Note 2: In addition to trade item identification, a company may use this data element for any other internal purpose (see [Section 2.6.4](#)).

Note 3: Suppliers manufacturing their own label products for several different customers should use unique EAN.UCC System numbering to distinguish their customers. If this is not done, the supplier will not be able to use Electronic Data Interchange (EDI) or electronic catalogues.

2.1.2.3.4 Company Internal Numbering - EAN.UCC Prefix 04

Any company in the world may use this Element String for company internal trade item numbering. If the EAN.UCC Prefix 04 is being applied, the user company may structure the trade item number.

Note: In addition to trade item identification, a company may use this data element for any other internal purpose (see [Section 2.6.4](#)).

2.1.2.3.5 Company Internal Numbering - EAN.UCC Prefix 00 (LAC and RZSC)

The EAN.UCC Prefix 00 provides for company internal numbering, using Locally Assigned Codes (LACs) or Retailer Zero-Suppressed Codes (RZSCs), which are carried by a UPC-E Bar Code Symbol. EAN.UCC Company Prefixes 00 00000 and 00 01000 to 00 07999 are used in this feature. For details, see [Section 3.A.2](#).

2.1.2.4 Variable Measure Trade Items - Restricted Circulation

2.1.2.4.1 Definition

Variable Measure Trade Items are those sold in random quantity against a fixed price per unit quantity and intended to cross a Point-of-Sale (e.g., apples sold at a fixed price per kilogram).

These items are either marked in the store by the retailer or are marked at the source by the supplier. National solutions are available for this purpose.

EAN.UCC Prefixes 02 and 20 to 29 are available to EAN Member Organisations and UCC to devise rules for the marking of Variable Measure Trade Items in their territory. EAN Member Organisations should make part of this capacity available to user companies for company internal applications.

The data fields available after the relevant EAN.UCC Prefix (defined by the EAN Member Organisation or UCC for their territory) can be structured in a variety of ways to represent the product type, net weight, calculated price, or number of units. Equipment is commercially available for automatically weighing items, calculating an item price from the unit price, and printing the information as a bar code label. The scanning equipment can then be programmed to use the prefix as an instruction to decode the ensuing data fields according to the particular structure adopted.

2.1.2.4.2 Identification of Variable Measure Trade Items

EAN Member Organisations should assign one or several of the EAN.UCC Prefixes 02 and 20 through 29 for the identification of Variable Measure Trade Items.

Although each EAN Member Organisation and/or user is perfectly free to develop its solution for numbering Variable Measure Trade Items, the EAN.UCC System provides recommended structures aiming at some degree of equipment standardisation. These formats may include an Item Reference, the retail price of the item, and a price verifier-digit. The recommended structures are shown in Figure 2.1.2.4.2 – 1.

Figure 2.1.2.4.2 – 1

EAN.UCC Prefix*	Recommended Data Structures (Exact Structure Determined by EAN Member Organisation)	Check Digit
02	I I I I I V P P P P	C
or	I I I I V P P P P P	C
20 - 29	I I I I I I P P P P	C
	I I I I I P P P P P	C

* The EAN.UCC Prefix is co-administered by EAN International and the UCC and denotes the format and meaning of a particular Element String.

Where: I..I = Item Reference
V = Price verifier-digit calculated according to the algorithm specified in [Section 3.A.1](#)
P..P = Price in local currency
C = Check Digit calculated according to the standard algorithm in [Section 3.A.1](#)

Note: The price field may contain 0, 1, or 2 implied decimal places depending on the monetary unit used. The decimal point, which is not included in the bar code symbol, must nevertheless be taken into account by the marking equipment when printing the Human Readable Interpretation on the label.

EAN Member Organisations may choose to implement a national solution for Variable Measure Trade Items branded by the supplier for retail. Any national branded variable measure solution requires EAN Member Organisations to manage the allocation of the item number at a national level.

2.1.3 Attributes of Trade Items

2.1.3.1 General Considerations

2.1.3.1.1 Types of Trade Item Attributes

Trade item attributes are classified into three categories:

- Varying attributes, the use of which is determined by business practices
- Fixed attributes or characteristics of trade items are generally communicated between trading partners by Electronic Data Interchange (EDI) or other means and should thus not be marked on the goods. However, some fixed attributes have been made available for transitional use in order to provide temporary help for particular business applications.
- Varying attributes with restrictions have been established to fulfil special functions in particular applications. Their use makes sense for the issuing company or a within a specific user sector.

~~2.1.4.1.22.1.3.1.2~~ **Symbol Marking of Trade Item Attributes**

Attributes of trade items shall be symbol marked using a UCC/EAN-128 Bar Code Symbol. The only exceptions are the two- and five-digit Add-On Symbols, which are supplementary to the primary symbol.

~~2.1.4.22.1.3.2~~ **Varying Trade Item Attributes**

2.1.3.2.1 Batch or Lot Number: AI (10)

This Element String provides the batch or lot number of the trade item on which the Element String is applied. The Element String is used for tracking trade items with particular manufacturing characteristics wherever required. Complete tracking of the trade item must include the Global Trade Item Number™ (GTIN™).

Note: This Element String must not be used to express characteristics of a trade item that should be included in the GTIN. Use non-significant (shorter) data for batch or lot numbers leading to shorter Element Strings.

Formatted: Bullets and Numbering

Formatted: Bullets and Numbering

2.1.3.2.2 Dates

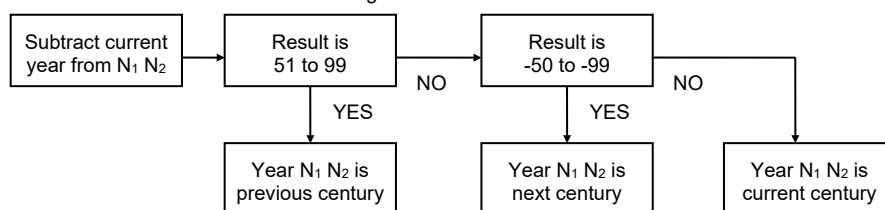
These Element Strings are used to differentiate identical trade items by date information where this is required for business practices. The following types of dates are available:

- Production date - AI (11)
- Packaging date - AI (13)
- Minimum durability date (quality) - AI (15)
- Maximum durability date (safety) - AI (17)
- Date and time of production - AI (8008)

It is left to the discretion of the user to interpret a particular date type most useful for his business practices. Such interpretation may change according to the product range for which a date is being applied

Since the data field year consists of two positions, the century is established by the procedure shown in Figure 2.1.3.2.2 – 1.

Figure 2.1.3.2.2 – 1



Note: The Element String can only specify a date in the range from 49 years in the past to 50 years in the future of the current year.

2.1.3.2.3 Serial Number: AI (21)

This Element String represents the serial number of a trade item. It is used for tracking a trade item with a particular serial number. Proper tracking must include the Global Trade Item Number™ (GTIN™).

2.1.3.2.4 Secondary Data for Specific Health Industry Products: AI (22)

This Element String is mainly used in the United States. It contains a special arrangement of supplementary data required for health industry products. For details, see [Section 7.8](#).

2.1.3.2.5 Lot Number (Transitional Use): AI (23n)

The purpose of this Element String is identical to the batch or lot number (AI (10)). However, it provides only numeric lot numbers. It was created to enable concatenation without using the Function 1 Character (FNC1) as a separator. It is considered a temporary system component that will be discontinued in the future.

2.1.3.2.6 Secondary Serial Number: AI (250)

This Element String is used for tracking a particular component contained in a trade item and when used, Element String AI (21) must also appear on the trade item. The secondary serial number may refer to any of the components contained. It is an attribute of the Global Trade Item Number™ (GTIN™). For example, the secondary serial number may be placed on the chassis of a television set to mark its serial number. The company using this Element String should make clear to all business partners which component of a given trade item a secondary serial number relates.

2.1.3.2.7 Reference to Source Entity: AI (251)

Reference to source entity is an attribute of a trade item that refers back to the original item from which the trade item was derived. The issuer of the trade item must indicate through other means the source entity to which the data refers.

2.1.3.2.8 Logistic Measures for Variable Measure Trade Items: AI (33nn), (34nn), (35nn), (36nn)

Logistic measures for Fixed Measure Trade Items remain unchanged for each item. Consequently, they are considered as fixed characteristics and should not be symbol marked on the trade item. Logistic measures for Variable Measure Trade Items, however, can change according to the varying size or weight of the items. This Element String may be used to represent the logistic measure of a particular Variable Measure Trade Item.

2.1.3.2.9 Kilograms Per Square Metre: AI (337n)

This Element String is used to differentiate identical trade items by the effective weight per square metre. It is a varying attribute of the trade item and it is not a variable measure of the trade item concerned.

For example, depending upon the production conditions, the actual weight of standard paper expressed in grams per square metre may vary slightly. The Global Trade Item Number™ (GTIN™) remains unchanged, but it may be useful to mark the actual weight per square metre on the trade item.

2.1.3.2.10 Country of Origin of a Trade Item: AI (422)

This Element String may be used on a physical unit to denote the country of origin of the trade item, the identification number of which is represented in either AI (01) or AI (02).

2.1.3.2.11 Country of Initial Processing: AI (423)

This Element String may be used on a physical unit to denote the country of initial processing of the trade item, the identification number of which is represented in either AI (01) or AI (02).

2.1.3.2.12 Country of Processing: AI (424)

This Element String may be used on a physical unit to denote the country of processing of the trade item, the identification number of which is represented in either AI (01) or AI (02).

2.1.3.2.13 Country of Disassembly: AI (425)

This Element String may be used on a physical unit to denote the country of disassembly of the trade item, the identification number of which is represented in either AI (01) or AI (02).

2.1.3.2.14 Country Covering Full Process Chain: AI (426)

This Element String may be used on a physical unit to denote the country covering full process chain of the trade item, the identification number of which is represented in either AI (01) or AI (02).

2.1.3.2.15 Approval Number of Processor: AI (703s)

In some countries, some products are required by law to be marked with an approval number allocated by a national authority. This Element String may be used on a physical unit to denote the country and approval number of a trade item, the identification number of which is represented by a Global Trade Item Number™ (GTIN™). As multiple approval numbers may be required, the fourth digit of the AI(s) indicates the sequence of the processors. An example from a meat supply chain would be:

A bovine animal has been slaughtered in a Belgian slaughterhouse (approval number 987654), and the deboning was done by a Dutch deboning hall (approval number EGNL410).

The country and approval number for slaughtering is shown in Figure 2.1.3.2.15 – 1.

Figure 2.1.3.2.15 – 1

AI	ISO Country Code for Belgium	Approval Number
7030	056	987654

The country and approval number of the first processor (Dutch deboning hall) is shown in Figure 2.1.3.2.15 – 2.

Figure 2.1.3.2.15 – 2

AI	ISO Country Code for the Netherlands	Approval Number
7031	528	EGNL410

2.1.3.3 Fixed Trade Item Attributes

2.1.3.3.1 Additional Product Identification Assigned by the Manufacturer: AI (240)

This Element String has been created to represent a company's existing (non-EAN.UCC System) trade item identification number.

The ID number may be marked on the same item together with the EAN.UCC Identification Number (AI (01)) in order to facilitate migration to the EAN.UCC System. There must be a one-to-one relationship between the contents of AI (240) and AI (01).

Note: The use of this Element String must be based on an agreement between the users concerned for a limited period. In no way should a company supply internal item identification of any other kind via AI (240), which would violate the EAN.UCC System's principles. It is not a substitute for the Global Trade Item Number™ (GTIN™).

2.1.3.3.2 Customer Part Number: AI (241)

This Element String has been created to facilitate the conversion from the business use of a customer assigned part number to a manufacturer's Global Trade Item Number™ (GTIN™).

2.1.3.4 Varying Trade Item Attributes with Restrictions

2.1.3.4.1 Serial Number for Serial Publications - Two-Digit Add-On Symbol

The two-digit Add-On Symbol identifies each title of a serial publication. This bar code symbol, used to provide supplementary identification on serial publications, is not designed to be scanned at the Point-of-Sale. The Global Trade Item Number™ (GTIN™) provides the necessary data for correct price capture.

This bar code symbol is applied for the processing of returns of serial publications requiring additional identification beyond the level provided by the item identification number. When the two-digit Add-On Symbol is scanned, it is always processed together with the GTIN.

2.1.3.4.2 Supplementary Information for Books, Paperbacks, and Printed Sheet Music - Two-Digit and Five-Digit Add-On Symbol

The two-digit and five-digit Add-On Symbols can identify a title of a book or paperback. These bar code symbols are used to track a particular edition of a book, but not to carry information otherwise included in the Global Trade Item Number™ (GTIN™).

Note: The two-digit and five-digit Add-On Symbols must not be used to represent the price of the book for several reasons. First, the bar code symbol does not ensure the reading reliability needed for price capture. Secondly, there is no currency indicator available to prohibit price misinterpretation for imported or exported books. Thirdly, the system logic does not provide a means to distinguish whether the five-digit Add-On Symbol represents the price or the supplementary information of the particular book.

2.1.3.4.3 Product Variant: AI (20)

EAN.UCC System application rules clearly state that each trade item that is different from another must be assigned a unique Global Trade Item Number™ (GTIN™). However, there are cases where a difference is not significant outside the manufacturing company and, therefore, no separate identification number is required.

Element String AI (20) is a means to handle variations of trade items that are significant only for the producer of the item.

2.1.3.4.4 Price Per Unit of Measure: AI (8005)

This Element String is used to discriminate groupings of price marked Variable Measure Trade Items and to inform about the price per unit of measure marked on the individual units contained in the trade item. It should in no way be used for price marked Fixed Measure Trade Items, in which groupings of trade items not to be scanned at the Point-of-Sale require a unique EAN.UCC System identification number for each separate price or a product variant (AI (20)).

2.1.4 Allocating the Numbers

2.1.4.1 General Rules

A different, unique number must identify each different trade item. This implies that each variant must be assigned a unique number. For example, each different size or colour of a garment should be allocated a separate, unique Global Trade Item Number™ (GTIN™).

The brand owner of the trade item assigns the GTIN, but if a product is made specifically for a customer and orderable only by this customer, a GTIN can be assigned by the customer using the customer's EAN.UCC Company Prefix.

The GTIN should not contain any internal product number, which could change for reasons other than the valid reasons for changing a GTIN. It is recommended that users allocate GTINs sequentially.

Different languages on the package normally require the allocation of a different GTIN. However, if two products can be substituted, the same GTIN can be used. For example, a product marked in only French language can have the same GTIN as the same product marked in both French and German languages. It is the manufacturer's responsibility to distinguish the same GTINs for packages marked in different languages.

Additional rules may be defined by the EAN Member Organisations or UCC regarding the assignment of GTINs to comply with national legislation or other regulations.

2.1.4.2 Introduction of New Products

A new Global Trade Item Number™ (GTIN™) should be allocated when a product is introduced. This rule also applies to sample or test products, which are distributed in an open environment.

2.1.4.3 Lead Time for Re-Using a GTIN™

A Global Trade Item Number™ (GTIN™) allocated to a trade item that has become obsolete must not be re-used for another trade item until at least 48 months have elapsed from the date the original trade item was last supplied by the brand owner. In the case of garments, the minimum retention period is 30 months.

A longer period may be needed depending upon the type of goods. For example, steel beams may be stored for many years before entering the supply chain. Brand owners should consider what would be a reasonable period of time for the trade item to remain in the supply chain cycle before re-using GTINs.

In addition, when contemplating the re-use of a GTIN, consideration should also be given to the use of data associated with the original GTIN by trading partners for statistical analysis or service records, which may continue long after the original trade item was last supplied.

2.1.4.4 Data Alignment

When a new Global Trade Item Number™ (GTIN™) is assigned to a trade item, it is essential that the party allocating the number, normally the manufacturer, provides detailed information to trading partners about the characteristics of the new GTIN. This information should be provided at as soon as possible before the product is actually traded.

2.1.4.5 Pre-Priced Merchandise

Pre-pricing is discouraged as a trade practice as it introduces complexity for trade item file maintenance through the supply chain. If however, the price is marked on the item, the Global Trade Item Number™ (GTIN™) should be changed when the price marked on the item changes.

Note: National, federal, or local regulations may apply and take precedence over this guideline.

2.1.4.6 Trade Item Variants

The guidelines in the subsections that follow indicate when a different number must be assigned in case of promotions or changes in the trade item. They are based on the principle of reducing Global Trade Item Number™ (GTIN™) changes whenever possible.

2.1.4.6.1 Promotional Variants

- Promotional variants of trade items, which affect the size and/or the weight of the product, must be allocated a separate, unique Global Trade Item Number™ (GTIN™) (e.g., free quantity, free gift attached).
- Promotional variants of trade items, in which a price reduction is explicitly specified on the pack (flash packs), must be allocated a separate, unique GTIN, unless local trade practices or price marking legislation dictate otherwise (e.g., 10 cents off).
- Each seasonal promotion of a trade item should be allocated a separate, unique GTIN (e.g., candy specially over-wrapped for a particular holiday).
- Other promotional variants should not be allocated a separate, unique GTIN (e.g., money off coupon, free gift inside, "send for" offer, competition offer).

2.1.4.6.2 Product Changes

Product changes include any change or improvement during the life of a product that are decided by the manufacturer of the product. In the cases described below, the assumption is made that the new product replaces the old one. Should the manufacturer decide to create a variant (e.g., with different ingredient) in parallel with the standard product, then a separate, unique number must be allocated.

- Minor product changes or improvements do not require the allocation of a different Global Trade Item Number™ (GTIN™) (e.g., label artwork redesign, minor product description change with contents unchanged, minor ingredients change).
- When product changes affect the product quantity, dimensions, packaging type, product name or brand, or the product description, a separate, unique GTIN must be allocated.

2.1.4.6.3 Trade Item Variants for Groupings

- Trade items that are a standard and stable grouping of a series of units identified by a Global Trade Item Number™ (GTIN™) must also be allocated a separate GTIN whenever there is a change to the GTIN of any of the units contained.
- For trade items containing units which are themselves promotional variants or minor product variants of trade items whose GTINs remain unchanged, the rules are:
 - If the trade item must be distinguished for effective ordering, handling, and tracking, a separate GTIN must be allocated for the trade item (e.g., promotions that are limited to certain geographical areas, date-specific promotions, different languages on the package).
 - If the identification of minor product variants is only relevant to a manufacturer, the manufacturer should distinguish these variants by using the product variant attribute AI (20) (e.g., minor package design changes, side loading as opposed to top loading cases).

Section 2.2:

Numbering and Symbol Marking of Logistic Units

Table of Contents

2.2.1 Introduction.....	3
2.2.2 Definition and Identification of Logistic Units.....	3
2.2.2.1 Element Strings Used on Logistic Units.....	4
2.2.2.1.1 Identification of Trade Items Contained in a Logistic Unit: AIs (02) and (37)	4
2.2.2.1.2 Logistic Measures: AI (33nn), (34nn), (35nn), (36nn).....	4
2.2.2.1.3 Consignment Number: AI (401)	4
2.2.2.1.4 Shipment Identification Number: AI (402)	4
2.2.2.1.5 Routing Code: AI (403)	4
2.2.2.1.6 Ship to - Deliver to EAN.UCC Global Location Number: AI (410)	4
2.2.2.1.7 Ship for - Deliver for - Forward to EAN.UCC Global Location Number: AI (413)	4
2.2.2.1.8 Ship to - Deliver to Postal Code Within a Single Postal Authority: AI (420)	5
2.2.2.1.9 Ship to - Deliver to Postal Code with Three-Digit ISO Country Code: AI (421).....	5
2.2.3 Special Considerations	5
2.2.4 EAN.UCC Logistics Label Design	6
2.2.4.1 Scope	6
2.2.4.2 Concepts	7
2.2.4.2.1 Logistics Information Flow	7
2.2.4.2.2 Representation of Information.....	7
2.2.4.2.3 Specific Bar Code Symbol Structures	7
2.2.4.2.4 Identification of a Logistic Unit	7
2.2.4.3 Label Design	9

2.2.4.3.1 Supplier, Customer, Carrier Sections	9
2.2.4.3.1.1 Supplier Section	9
2.2.4.3.1.2 Customer Section	9
2.2.4.3.1.3 Carrier Section	9
2.2.4.3.2 Bar Code Symbol and Human Readable Interpretation Layout	10
2.2.4.3.3 Label Dimensions	10
2.2.4.4 Technical Specifications	11
2.2.4.4.1 Bar Code Symbols	11
2.2.4.4.1.1 Concatenation	11
2.2.4.4.1.2 X-Dimension (Symbol Magnification)	11
2.2.4.4.1.3 Bar Code Symbol Height	11
2.2.4.4.1.4 Quiet Zones	11
2.2.4.4.1.5 Orientation and Placement	11
2.2.4.4.1.6 Human Readable Interpretation	12
2.2.4.4.2 Text	12
2.2.4.4.2.1 Plain Text	12
2.2.4.4.2.2 Human Readable Interpretation	12
2.2.4.4.2.3 Data Titles	12
2.2.4.4.3 Label Location	13
2.2.4.4.3.1 Units Less than 1 Metre in Height	14
2.2.4.4.3.2 For Pallets Less than 1 Metre in Height	15
2.2.4.4.3.3 Units Greater than 1 Metre in Height	15
2.2.4.5 Label Examples	16

2.2.1 Introduction

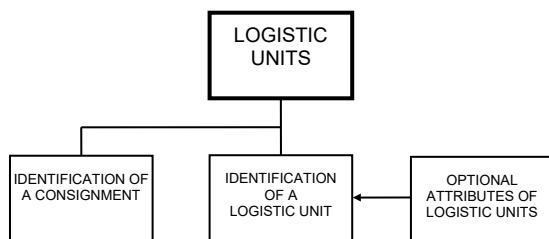
A logistic unit is an item of any composition established for transport and/or storage that needs to be managed through the supply chain.

Tracking and tracing logistic units in the supply chain is a major application of the EAN.UCC System. Scanning the standard identification number, marked on each logistic unit, allows the physical movement of units to be individually tracked and traced by providing a link between the physical movement of items and the associated information flow. It also opens up the opportunity to implement a wide range of applications, such as cross docking, shipment routing, and automated receiving.

Logistic units are identified with an EAN.UCC Identification number called the SSCC. The SSCC ensures that logistic units are identified with a number that is unique worldwide.

Attribute information, such as a Consignment Number, AI (401), may be optionally encoded using internationally agreed data structures and a bar code symbology that allow unambiguous interpretation.

Figure 2.2.1 – 1



2.2.2 Definition and Identification of Logistic Units

The identification and symbol marking of logistic units enables a large number of user applications. In particular, the SSCC provides a link between bar code symbol and ID number information about a logistic unit and information pertaining to the unit that is communicated between trading partners using Electronic Data Interchange (EDI).

The SSCC Element String AI (00) identifies logistic units (see [Section 3.6.1](#)). Each individual logistic unit is allocated a unique number, which remains the same for the life of the logistic unit. In principle this unique reference number can be used as the key to access information regarding the logistic unit in computer files. However, attributes relating to the logistic unit (e.g., ship to information, logistic weights) are also available as standardised Element Strings.

2.2.1.4.2.2.1 Element Strings Used on Logistic Units

The use of attribute information on logistic units is optional. However, when used, attribute information should be processed with the SSCC that identifies the logistic unit.

2.2.1.4.2.2.1.1 Identification of Trade Items Contained in a Logistic Unit: AIs (02) and (37)

Formatted: Bullets and Numbering

When a logistic unit is a grouping of trade items, it is sometimes useful to indicate the Global Trade Item Number™ (GTIN™) of the contained items in association with the SSCC. The Element String AI (02), which has a mandatory association with AI (37), may be used only on a unit that is not itself a trade item and only if all trade items that are contained within the unit have the same GTIN.

2.2.2.1.2 Logistic Measures: AI (33nn), (34nn), (35nn), (36nn)

The EAN.UCC System provides standard Element Strings for representing logistic weights and measures in metric and other units of measure. In principle a particular logistic measure should be applied in only one unit of measure on a given logistic unit. However, application of the same attribute in several units of measure does not impede the correct processing of the transmitted data.

2.2.2.1.3 Consignment Number: AI (401)

The Consignment Number, AI (401), identifies a logical grouping of goods (one or more physical entities) that has been consigned to a freight forwarder and is intended to be transported as a whole. The Consignment Number, AI (401), must be allocated by a freight forwarder, carriers acting as a freight forwarder, or a consignor, but only if the prior agreement of the freight forwarder is given. Typically AI (401) encodes a House Way Bill Number (HWB).

2.2.2.1.4 Shipment Identification Number: AI (402)

The Shipment Identification Number (Bill of Lading) is assigned by a consignor. It is a globally unique number that identifies a logical grouping of physical units in a transport shipment. It may be used as a communication reference by all parties in the transport chain, such as in (Electronic Data Interchange) (EDI) messages where it can be used as a shipment reference and/or a consignor's loading list.

2.2.2.1.5 Routing Code: AI (403)

The Routing Code, AI (403), is assigned by a parcel carrier. It is intended to provide a migration path to the adoption of a yet to be defined international, multi-modal solution. The routing code, AI (403), must not be used to encode information that could be encoded in a separate AI (such as AI (420), ship to postal code).

2.2.2.1.6 Ship to - Deliver to EAN.UCC Global Location Number: AI (410)

This Element String has been designed to allow the automatic sortation of logistic units using the EAN.UCC Global Location Number (GLN).

2.2.2.1.7 Ship for - Deliver for - Forward to EAN.UCC Global Location Number: AI (413)

This Element String has been designed to allow the cross docking of logistic units using the EAN.UCC Global Location Number (GLN). It is used in conjunction with the Element String AI (410) to indicate the cross docking station and the final destination of the logistic unit.

2.2.2.1.8 Ship to - Deliver to Postal Code Within a Single Postal Authority: AI (420)

This Element String has been designed to allow the automatic sortation of logistic units using the postal code in a single postal area.

2.2.2.1.9 Ship to - Deliver to Postal Code with Three-Digit ISO Country Code: AI (421)

This Element String has been designed to allow the automatic sortation of logistic units using the postal code. As the postal code is prefixed by the ISO country code, it may be used internationally.

2.2.3 Special Considerations

By their nature, units that need to be tracked and traced individually in a supply chain require unique identification numbers. The SSCC provides this identification number.

Because each logistic unit must be assigned its own unique SSCC, it is not practical to preprint the bar code symbol containing the SSCC on the logistic unit packaging. A more logical approach is to create a label that can be affixed to the logistic unit when the unit is constructed.

Further, a logistic unit may also be a trade item and hence be subject to the EAN.UCC System specifications for trade items (See Section 2.1). If this is the case, it is logical to generate a single label containing all of the information required.

EAN International and the Uniform Code Council (UCC™), along with representatives from manufacturers, retailers, transporters, and EAN Member Organisations, have developed a voluntary standard for bar code symbol label applications: the EAN.UCC Logistics Label. The SSCC and its application on logistic units are the central focus of the EAN.UCC Logistics Label.

2.2.4 EAN.UCC Logistics Label Design

These specifications constitute the basis for all EAN.UCC Logistics Labels. Other sections, most notably Section 3.0, Definitions of the Element Strings, and Section 5.3, UCC/EAN-128 Symbology Specifications, should be read in conjunction with the following sub-sections.

~~2.2.1.4~~2.2.4.1 Scope

These specifications detail the structure and layout of EAN.UCC Logistics Labels. Emphasis is given to the basic requirements for practical application in an open trade environment. Primary topics include:

- The unambiguous identification of logistic units
- The efficient presentation of text and machine readable data
- The information requirements of the key partners in the supply chain: suppliers, customers, and carriers
- Technical parameters to ensure systematic and stable interpretation of labels

Formatted: Bullets and Numbering

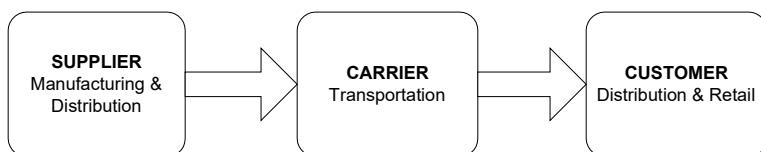
2.2.4.2.2.4.2 Concepts

2.2.4.2.1 Logistics Information Flow

As a logistic unit moves through the supply chain, a series of events occur that defines the information related to the unit. The whole supply chain process of manufacturing, finished goods distribution, transportation, and deployment into the marketplace adds layers of information related to the logistic unit.

For example, the physical content of the unit is typically defined at finished goods distribution. At that point in time the identification of the logistic unit as an entity is possible. Other elements of information, such as final destination or the composition of a multi-unit shipment, are not typically known until later in the supply chain process. In a trading relationship, different elements of information are generally known and applied by the supplier, carrier, and customer.

Figure 2.2.4.2.1 – 1



2.2.4.2.2.2 Representation of Information

The information included on an EAN.UCC Logistics Label comes in two basic forms. Human Readable Interpretation is used by people and is comprised of text and graphics. Machine readable information is designed for data capture by a machine. Bar code symbols are machine readable and are a secure and efficient method for conveying structured data, while Human Readable Interpretation allows people general access to basic information at any point in the supply chain. Both methods add value to EAN.UCC Logistics Labels, and often co-exist on the same label.

The EAN.UCC Logistics Label has three sections. The top section of the label contains free format information. The middle section contains text information and the Human Readable Interpretation of the bar code symbol(s). The lowest section contains the bar code symbol(s).

2.2.4.2.3 Specific Bar Code Symbol Structures

The UCC/EAN-128 Symbology is used for EAN.UCC Logistics Labels. This symbology, which is used exclusively for EAN.UCC System defined data structures, is a subset of Code 128, a highly refined, secure, and space efficient alphanumeric symbology. The data formats carried include the Element Strings and their Application Identifiers (AIs) (see [Section 3.0](#)). Each AI is a two-, three-, or four-digit prefix that defines the meaning of the data that follows. AIs allow data to be represented in bar code symbols in a form that is unambiguously and securely interpreted when scanned.

2.2.4.2.4 Identification of a Logistic Unit

The one mandatory field for all EAN.UCC Logistics Labels is the SSCC. The SSCC is an identification number that is unique to each logistic unit. The SSCC is represented by AI (00) and in principle is sufficient for all logistics applications.

In an environment where Electronic Data Interchange (EDI) is used to transmit detailed information about a logistic unit, or where that information is already resident in a database, the SSCC acts as a reference pointer to information.

Formatted: Bullets and Numbering

However, when EDI is not available at each point in the supply chain, or when replicated data is desired, certain additional elements of information are desirable in bar code form. Each of these is also represented through the use of AIs.

2.2.4.3 Label Design

The layout of the EAN.UCC Logistics Label groups information into three logical sections for the supplier, customer, and carrier. Each label section may be applied at a different point in time as relevant information becomes known. Additionally, within each section, bar code symbols are segregated from text information to facilitate interpretation by both machines and people.

The labeller, the organisation responsible for printing and applying the label, determines the content, format, and dimensions of the label. The SSCC is the single mandatory element for all EAN.UCC Logistics Labels. Other information, when required, should comply with the specifications of this document and with the proper use of Application Identifiers.

~~2.2.1.1.1~~ 2.2.4.3.1 Supplier, Customer, Carrier Sections

A section is a logical grouping of information that is generally known at a particular time. There are three label sections on an EAN.UCC Logistics Label, each representing a group of information. Generally, the order of the sections, from top to bottom, is: carrier, customer, and supplier. However, this order and top/down alignment may vary depending on the size of the logistic unit and the business process being served.

Formatted: Bullets and Numbering

~~2.2.1.1.1~~ 2.2.4.3.1.1 Supplier Section

The supplier section of the label contains information that is generally known at the time of packaging by the supplier. The SSCC is applied here as the unit identifier, along with the Global Trade Item Number™ (GTIN™) if used.

Other information that may be of interest to the supplier but might also be useful for customers and carriers, can be applied. This includes product-related information such as product variant; dates such as production, packaging, expiration, and best-before dates; and lot, batch and serial numbers.

Formatted: Bullets and Numbering

2.2.4.3.1.2 Customer Section

The customer section of the label contains information that is generally known at the time of order and order processing by the supplier. Typical information includes the ship to location, purchase order number, and customer-specific routing and handling information.

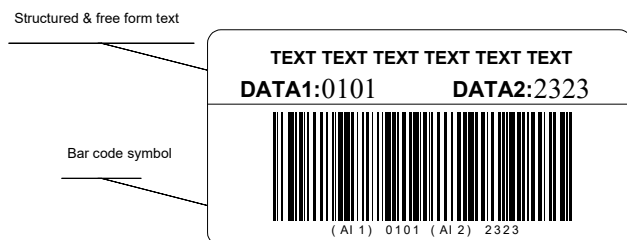
2.2.4.3.1.3 Carrier Section

The carrier section of the label contains information that is generally known at the time of shipment and is typically related to transport. Typical information includes ship to postal codes, AI (420), Consignment Numbers, AI (401), and carrier-specific routing and handling information.

2.2.4.3.2 Bar Code Symbol and Human Readable Interpretation Layout

Bar code symbols are represented in the lower part of each section, while Human Readable Interpretation is shown in the upper part of the section. This facilitates access to each component.

Figure 2.2.4.3.2 – 1



2.2.4.3.3 Label Dimensions

The physical dimensions of the label are determined by the labeller, but the size of the label should be consistent with the data requirements for all sections of the label. Factors influencing label dimensions include the amount of data required, the content and X-dimension of the bar code symbols used, and the dimensions of the logistic unit to be labelled.

The standard A6 (105 mm x 148 mm) or 4 x 6 inch formats are sufficient for most requirements and are the predominant label sizes used. Other dimensions are typically variations driven by data requirements or logistic unit size. As a guideline to users, the width of the label is best held constant at 105 mm (4 in.), while the height of the label varies depending on data requirements.

2.2.4.4 Technical Specifications

2.2.4.4.1 Bar Code Symbols

UCC/EAN-128 Bar Code Symbols shall be used on the EAN.UCC Logistics Label.

2.2.1.1.1.12.2.4.4.1.1 Concatenation

Concatenation is an effective means for presenting multiple Element Strings in a single bar code symbol and should be used to conserve label space and optimise scanning operations whenever possible. The exception is the SSCC, which is the identifier for the logistic unit and the most fundamental element of the label. Due to the larger X-dimension recommended for the UCC/EAN-128 Bar Code Symbol encoding the SSCC, concatenation may not be feasible on a standard width label.

Formatted: Bullets and Numbering

2.2.1.1.1.22.2.4.4.1.2 X-Dimension (Symbol Magnification)

In the past, the term symbol magnification was extensively used to specify the size of a bar code symbol. This technique relied upon setting a nominal size (100%) that was directly related to a given X-dimension. Since January 2000, the more precise X-dimension has been used to specify permissible symbol sizes (see [Section 5.4](#)).

Formatted: Bullets and Numbering

The recommended X-dimension range is between 0.495 mm (0.0195 in.) and 0.94 mm (0.037 in.) The minimum X-dimension recommended for the UCC/EAN-128 Bar Code Symbol encoding the SSCC is 0.495 mm (0.0195 in.) and, if using a standard width label, the maximum X-dimension is 0.94 mm (0.037 in.) for a bar code symbol encoding the SSCC.

The reliability of scanning will always be enhanced by selecting an X-dimension at the higher end of the specified range. However, if the information required cannot be accommodated in the space available, a lower X-dimension may be used. In any case, the minimum X-dimension is 0.250 mm (0.00984 in.) Using smaller symbols reduces reading distance and makes the production of quality symbols more difficult to maintain.

2.2.1.1.1.32.2.4.4.1.3 Bar Code Symbol Height

Taller symbols present a better target for readers. The recommended bar code symbol height of at least 32 mm (1.25 in.) is preferred for the UCC/EAN-128 Bar Code Symbol encoding the SSCC. A two-year migration path is foreseen from the old minimum height of 27 mm (1.1 in.). Space constraints may not allow a bar code to be printed at the recommended height, but in no case shall a bar code symbol be less than 13 mm (0.5 in.) high.

Formatted: Bullets and Numbering

2.2.4.4.1.4 Quiet Zones

Bar codes should be printed with leading and trailing Quiet Zones that are at least 10 modules wide.

2.2.4.4.1.5 Orientation and Placement

Picket Fence Orientation Bar Code Symbols should be used on logistic units. In other words, the bars and spaces shall be perpendicular to the base on which the logistic unit stands. In all cases, the UCC/EAN-128 Bar Code Symbol encoding the SSCC shall be placed in the lowest portion of the label.

2.2.4.4.1.6 Human Readable Interpretation

As a back up key entry and diagnostic aid, a Human Readable Interpretation of each bar code symbol shall be provided above or below the symbol. It includes Application Identifiers, data content, and a Check Digit, but no representation of special symbol characters or the Symbol Check Character.

To facilitate key entry, AIs should be set apart from the data by parentheses.

This Human Readable Interpretation characters shall be no less than 3 mm high and clearly legible and preferably below the symbol.

2.2.4.4.2 Text

2.2.4.4.2.1 Plain Text

Text that has no bar code symbol equivalent is often required on a label. The name and address of the sender and receiver are typical examples. In many instances companies may also wish to add specific text to a label (e.g., company logos). All text shall be clearly legible and no less than 3 mm high.

2.2.1.1.1-2.2.4.4.2.2 Human Readable Interpretation

Human Readable Interpretation is text designed to support manual operations and to facilitate key entry in menu driven systems. It is the equivalent of data elements represented in bar code symbols and is comprised of data titles and data content. The data content should be at least 7 mm in height. If there is no language agreed between trading partners, data titles must be printed in English. As an option left at the discretion of the labeller, a second language can be added. Application Identifiers are not included in Human Readable Interpretation.

2.2.1.1.1-2.2.4.4.2.3 Data Titles

Data titles are the standard abbreviated descriptions of data fields used to denote the Human Readable Interpretation of encoded data. They are prefixes of the Human Readable Interpretation to support manual interpretation of data fields. They can also be used adjacent to other text or bar code symbols to clarify content, such as the word "from" adjacent to a sender's address.

All data titles are shown in [Section 3.A.4](#).

Formatted: Bullets and Numbering

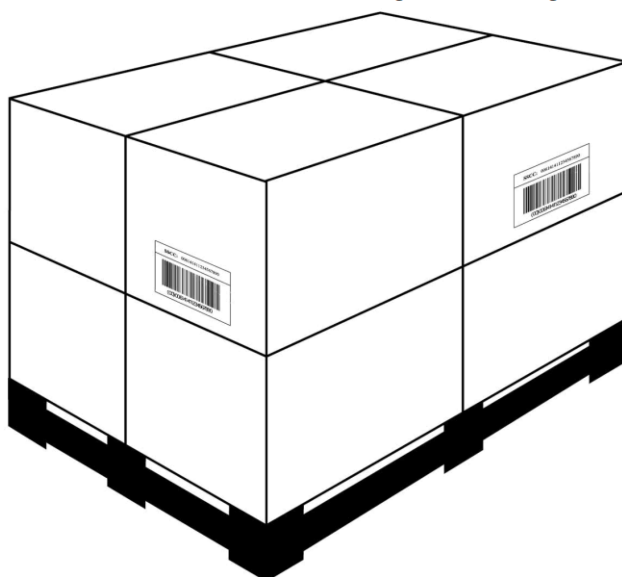
Formatted: Bullets and Numbering

2.2.4.4.3 Label Location

Each full unit, whether a trade item or a logistics unit, shall have at least one bar code symbol. The symbol should be a minimum of 50 mm (2") from any vertical edge. Two labels (or printed bar code symbols) are strongly recommend and should be affixed to adjacent sides of the Logistics Unit: one on a short side and one on the long side to its right (in warehouse applications this enables consistent turning to ensure a label is visible).

Figure 2.2.4.4.3 – 1

Two labels on adjacent sides: one on the short side & one on the long side to its right

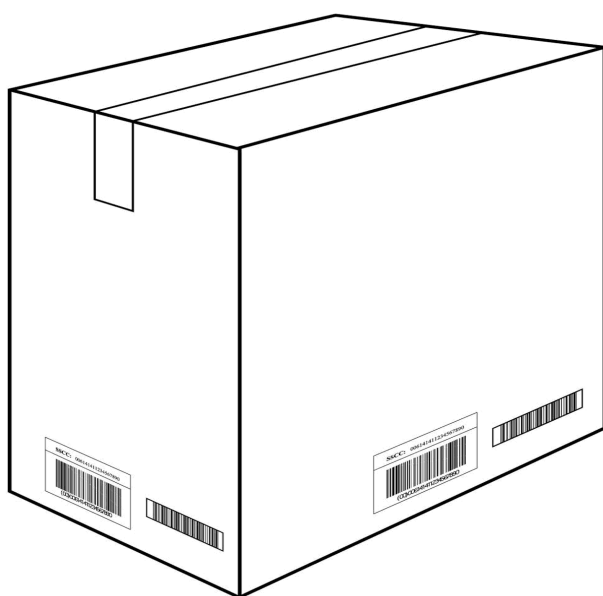


2.2.4.4.3.1 Units Less than 1 Metre in Height

For cartons and other units less than 1 m (39 in.) in height (pallets excluded) labels should be placed so that the lowest edge of the SSCC is 32 mm (1.25 in.) from the base of the unit. Including Quiet Zones, the symbol should at least 19 mm (0.75 in.) from the vertical edge.

If the unit is already marked with an EAN-13, UPC-A, ITF-14, or UCC/EAN-128 Bar Code Symbol for trade item identification purposes, the label shall be placed so as not to obscure the pre-existing bar code symbol. In situations like this, the preferred location for the label is to the side of the pre-existing bar code, so that a consistent horizontal location is maintained.

Figure 2.2.4.4.3.1 – 1



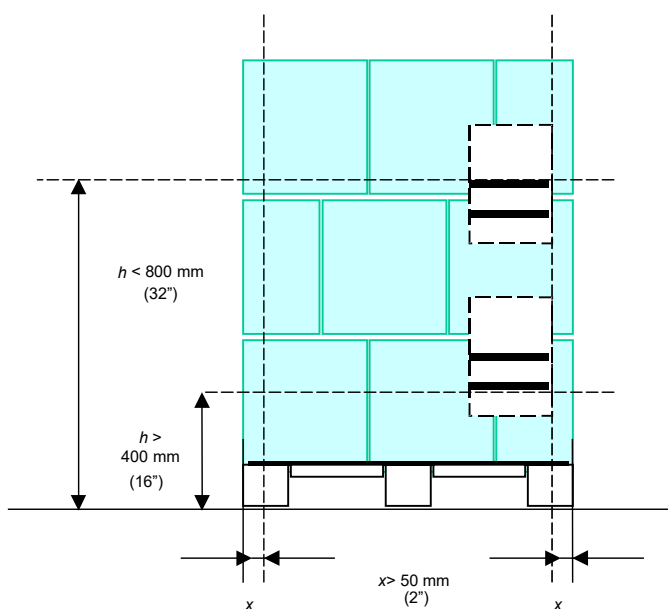
2.2.4.4.3.2 For Pallets Less than 1 Metre in Height

For pallets less than 1 m (39 in.) in height, symbols should be placed as high as possible but not more than 800 mm (32 in.) from the base of the unit.

2.2.4.4.3.3 Units Greater than 1 Metre in Height

For pallets and other units greater than 1 m in height, labels should be placed so that all bar code symbols are at a height between 400 mm (16 in.) and 800 mm (32 in.) from the base of the unit, and no closer than 50 mm (2 in.) from the vertical edge.

Figure 2.2.4.4.3.3 – 1



2.2.4.5 Label Examples

Figure 2.2.4.5 – 1
The Basic Label: An SSCC



Figure 2.2.4.5 – 2
Label with Supplier and Carrier Sections

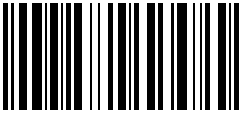
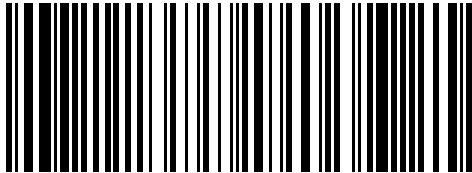
FROM	TO
BIG SUPPLIER 5 th AVENUE NEW YORK USA	GREAT VALUE 8163 NEW CAJUN DAYTON, OHIO USA
 (420) 45458	SHIP TO POST 45458 B/L 853930 PRO 2895769860
SSCC 0 0614141 123456789 0  (00)006141411234567890	

Figure 2.2.4.5 – 3

Label with Supplier Section with Concatenated Data

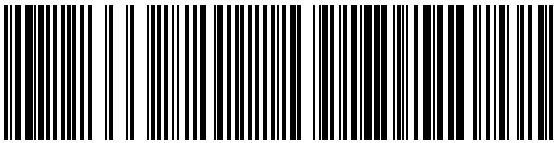
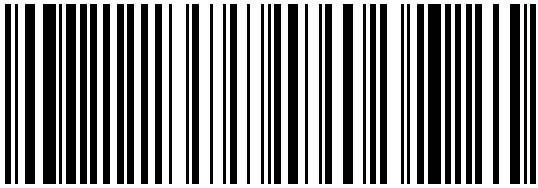
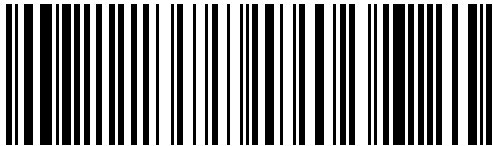
GRAND SUPPLIER COFFEE	
SSCC	
0 0614141 1234567890	
CONTENT	COUNT
00614141000418	20
BEST BEFORE (ddmmyy)	BATCH
14.02.00	4512XA
	
(02)00614141000418(15)000214(10)4512XA(37)20	
	
(0 0) 0 0 6 1 4 1 4 1 1 2 3 4 5 6 7 8 9 0	

Figure 2.2.4.5 – 4
Label with Supplier, Customer, and Carrier Sections

FROM BIG SUPPLIER 92 ROYAL ST. NEW YORK USA	TO GREAT VALUE 8163 NEW CAJUN DAYTON, OHIO USA
SHIP TO POST 45458 B/L 853930 CONSIGNMENT 541234550127501  (420) 45458(401) 541234550127501	
PO: 345-896779-0 DWCP: 9684584-23 Zone: 4 STORE # 49	
 (410) 0614141000531	SHIP TO LOC 0614141000531
SSCC 0 0614141 123456789 0  (00) 006141411234567890	

Section 2.3:

Numbering and Symbol Marking of Assets

Table of Contents

2.3.1 Introduction.....	2
2.3.2 Data Carrier	2
2.3.3 Application Overview	3
2.3.3.1 Identification of an Asset	3
2.3.3.1.1 EAN.UCC Global Returnable Asset Identifier (GRAI): AI (8003)	3
2.3.3.1.2 EAN.UCC Global Individual Asset Identifier (GIAI): AI (8004).....	4
2.3.4 Allocating EAN.UCC System Asset Identifiers	5
2.3.4.1 General Rule.....	5
2.3.4.1.1 Allocating EAN.UCC Global Returnable Asset Identifiers (GRAIs): AI (8003).....	5
2.3.4.1.1.1 Identical Assets and the EAN.UCC Global Returnable Asset Identifier	6
2.3.4.1.1.2 Serial Number (Optional)	6
2.3.4.1.2 Allocating EAN.UCC Global Individual Asset Identifiers (GIAIs): AI (8004)	7
2.3.4.2 Change of Asset Ownership	7
2.3.4.3 Information Associated with EAN.UCC Asset Identifiers	7

2.3.1 Introduction

The EAN.UCC System provides a method for the identification of assets. The object of asset identification is to identify a physical entity as an inventory item.

Each company holding an EAN.UCC Company Prefix may assign asset identifiers to the assets or trade items supplied to their customers. Best practices may dictate that the trade item manufacturer apply the asset identifier during the manufacturing process. This number may then be used for ordering new assets of an identical type. The EAN.UCC System asset identifiers act as keys to access the characteristics of an asset stored in a computer file and/or to record movements of assets.

Asset identifiers may be used for simple applications, such as the location and usership of a given fixed asset (e.g., a personal computer) or for complex applications, such as recording the characteristics of a Returnable Asset (e.g., a reusable beer keg), its movements, its life-cycle history, and any relevant data for accounting purposes.

2.3.2 Data Carrier

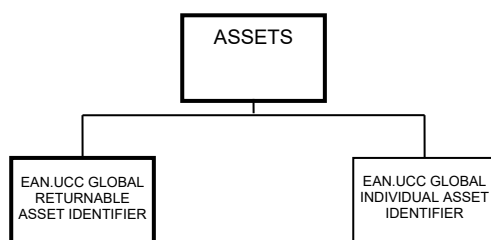
The only data carrier used to represent EAN.UCC System asset identifiers is the UCC/EAN-128 Bar Code Symbolology. When encoding an asset identifier, UCC/EAN-128 Bar Code Symbols should be printed at an X-dimension between 0.25 mm (0.00984 in.) and 1.016 mm (0.040 in.).

2.3.3 Application Overview

2.3.3.1 Identification of an Asset

2.3.3.1.1 EAN.UCC Global Returnable Asset Identifier (GRAI): AI (8003)

Figure 2.3.3.1.1 – 1



A Returnable Asset is a reusable package or transport equipment of a certain value, such as a beer keg, a gas cylinder, a plastic pallet, or a crate. The EAN.UCC System identification of a Returnable Asset, the EAN.UCC Global Returnable Asset Identifier (GRAI), enables tracking as well as recording of all relevant data.

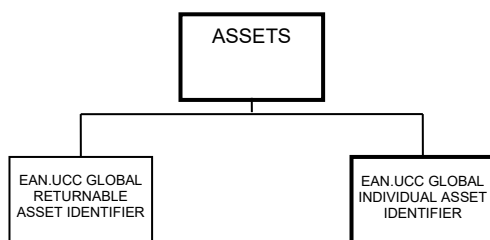
The Element String is comprised of the GRAI and an optional serial number (see [Section 3.6.49](#)). The GRAI is composed of the EAN.UCC Company Prefix of the company assigning the asset identifier and of the Asset Type. The latter is assigned to uniquely identify, together with the EAN.UCC Company Prefix, a particular kind of asset. The GRAI remains the same for all identical Returnable Assets. Although consecutive numbering is recommended, the structure is left to the discretion of the assigning company. An optional serial number may be used to distinguish Individual Assets within a given asset type.

A typical application using this Element String is in tracking returnable beer kegs. The owner of the beer keg applies a bar code symbol carrying a GRAI to the keg using a permanent marking technique. This bar code symbol is scanned whenever the keg is supplied full to a customer and scanned again when it is returned. This scanning operation allows the beer keg owner to automatically capture the life-cycle history of a given keg and to operate a deposit system, if desired.

Note: This Element String identifies a physical entity as a Returnable Asset. When such a physical entity is used to transport or to contain a trade item, the Element String AI (8003) must never be used to identify the transported or contained trade item.

2.3.1.1.2.2.3.1.2 EAN.UCC Global Individual Asset Identifier (GIAI): AI (8004)

Figure 2.3.3.1.2 – 1



In the EAN.UCC System, an Individual Asset is considered a physical entity made up of any characteristics.

This Element String identifies a particular physical entity as an asset. It must not be used for other purposes and must be unique for a period well beyond the lifetime of the relevant asset records. Whether or not the assigned EAN.UCC Global Individual Asset Identifier (GIAI) may remain with the physical item when changing hands depends on the particular business application. If it remains with the physical item, then it must never be re-used.

The GIAI comprises the EAN.UCC Company Prefix of the company assigning the asset identifier and an Individual Asset Reference (see [Section 3.6.50](#)). The Individual Asset Reference is alphanumeric. Its structure is left to the discretion of the company applying the Element String.

This Element String might, for example, be used to record the life-cycle history of aircraft parts. By symbol marking the GIAI, AI (8004), on a given part, aircraft operators are able to automatically update their inventory database and track assets from acquisition until retirement.

2.3.4 Allocating EAN.UCC System Asset Identifiers

2.3.4.1 General Rule

EAN.UCC System asset identifiers can be used to identify any fixed assets of a company. It is left to the discretion of the issuer to determine whether the EAN.UCC Global Returnable Asset Identifier (GRAI), AI (8003), or EAN.UCC Global Individual Asset Identifier (GIAI), AI (8004), is more suitable for the application concerned.

Asset identifiers must not be used for any other purpose and must remain unique for a period well beyond the lifetime of the relevant records.

If a company assigns asset identifiers to trade items supplied to its customers, the company must ensure that the asset identifiers are never re-used.

2.3.4.1.1 Allocating EAN.UCC Global Returnable Asset Identifiers (GRAIs): AI (8003)

The structure of the Element String for an EAN.UCC Global Returnable Asset Identifier (GRAI) can include two parts: the mandatory GRAI and an optional serial number (see [Section 3.6.49](#)).

Figure 2.3.4.1.1 – 1

		Format of the Element String															
		Application Identifier	EAN.UCC Global Returnable Asset Identifier												Serial Number (optional)		
			EAN.UCC Company Prefix							Asset Type		Check Digit					
(UCC-12)	8 0 0 3	0	0	N ₁	N ₂	N ₃	N ₄	N ₅	N ₆	N ₇	N ₈	N ₉	N ₁₀	N ₁₁	N ₁₂	X ₁ ← variable → X ₁₆	
(EAN/UCC-13)	8 0 0 3	0	N ₁	N ₂	N ₃	N ₄	N ₅	N ₆	N ₇	N ₈	N ₉	N ₁₀	N ₁₁	N ₁₂	N ₁₃	X ₁ ← variable → X ₁₆	

The exact method used to allocate the GRAI is left to the discretion of the issuing organisation. However, a unique number, the Asset Type, must be assigned for each type of asset being identified, and for ease of administration, the EAN.UCC System recommends that numbers be allocated sequentially and not contain classifying elements.

When it is not possible to assign an Asset Type (e.g., for museum exhibits), or when the type of asset is not required by the application (e.g., when the item is only used for a single type of asset), then the EAN.UCC Global Individual Asset Identifier (GIAI), AI (8004), should be used.

Formatted: Bullets and Numbering

2.3.4.1.1.1 Identical Assets and the EAN.UCC Global Returnable Asset Identifier

A single EAN.UCC Global Returnable Asset Identifier (GRAI) should be assigned to a series of identical assets (see Figure 2.3.4.1.1.1 – 1).

Figure 2.3.4.1.1.1 – 1

Asset Type	GRAI
50 litre aluminium beer keg	0 12345 6789 000 5
10 litre aluminium beer keg	0 12345 6789 001 2
10 litre wooden beer keg	0 12345 6789 002 9

2.3.4.1.1.2 Serial Number (Optional)

The owner of the asset assigns the optional serial number. It denotes an Individual Asset within a given Asset Type. The field is alphanumeric and is used to distinguish individual assets with the same Asset Types.

2.3.4.1.2 Allocating EAN.UCC Global Individual Asset Identifiers (GIAIs): AI (8004)

The EAN.UCC Global Individual Asset Identifier (GIAI) is structured according to Figure 2.3.4.1.2 - 1 (see [Section 3.6.50](#)).

Figure 2.3.4.1.2 – 1

Format of the Element String	
Application Identifier	EAN.UCC Global Individual Asset Identifier
	EAN.UCC Company Prefix Individual Asset Reference
8 0 0 4	$N_1 \dots N_i$ $X_{i+1} \dots$ variable length $X_j \text{ (} j \leq 30 \text{)}$

The exact method used to allocate the GIAI is left to the discretion of the issuing organisation. However, each GIAI must be unique for each individual asset being identified and, for ease of administration, the EAN.UCC System recommends that GIAIs be allocated sequentially and not contain classifying elements.

2.3.4.2 Change of Asset Ownership

If a company (possibly because of liquidation) sells an asset to another company that may or may not be using EAN.UCC System asset identifiers, whether or not the assigned asset identifier remains with the physical item depends on the particular business application. If it remains with the physical item, then it must never be re-used on another item.

2.3.4.3 Information Associated with EAN.UCC Asset Identifiers

The attributes of the asset should be established on a computer file using the EAN.UCC System asset identifier as the key to the information. Examples of the type of information held include the full name and address of the party who owns the asset, the value of the asset, the location of the asset, and the life-cycle history of the asset.

Section 2.4:

Numbering and Symbol Marking of Locations

Table of Contents

2.4.1 Introduction.....	2
2.4.2 Data Carrier	2
2.4.3 Application Overview	3
2.4.3.1 Identification of a Physical Location.....	3
2.4.3.1.1 EAN.UCC Global Location Number to Identify a Physical Location: AI (414).....	3
2.4.3.2 Location Numbering by Defined Function	4
2.4.3.2.1 Ship to – Deliver to EAN.UCC Global Location Number: AI (410)	4
2.4.3.2.2 Bill to - Invoice to EAN.UCC Global Location Number: AI (411)	4
2.4.3.2.3 Purchased from EAN.UCC Global Location Number: AI (412).....	4
2.4.3.2.4 Ship for - Deliver for - Forward to EAN.UCC Global Location Number: AI (413)	5
2.4.3.2.5 EAN.UCC Global Location Number of the Invoicing Party: AI (415) 5	5
2.4.3.3 Postal Codes	6
2.4.3.3.1 Ship to - Deliver to Postal Code Within a Single Postal Authority: AI (420)	6
2.4.3.3.2 Ship to - Deliver to Postal Code with Three-Digit ISO Country Code: AI (421).....	6
2.4.4 Allocating EAN.UCC Global Location Numbers.....	7
2.4.4.1 General Rule.....	7
2.4.4.2 Location Changes.....	7
2.4.4.3 Recommendation on Allocating EAN.UCC Global Location Numbers ..	7
2.4.4.4 Information Associated with an EAN.UCC Global Location Number	8

2.4.1 Introduction

The EAN.UCC Global Location Number (GLN) makes possible the unique and unambiguous identification of physical, functional, and legal entities. The EAN/UCC-13 Data Structure is used for this purpose, and the numbers represented are non-significant. There is no restriction on the allocation of the same EAN/UCC-13 Identification Number to a trade item and to a location.

In business operations, location numbers are meaningless if they are not associated with a particular function or purpose. All Element Strings described in this section indicate the particular function of the GLN represented in the bar code symbol.

Each company or organisation holding an EAN.UCC Company Prefix may assign GLNs to its own locations. It is the responsibility of the company using the GLNs to keep business partners informed of all numbers issued as well as the company's name and address details. Special care is needed if ownership of the company changes.

The use of GLNs is a pre-requisite for efficient Electronic Data Interchange (e.g., EANCOM®). Special procedures may be applied to provide GLNs for small companies or businesses that have not been assigned an EAN.UCC Company Prefix.

In addition to the GLN, the EAN.UCC System provides for a standard data structure to encode the official postal code of the "ship to" address. Postal codes are normally maintained by the national postal body in conjunction with the Universal Postal Union (UPU).

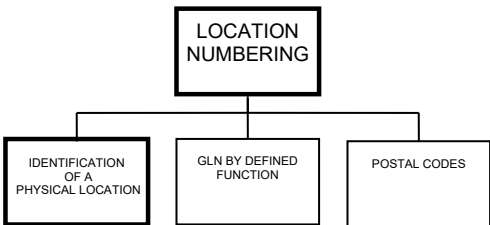
2.4.2 Data Carrier

The only data carrier used to represent the EAN.UCC Global Location Number (GLN) is the UCC/EAN-128 Bar Code Symbol. When encoding the GLN, UCC/EAN-128 Bar Code Symbols should be printed at an X-dimension between 0.25 mm (0.00984 in.) and 1.016 mm (0.040 in.). However, if the GLN is carried by a bar code symbol on an EAN.UCC Logistics Label, the recommendations contained in Section 2.2, Logistics Units, apply.

2.4.3 Application Overview

2.4.3.1 Identification of a Physical Location

Figure 2.4.3.1 – 1



2.4.1.1.12.4.3.1.1 EAN.UCC Global Location Number to Identify a Physical Location: AI (414)

Formatted: Bullets and Numbering

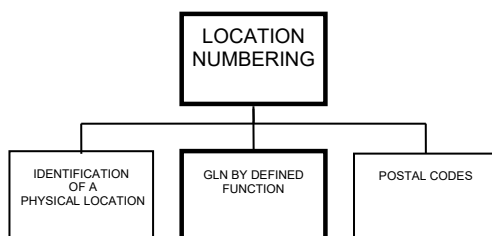
The function assigned to this Element String is the identification of a physical location. This implies that this Element String is represented in a data carrier on the location itself. Physical locations may, for example, be a room, a door of a warehouse, an x-ray room in a hospital, a control point, or a particular machine.

This Element String may be used to record and confirm presence at a given location for any purpose.

A typical application using this Element String is the identification of storage locations within a warehouse. The forklift driver scans the EAN.UCC Global Location Number (GLN), identifying the storage location whenever an item is brought to, or taken from, the identified location. The electronic message from the scanner is then used to automatically update the warehouse's stock management system.

2.4.1.22.4.3.2 Location Numbering by Defined Function

Figure 2.4.3.2 – 1

**2.4.1.1.12.4.3.2.1 Ship to – Deliver to EAN.UCC Global Location Number: AI (410)**

Formatted: Bullets and Numbering

This Element String represents the EAN.UCC Global Location Number (GLN) of the recipient of a transport unit. The GLN refers to the address where a particular consignment is to be delivered. This Element String is typically used in single leg transport operations. A transport unit may include a bar code symbol carrying the GLN of the unit's intended destination. When scanning this Element String, the data transmitted may be used to retrieve the related address and/or to sort the item by destination.

2.4.1.1.22.4.3.2.2 Bill to - Invoice to EAN.UCC Global Location Number: AI (411)

Formatted: Bullets and Numbering

This Element String represents the EAN.UCC Global Location Number (GLN) of the addressee of an invoice. The GLN refers to the name and address of the business partner to which an entity shall be invoiced and includes accounting-related information that may be used wherever required.

2.4.1.1.32.4.3.2.3 Purchased from EAN.UCC Global Location Number: AI (412)

Formatted: Bullets and Numbering

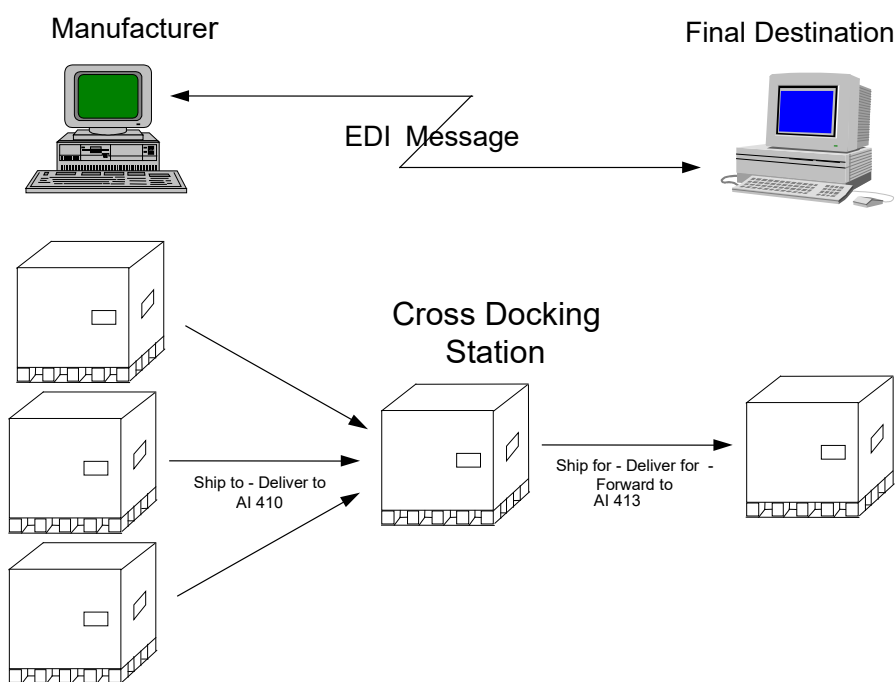
In business it is sometimes important to know from where a particular trade item was purchased. Applied on a trade item, this Element String provides the EAN.UCC Global Location Number (GLN) of the company that supplied and invoiced the item. The GLN always refers to the Global Trade Item Number™ (GTIN™) of the trade item on which the Element String has been applied.

2.4.3.2.4 Ship for - Deliver for - Forward to EAN.UCC Global Location Number: AI (413)

This Element String is used by the consignee for determining the internal or subsequent final destination of a physical unit.

A typical application using this Element String is in cross docking. Here, a bar code symbol carrying the Element String AI (410) is placed on a logistic unit at the point of creation to direct the goods to the intermediate destination (e.g., a distribution centre). The Element String AI (413) is also carried by the bar code symbol to direct the goods to their final destination (e.g., a retail store served by the distribution centre).

Figure 2.4.3.2.4 – 1

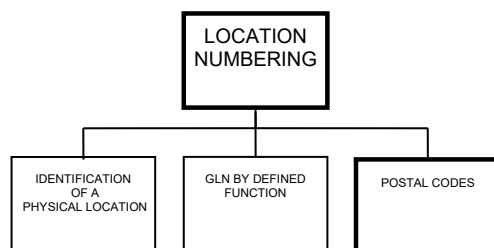


2.4.3.2.5 EAN.UCC Global Location Number of the Invoicing Party: AI (415)

This Element String is used to indicate the EAN.UCC Global Location Number (GLN) of the invoicing party. The GLN is mandatory information for the payment slip application (see [Section 2.6.5](#)).

2.4.3.3 Postal Codes

Figure 2.4.3.3 – 1



Within the EAN.UCC System, it is possible to encode the official postal code of the ship to address. The Element Strings for postal codes are described in the following subsections.

2.4.1.1.2.4.3.3.1 Ship to - Deliver to Postal Code Within a Single Postal Authority: AI (420)

This Element String represents the postal code of a given unidentified postal authority. It may not be used for items leaving the area of the concerned postal authority. The Element String has been designed to allow the automatic sorting of logistic units.

When postal code Element Strings were developed, AI (420), national applications, often used a different schema than international applications and was created to give more detail (e.g., down to the level of the household). For international postal codes, this level of detail was not felt necessary.

2.4.1.1.2.4.3.3.2 Ship to - Deliver to Postal Code with Three-Digit ISO Country Code: AI (421)

This Element String represents the postal code of a postal authority identified by the ISO country code. It may be used for items leaving the area of the concerned postal authority. The Element String has been designed to allow the automatic sorting of logistic units worldwide.

This Element String represents the national postal codes preceded by the ISO country code. It may be used as logistic information in the international logistic operations wherever appropriate.

A typical application using this Element String is in a single leg transport operation. Here, a logistic unit has a bar code symbol carrying the international version of the postal code of its intended destination. The electronic message from the scanner is then used to automatically route the logistic unit.

Formatted: Bullets and Numbering

Formatted: Bullets and Numbering

2.4.4 Allocating EAN.UCC Global Location Numbers

2.4.4.1 General Rule

EAN.UCC Global Location Numbers (GLNs) can be used to identify anything that can be addressed (e.g., companies, departments, functions, rooms, factories, shelves, delivery points, EDI network addresses). A separate unique number is required to identify each different location. Once assigned at the source (e.g., usually by the party owning the location), the GLN becomes a unique and universal reference that can be used by all.

2.4.1.2.4.4.2 Location Changes

Formatted: Bullets and Numbering

From time to time the details related to an EAN.UCC Global Location Number (GLN) might change. The location identified by the GLN may change ownership or the business carried out at one address may be transferred to a new address. The following are general cases on the use (or re-use) of GLNs due to a change in the circumstances in which the number was originally established.

If a company (possibly because of liquidation) sells a location to another party who may or may not be using GLNs, the GLN for the address that is associated with the previous owner should be closed. If the new owner of the address wishes to identify the location with a GLN, a new number should be assigned.

If a company closes one address and opens a similar operation at a new address, the company may either transfer the existing GLN to the new address or assign a new GLN for the new address. The reason for requesting a new GLN may be that the owner wants to maintain records on his computer files that show the performance of the old location. At a later date, this performance may be compared with the performance of the new location.

If a function identified by a GLN changes, the details associated with the GLN should be changed by the party responsible for it on the related computer file record.

A GLN that has stopped being used should remain so for at least three years before being reallocated. The delay must allow time for all references of the old GLN to be removed from trading partners' files. When the GLN is put into use once again, the details relating to the new party and/or location must be retransmitted (e.g., using a PARTN EANCOM® message).

2.4.4.3 Recommendation on Allocating EAN.UCC Global Location Numbers

The exact method used to allocate the EAN.UCC Global Location Number (GLN) is at the discretion of the issuing organisation. The GLN must be unique for each individual location being identified.

For ease of administration, EAN International and the Uniform Code Council (UCC™) recommend GLNs be allocated sequentially without classifying elements.

2.4.4.4 Information Associated with an EAN.UCC Global Location Number

The characteristics of a party or location should be established on a computer file using the EAN.UCC Global Location Number (GLN) as the key to the information.

An example of the type of information held includes the full name and address of the party, bank details and account number, sales department that deals with the party, and profile of a company.

Section 2.5:

Numbering and Symbol Marking of Service Relationships

Table of Contents

2.5.1 Introduction.....	2
2.5.2 Data Carrier	2
2.5.3 Application Overview	2
2.5.3.1 EAN.UCC Global Service Relation Number (GSRN): AI (8018)	2
2.5.4 Allocating EAN.UCC Global Service Relation Numbers.....	4
2.5.4.1 General Rule.....	4
2.5.4.2 Changes in a Service Relationship	4
2.5.4.3 Recommendation for Allocating EAN.UCC Global Service Relation Numbers	4
2.5.4.4 Information Associated with an EAN.UCC Global Service Relation Number	5

2.5.1 Introduction

The EAN.UCC Global Service Relation Number (GSRN) is used to identify the recipient of services in the context of a service relationship. It provides a unique and unambiguous identification number for the service provider to store data relevant to service(s) provided to the recipient. The GSRN is the key to access information stored on computer systems or reference information transferred via Electronic Data Interchange (EDI).

The GSRN can be used to identify the service relationships in:

- A hospital admission, where it could be used to record a patient's room charges, medical tests, and patient charges
- A membership in a frequent flyer programme, where it could be used to record awards, claims, and preferences
- A membership in a loyalty scheme, where it could be used to record visits, purchase value, and awards
- A membership in a club, where it could be used for recording entitlements, use of facilities, and subscriptions
- A service agreement, where it could be used to manage agreed upon services, such as maintenance services for a television or computer

2.5.2 Data Carrier

The data carrier for the EAN.UCC Global Service Relation Number (GSRN) is the UCC/EAN-128 Bar Code Symbol. When encoding the GSRN, the UCC/EAN-128 Bar Code Symbol should be printed at an X-dimension between 0.25 mm (0.00984 in.) and 1.016 mm (0.040in.).

2.5.3 Application Overview

2.5.3.1 EAN.UCC Global Service Relation Number (GSRN): AI (8018)

The EAN.UCC Global Service Relation Number (GSRN) is a non-significant number used to identify a database entry for recording recurring services. These services are activities carried out by a service provider for a service user, based upon a bilateral agreement. Consequently, the GSRN identifies a particular service arrangement with reference to a particular service provider and to a particular user. It may in some instances identify the user as a participant (or member) in a programme or scheme. However, it never constitutes a person's personal identification number because it is always related to a given service arrangement.

A typical application using this Element String is the identification of membership in a student library. The library would issue all members a card that includes a unique GSRN identifying the relationship between the library and a student. The library would then scan the GSRN whenever a book was lent or returned. The electronic message from the scanner would then be used to automatically update the library's stock management database. See Figure 2.5.3.1 – 1 for an example of how the GSRN would appear on this membership card.

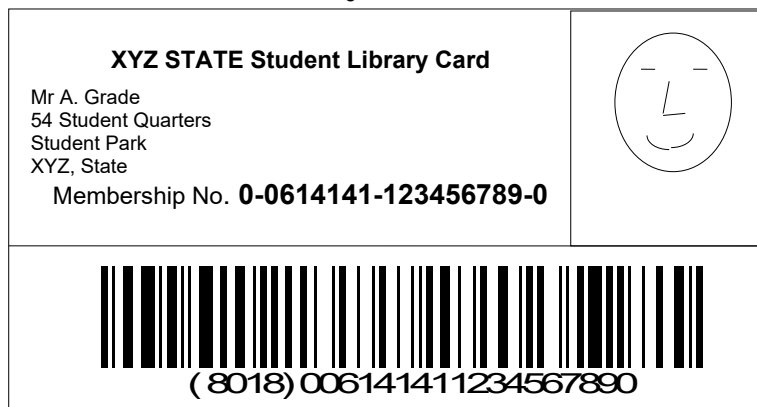
The worldwide, unique GSRN may also be used in other applications. For example, it could be used to give students access to other libraries that have formed a cooperative lending agreement.

GSRNs also can be used to identify hospital patients. In this case, the service provider is the hospital and the service recipient is the patient. The EAN.UCC Company Prefix used is the one allocated to the hospital. The hospital generates a GSRN for each of its patients and encodes it in a UCC/EAN-128 Bar Code Symbol on the patient's wristband as well as his or her corresponding medical record.

When a product or service is administered (e.g., a particular treatment is given) it can easily be associated with the patient by scanning the patient's GSRN and the Global Trade Item Number™ (GTIN™) of the product or service.

It should be noted that the GSRN is not meant to identify a single service as a trade item. Neither is it used to identify a physical unit as a trade item. It may identify a physical unit for service purposes (e.g., a computer with a service agreement).

Figure 2.5.3.1 – 1



2.5.4 Allocating EAN.UCC Global Service Relation Numbers

2.5.4.1 General Rule

The EAN.UCC Global Service Relation Number (GSRN) can be used to identify any service relationship. A separate, unique number can be issued, normally by the service provider, to identify any given service relationship. Once assigned, the GSRN becomes a unique and universal reference that can be used by all parties involved in the service relationship.

2.5.1.22.5.4.2 Changes in a Service Relationship

From time to time the details related to an EAN.UCC Global Service Relation Number (GSRN) may change. The following are general cases that may occur if the circumstances under which the GSRN was originally set up change:

- If a service provider ceases trading (possibly because of liquidation), any GSRNs allocated by that organisation should be phased out. If the activity covered by the GSRN is transferred, the new service provider may continue to use existing GSRNs, but should allocate further GSRNs using the new provider's EAN.UCC Company Prefix.
- If the range of services identified by a GSRN changes, the service provider should change the details associated with the GSRN on the related computer file record. The assignment of a new GSRN is not required in this case.
- A GSRN used to identify a particular service relationship that has terminated should not be reallocated for a period well beyond the lifetime of the relevant records.

2.5.1.32.5.4.3 Recommendation for Allocating EAN.UCC Global Service Relation Numbers

Formatted: Bullets and Numbering

Formatted: Bullets and Numbering

The exact method used to allocate the EAN.UCC Global Service Relation Number (GSRN) is left to the discretion of the issuing organisation. However, the GSRN must be unique for each individual service recipient and remain unique for a period well beyond the lifetime of the records relevant to the service relationship.

For ease of administration, EAN International and the Uniform Code Council (UCC™) recommend that GSRNs be allocated sequentially and do not contain classifying elements.

2.5.4.4 Information Associated with an EAN.UCC Global Service Relation Number

The EAN.UCC Global Service Relation Number (GSRN) is a standalone Element String. All information required by the service provider should be established on a computer file using the GSRN as the key to access the information. The type of information stored is determined by the nature of the service relationship. Typical information includes the service recipient's full name, address, and details on services rendered.

Section 2.6:

Numbering and Symbol Marking for Special Applications

Table of Contents

2.6.1 Coupons	4
2.6.1.1 Introduction	4
2.6.1.2 Application Overview	4
2.6.1.3 Coupon Identification for Restricted Geographic Distribution	4
2.6.1.3.1 Coupon Identification for Restricted Geographic Distribution (EAN.UCC Prefix 99)	4
2.6.1.3.2 EAN.UCC Common Currency Coupon Identification (EAN.UCC Prefixes 981 and 982)	5
2.6.1.3.2.1 Use of EAN.UCC Common Currency Coupon Code for the Euro	6
2.6.1.3.3 UCC Coupon Code Identification for use in North America (EAN.UCC Prefix 05)	7
2.6.1.3.3.1 UCC Coupon Extended Code: AI (8100 – 8102)	7
2.6.1.4 Symbol Marking of Coupons	8
2.6.1.5 Allocating EAN.UCC System Coupon Data	8
2.6.1.5.1 General Rule	8
2.6.1.5.2 Recommendation on Allocating Coupon Reference Numbers	8
2.6.2 Refund Receipts	9
2.6.2.1 Introduction	9
2.6.2.2 Application Overview	9
2.6.2.2.1 EAN.UCC System Identification of Refund Receipts - Restricted Geographic Distribution (EAN.UCC Prefix 980)	9
2.6.2.3 Symbol Marking of Refund Receipts	10
2.6.2.4 Allocating Refund Receipts	10
2.6.2.4.1 General Rule	10

2.6.3 Electronic Serial Identifier for Cellular Mobile Telephones (CMTI): AI (8002)	11
2.6.3.1 Introduction	11
2.6.3.2 Application Overview	11
2.6.3.3 Allocating Electronic Serial Identifiers: AI (8002)	11
2.6.4 Internal Applications	12
2.6.4.1 Introduction	12
2.6.4.2 Application Overview	12
2.6.4.2.1 Definition	12
2.6.4.2.2 Data Carrier	12
2.6.4.3 Allocating Internal Application Numbers	13
2.6.4.4 Company Internal Applications Using EAN/UPC Symbology	13
2.6.4.4.1 Company Internal Applications Using EAN.UCC Prefixes	13
2.6.4.5 Internal Applications Using UCC/EAN-128 Symbology	14
2.6.4.5.1 Information Mutually Agreed Between Trading Partners (Including FACT Data Identifiers: AI (90))	14
2.6.4.5.2 Company Internal Information: AIs (91 to 99)	14
2.6.5 Numbering and Symbol Marking for Payment Slips	15
2.6.5.1 Introduction	15
2.6.5.1.1 Business Demand for the Application	15
2.6.5.2 Potential Benefits	16
2.6.5.3 Application Rules	17
2.6.5.3.1 Definition of a Payment Slip	17
2.6.5.3.2 Bar Code Symbology	17
2.6.5.3.3 Bar Code Symbol Information	17
2.6.5.3.3.1 EAN.UCC Global Location Number of the Invoicing Party	17
2.6.5.3.3.2 International Bank Account Number (IBAN): AI (8007)	18
2.6.5.3.3.3 Payment Slip Reference Number: AI (8020)	18
2.6.5.3.3.4 Amount Payable	18
2.6.5.3.3.5 Due Date	18

2.6.5.4 Application Overview	19
2.6.5.4.1 Application Requirements	19
2.6.5.4.2 Overview of the Key Steps When Using Bar Code Symbols with Payment Slips	19
2.6.A.1 Appendix 1: Example of a Payment Slip	21
2.6.A.2 Appendix 2: Guideline on the Use of EAN.UCC Global Location Numbers	22
2.6.A.2.1 Introduction	22
2.6.A.2.2 What is an EAN.UCC Global Location Number?	22
2.6.A.2.3 What Information is Associated with an EAN.UCC Global Location Number?	22
2.6.A.2.4 Are EAN.UCC Global Location Numbers Used in EDI?	22
2.6.A.3 Appendix 3: Introduction to the International Bank Account Number (IBAN): AI (8007)	24
2.6.6 Customer Specific Articles	25
2.6.6.1 Introduction	25
2.6.6.2 Application Overview	25
2.6.6.2.1 Definition	25
2.6.6.2.2 Customer Specific Articles Data Flow	26
2.6.6.3 Allocating EAN.UCC System Numbers for Customer Specific Articles 	27
2.6.6.3.1 General Rule	27
2.6.6.3.2 Ordering of Customer Specific Articles	27
2.6.6.3.2.1 Base Article Number	27
2.6.6.3.2.2 Specifications	28
2.6.6.3.2.2.1 Option	28
2.6.6.3.2.2.2 Parameter	28
2.6.6.3.2.2.3 Part	28
2.6.6.3.2.2.4 External References	28
2.6.6.3.2.3 Data Carrier	29
2.6.6.3.3 Identification of the Physical Article Actually Produced	29
2.6.6.3.3.1 Data Carrier	29

2.6.1 Coupons

2.6.1.1 Introduction

A coupon is a voucher that can be redeemed at the Point-of-Sale for a cash value or free item. Coupon identification is organised at the local level. Determining the data structure of a coupon is, therefore, the responsibility of the Uniform Code Council (UCC™) or the EAN Member Organisations for their area of jurisdiction.

The purpose of coupon numbering and symbol marking is to automate and speed up coupon handling procedures at the Point-of-Sale. Moreover, coupon issuers and retailers may be able to reduce the costs involved in sorting coupons, administering manufacturers' payments, and producing reports on redemption.

All EAN.UCC System coupon standards presented here allow for coupon validation" (e.g., to check whether the item(s) covered by the coupon are within the customer's order).

If either validation or value look up is performed, manufacturers must advise their distributors and retailers of the impending issue of a coupon so that retailers' files can be updated to process the information at the Point-of-Sale.

2.6.1.2 Application Overview

An EAN.UCC System coupon number is used for numbering promotional coupons for manufacturers and retailers as well as tokens with monetary value, such as gift tokens, book tokens, food stamps, record vouchers, luncheon vouchers, and social security tokens.

The structure of EAN.UCC System coupon numbers ensures uniqueness against all other EAN.UCC System numbers only when used within the monetary area of the appropriate EAN Member Organisation(s).

2.6.1.3 Coupon Identification for Restricted Geographic Distribution

2.6.1.3.1 Coupon Identification for Restricted Geographic Distribution (EAN.UCC Prefix 99)

The prefix 99 has been released for use with coupon numbers.

The internationally agreed standard for EAN.UCC System coupon numbers is shown in Figure 2.6.1.3.1 – 1.

Figure 2.6.1.3.1 – 1

EAN.UCC Prefix	Coupon Data (Structure Determined by EAN Member Organisation and the Uniform Code Council)	Check Digit
9 9	N ₃ N ₄ N ₅ N ₆ N ₇ N ₈ N ₉ N ₁₀ N ₁₁ N ₁₂	N ₁₃

Within this structure, the Uniform Code Council (UCC™) and each EAN Member Organisation are free to develop a national coupon solution. Four recommended structures provide a degree of equipment standardisation.

These recommended structures are shown in Figure 2.6.1.3.1 – 2.

Figure 2.6.1.3.1 – 2

EAN.UCC Prefix	Recommended Coupon Data Structures (Exact Structure Determined by EAN Member Organisation)	Check Digit
9 9	Y Y Y Y R R R V V V	C
9 9	Y Y Y R R R V V V V	C
9 9	Y Y Y Y Y R R R T T	C
9 9	Y Y Y Y Y R R R R R	C

Where:

- Y = Coupon issuer number (issued by the UCC or an EAN Member Organisation)
- R = Coupon reference number (allocated by a coupon issuer)
- V = Redemption value
- T = Value Code (standardised by the UCC or an EAN Member Organisation)
- C = Check Digit calculated according to the standard algorithm

The UCC, EAN Member Organisations, or retailers may require that the third digit of the coupon numbers (990 to 999) be programmable in order to cope with specific demands such as:

- Taxable or non-taxable coupons
- Different currencies
- Indication of the decimal position

2.6.1.3.2 EAN.UCC Common Currency Coupon Identification (EAN.UCC Prefixes 981 and 982)

The EAN.UCC Prefixes 981 and 982 have been released for use with coupons expressing a value in a common currency.

The internationally agreed standard for EAN.UCC Common Currency Coupon Codes is shown in Figure 2.6.1.3.2 – 1.

Figure 2.6.1.3.2 – 1

EAN.UCC Prefix	Coupon Data (Structure Determined in Agreement with EAN International)	Check Digit
9 8 1 or 9 8 2	N ₄ N ₅ N ₆ N ₇ N ₈ N ₉ N ₁₀ N ₁₁ N ₁₂	N ₁₃

Within this structure, EAN Member Organisations in a common currency area should develop a common coupon solution that is valid throughout the common currency area.

2.6.1.1.1.12.6.1.3.2.1 Use of EAN.UCC Common Currency Coupon Code for the Euro

At present the only application of EAN.UCC Prefixes 981 and 982 is for the euro. The euro is a new currency that began to replace the national currencies of some countries on 1 January 1999. A migration period of several years is planned, with notes and coins being introduced in 2002.

Within the euro area, coupon issuer numbers are administered by:

EAN BELGIUM•LUXEMBOURG

Rue Royale 29

1000 Brussels

Belgium

Tel: + 32.2.229.18.80, Fax: + 32.2.217.43.47, Email <info@eanbelgilux.be>

See Figure 2.6.1.3.2.1 – 1 for the coupon data structure in the euro area.

Figure 2.6.1.3.2.1 – 1

EAN.UCC Prefix	Coupon Data			Check Digit
9 8 1	Y ₁ Y ₂ Y ₃ Y ₄	R ₁ R ₂	E E , E	C
9 8 2	Y ₁ Y ₂ Y ₃ Y ₄	R ₁ R ₂	E , E E	C

Where: Y = Coupon issuer number (issued by an EAN Member Organisation)
R = Coupon reference number (allocated by a coupon issuer)
E = Redemption value (expressed in euro); value 000 indicates free gift
C = Check Digit calculated according to the standard algorithm

Note: The only difference between the two structures is the position of the implied decimal point.

2.6.1.3.3 UCC Coupon Code Identification for use in North America (EAN.UCC Prefix 05)

Prefix 05 is reserved for use in North America only. The structure is given in [Section 3.2.6](#).

Coupons using the EAN.UCC Prefix 05 are constructed using the UCC Company Prefix assigned to a given organisation. For UCC Company Prefixes beginning with a digit other than zero, the presence of one of the Element Strings AI (8100), (8101), or (8102) is required.

See the [Application Standard for UCC Coupon Codes](#) for detailed information on UCC Coupon Code data content and applied numbers.

~~2.6.1.4.1~~ **2.6.1.3.3.1 UCC Coupon Extended Code: AI (8100 – 8102)**

Element Strings AI (8100) to AI (8102) represent supplementary data related to a particular UCC Coupon Code using the EAN.UCC Prefix 05. They are never used as a stand-alone Element String.

The Element String AI (8100) enables the representation of an Offer Code and the extension of the use of UCC Coupon Codes to companies whose UCC Company Prefix does not begin with the UCC Prefix 0.

The Element String AI (8101) enables the representation of an Offer Code and expiration data, and extends the use of UCC Coupon Codes to companies whose UCC Company Prefix does not begin with the UCC Prefix 0.

The Element String AI (8102) enables the extension of the use of UCC Coupon Codes to companies whose UCC Company Prefix does not begin with the UCC Prefix 0.

See the [Application Standard for UCC Coupon Codes](#) for detailed information on data content and applied numbers.

Formatted: Bullets and Numbering

2.6.1.4 Symbol Marking of Coupons

A coupon with the EAN.UCC Prefix 99, 981, or 982 is carried by the EAN-13 Bar Code Symbol.

A coupon with the EAN.UCC Prefix 05 is carried by the UPC-A Bar Code Symbol.

The UCC Coupon Extended Code, AIs (8101 to 8103), is carried by the UCC/EAN-128 Bar Code Symbol.

2.6.1.5 Allocating EAN.UCC System Coupon Data

2.6.1.5.1 General Rule

EAN.UCC System coupon identification specifications are flexible and have been designed to cater for current and future requirements.

Due to the nature of coupon numbering, a range of national solutions is offered, each of which is defined by the respective EAN Member Organisation or the Uniform Code Council (UCC™). National coupon solutions are not unique worldwide and must be operated in the restricted area defined by the EAN Member Organisation or the UCC.

In the interest of consistency and to avoid misinterpretation by equipment vendors, when defining national specifications, EAN Member Organisations should include appropriate mention of all EAN.UCC System coupon data structures.

Coupon reference numbers must not be re-used for a period of three years.

2.6.1.5.2 Recommendation on Allocating Coupon Reference Numbers

The exact method used to allocate EAN.UCC System coupon reference numbers is left to the discretion of the issuing organisation. However, the UCC Coupon Code must be unique for each individual promotion.

For ease of administration, coupon reference numbers should be allocated sequentially.

2.6.2 Refund Receipts

2.6.2.1 Introduction

Refund Receipts are vouchers produced to automate payment for returned empty containers.

Refund Receipts automate and expedite the handling of empty containers (e.g., bottles, crates) that have a refund value in a retail store.

When customers return empty containers (which have a refund value), the containers have to be checked and valued. This process can be done manually or by automated equipment capable of handling empty containers. When the returned containers have been valued, a Refund Receipt is printed and given to the customer. The customer presents the Refund Receipt at the store checkout, and the corresponding amount is refunded in cash or deducted from the customer's bill.

An EAN-13 Bar Code Symbol can be printed on the Refund Receipt to encode the required data including a security number and the monetary value.

2.6.2.2 Application Overview

The structure of Refund Receipts ensures uniqueness against all other EAN.UCC System ID numbers only when used within the restricted environment defined by the appropriate EAN Member Organisation or the Uniform Code Council (UCC™).

2.6.2.2.1 EAN.UCC System Identification of Refund Receipts - Restricted Geographic Distribution (EAN.UCC Prefix 980)

The EAN.UCC Prefix 980 has been released for use with Refund Receipt data.

The internationally agreed standard for EAN.UCC System Refund Receipt data is shown in Figure 2.6.2.2.1 – 1.

Figure 2.6.2.2.1 – 1

EAN.UCC Prefix	Refund Receipt Data (Structure Determined by EAN Member Organisation or the Uniform Code Council)	Check Digit
9 8 0	N ₄ N ₅ N ₆ N ₇ N ₈ N ₉ N ₁₀ N ₁₁ N ₁₂	N ₁₃

Within this structure each EAN Member Organisation or the Uniform Code Council (UCC™) develops its own national Refund Receipt solution. The recommended structure shown in Figure 2.6.2.2.1 – 2 aims at some degree of equipment standardisation.

Formatted: Bullets and Numbering

Figure 2.6.2.2.1 – 2

Prefix	Recommended Structure	Check Digit
9 8 0	S S S S S V V V V	C

Where: S = Security number

This number is used to provide some security in the handling of the Refund Receipt. For example, it consists of a sequential number, which is incremented by 1, for each ticket generated. In this case, the Point-of-Sale system will be able to recognise a Refund Receipt that had already been refunded. The security number can also include a two-digit machine number and a three-digit sequential number, in the case where several machines are available to the customers at the same location.

V = Monetary value of the refund

The scale factor (decimal places) will depend on the currency used.

C = Check Digit

Calculated according to the standard algorithm

2.6.2.3 Symbol Marking of Refund Receipts

EAN-13 Bar Code Symbols are used with Refund Receipts.

2.6.2.4 Allocating Refund Receipts

2.6.2.4.1 General Rule

Refund Receipt specifications are flexible and have been designed to cater for current and future requirements.

Due to the nature of Refund Receipt identification, several national solutions are offered, each of which is defined by the respective EAN Member Organisation or the Uniform Code Council (UCC™). National Refund Receipt solutions are not unique worldwide and must be operated in the restricted circulation defined by the EAN Member Organisation or the UCC.

2.6.3 Electronic Serial Identifier for Cellular Mobile Telephones (CMTI): AI (8002)

2.6.3.1 Introduction

The purpose of an Electronic Serial Identifier, AI (8002), for cellular mobile telephones (CMTI) is to uniquely identify a cellular phone within a given jurisdiction.

The information from the bar code symbol can be used to automate and speed up the capture of CMTIs.

~~2.6.1.2~~2.6.3.2 Application Overview

The Cellular Mobile Telephone (CMTI) is usually assigned by a national or pluri-national authority. Issuing authorities must ensure that the Electronic Serial Identifier is unique for each cellular phone. However, because Electronic Serial Identifiers are assigned by different issuing authorities, they are not unique worldwide.

Figure 2.6.3.2 – 1 illustrates Electronic Serial Identifier, AI (8002), 123456789 carried by a UCC/EAN-128 Bar Code Symbol.

Figure 2.6.3.2 – 1



~~2.6.1.3~~2.6.3.3 Allocating Electronic Serial Identifiers: AI (8002)

An Electronic Serial Identifier, AI (8002) is assigned by the appropriate national or pluri-national body and can be carried by a bar code symbol placed directly on the cellular phone. The Electronic Serial Identifier, AI (8002), is unique for each cellular telephone within the jurisdiction of the issuing body.

Formatted: Bullets and Numbering

Formatted: Bullets and Numbering

2.6.4 Internal Applications

2.6.4.1 Introduction

The EAN.UCC System has been established as an open standard. The primary benefits derived from the EAN.UCC System are that the same bar code symbols and unique identification numbers are used by all participants in the supply chain. This significantly reduces supply chain costs by standardising the data exchanged between trading partners and allowing “label once, scan many” operations.

However, organisations that have the capability to process EAN.UCC System data may have the requirement to encode, in machine readable form, data for a company's internal purposes. The EAN.UCC System makes available the following guidelines to meet purely internal applications. The guidelines are compatible with the overall EAN.UCC System, but to avoid the possibility of causing ambiguity elsewhere in the supply chain. It is strongly recommended that any bar codes containing data for internal-use are destroyed before items carrying them leave the organisation.

2.6.4.2 Application Overview

2.6.4.2.1 Definition

An internal application is broadly defined as any numbering and symbol marking system that is restricted to within the operations of a company.

Facilities are available within the EAN.UCC System to identify items only within the operations of a company. In these cases, the identified units have a restricted distribution, as the identification numbers they bear are not unique worldwide.

2.6.4.2.2 Data Carrier

Internal application ID numbers are carried by UPC-A, EAN-13, EAN-8 or UPC-E Bar Code Symbols (using certain EAN.UCC Prefixes) or the UCC/EAN-128 Bar Code Symbol (using certain AIs).

2.6.4.3 Allocating Internal Application Numbers

Specifications for internal ID numbers are flexible and leave the choice of data structure, following the appropriate EAN.UCC Prefix or Application Identifier, completely at the discretion of the issuing organisation.

2.6.4.4 Company Internal Applications Using EAN/UPC Symbology

2.6.4.4.1 Company Internal Applications Using EAN.UCC Prefixes

Full details related to the use of EAN.UCC Prefixes 02 and 20 to 29, for internal applications, can be found in [Section 3.0](#).

Organisations wishing to use these EAN.UCC Prefixes for purely internal applications should contact their EAN Member Organisation for the guidelines prevailing in their area.

2.6.4.5 Internal Applications Using UCC/EAN-128 Symbology

In addition to the EAN.UCC Prefixes noted above, the EAN.UCC System makes available Application Identifiers for internal applications. Like all other data structures using Application Identifiers, internal application AIs may only be carried by UCC/EAN-128 Bar Code Symbols.

2.6.4.5.1 Information Mutually Agreed Between Trading Partners (Including FACT Data Identifiers: AI (90))

Element String AI (90) may be used to represent any information that has been mutually agreed between two trading partners. The agreement may include the use of FACT DIs (Data Identifiers). If a FACT DI is used, it should appear immediately after the AI (90), followed by the appropriate data. The use of FACT DIs gives little security to users.

The bar code symbol carrying this Element String should be removed from any item that leaves the jurisdiction of the trading partners. Failure to remove the symbol may cause problems if another trading partner using the same AI for a separate internal application scans the item.

2.6.4.5.2 Company Internal Information: AIs (91 to 99)

Element Strings AI (91) to (99) may contain any internal information relevant to a company's internal applications.

The bar code symbol containing these Element Strings should be removed from any item that leaves the jurisdiction of the company. Failure to remove the symbol may cause problems if a trading partner using the same AI for a separate internal application scans the item.

2.6.5 Numbering and Symbol Marking for Payment Slips

EAN International, in conjunction with representatives of banks, utility service providers, and retailers, has developed this voluntary standard for applications of bar code symbols on payment slips.

This standard is based on the use of EAN.UCC System Application Identifiers and utilises UCC/EAN-128 Bar Code Symbols. It is a complement to, and should be read in conjunction with:

- Other sections of these specifications
- *EANCOM*[®], the Electronic Data Interchange (EDI) standard providing implementation guidelines for UN/EDIFACT messages.

Organisations wishing to automate the payment process should use this standard as a basis to produce specific implementation guidelines pertinent to their application. The implementation guidelines in the following subsections consider issues such as domestic versus international payments and local banking laws.

2.6.1.42.6.5.1 Introduction

Formatted: Bullets and Numbering

2.6.5.1.1 Business Demand for the Application

The use of EAN.UCC System standards has led to major innovations in the retail sector. The EAN.UCC System family of bar code symbols has enabled automation at the Point-of-Sale (POS). Studies have shown that identifying goods with EAN.UCC System bar code symbols and ID numbers reduces the amount of time required to process a transaction, increases the accuracy of data, and enables efficient Electronic Data Interchange (EDI).

This success has led other industries to introduce the EAN.UCC System into their business processes. One such application of the EAN.UCC System is the automation of payment for billable services.

Utility companies (e.g., electricity, gas, water) and other service providers (e.g., insurance, government agencies) have sought to improve their customer service through automating the payment system. This requires that the information needed by all partners in the payment process be in a form that can be automatically captured. Bar code symbols are one of the most cost-effective means of capturing data.

The information flow that accompanies the physical payment demand is communicated between trading partners in a variety of ways; however, EDI is the most optimal means. In practice, fully automated communication channels that make it possible to rely exclusively on electronic files for retrieving information are not always available.

For this reason, there may be a need to indicate relevant information on the payment slip, in addition to an identification number of the invoicing party and a reference number for the payment slip. The various fields of information that must be communicated need to be organised in a standard way in order to facilitate their interpretation and processing by the partners involved.

2.6.5.2 Potential Benefits

The potential benefits of payment slips carrying bar code symbols include:

- For the customer (invoicee):
 - Provides flexible payment facilities. Payment can be made, for example, at banks, post offices, automatic teller machines, supermarkets, and on the Internet.
 - Increases quality in the capture of payment reference information for use in international banking
- For the issuer of the invoice (invoicing party):
 - Using bar code symbols to represent critical payment data greatly reduces the possibility of key entry error.
 - By offering customers more payment locations, the issuer of the invoice provides an increased level of service to customers.
- For the payment receiving agency:
 - The agency can use its investment in scanning technology to provide a payment collection service to customers while being able to charge the invoicing party a collection fee.
 - For retailers, the provision of such a service could provide a commercial advantage, because customers may choose to use a retailer who provides such a service over one that does not.
- For the bank:
 - Provides an opportunity to use symbol and scanning technology at the cashier's desk to process payments quickly and accurately. In addition this technology could be extended to ATM machines in bank lobbies, allowing customers to pay their bills 24 hours a day.
 - Provides an opportunity in some countries to offer new services to batch payments issued by the payment receiving agency on behalf of large invoice issuers (e.g., utility suppliers)

2.6.5.3 Application Rules

2.6.5.3.1 Definition of a Payment Slip

A payment slip is that part of a paper invoice used to facilitate payment. The payment slip covers a wide range of payment demands, such as telephone bills, electricity bills, and insurance renewals. The payment slip is normally issued by a service provider (the invoicing party) to a final customer (the invoicee) and represents a payment demand. Normally the payment slip would outline in Human Readable Interpretation:

- Details of the customer
- Details of the service provider
- A detailed invoice for the service(s) provided
- A reference number
- The amount payable
- The payment conditions (e.g., pay before date, where to pay)

2.6.5.3.2 Bar Code Symbology

The UCC/EAN-128 Bar Code Symbol is used with payment slips. They in no way replace the need for Human Readable information.

~~2.6.1.1.32~~ 2.6.5.3.3 Bar Code Symbol Information

Formatted: Bullets and Numbering

2.6.5.3.3.1 EAN.UCC Global Location Number of the Invoicing Party

The Application Identifier to indicate the EAN.UCC Global Location Number (GLN) of the invoicing party is AI (415).

The GLN of the invoicing party identifies the issuer of the payment slip. It is used as a key to access database information about the invoicing party (normally held by the payment receiving agency). The same GLN is used for all payment slips issued by the invoicing party under identical payment conditions. The GLN of the invoicing party is used by the payment receiving agency to reference the characteristics of the contract with the invoicing party, such as:

- Whether the payment can be accepted
- Contact details of the invoicing party
- Action to take if the due date has expired
- Transfer arrangement of funds to the invoicing party's bank

A different GLN shall be used whenever the payment conditions are different. For more information, see Section 2.6.A.2.

2.6.1.1.1.22.6.5.3.3.2 International Bank Account Number (IBAN): AI (8007)

The Application Identifier to indicate the International Bank Account Number (IBAN) is AI (8007).

The bank account identifier of the invoicing party is defined in ISO 13616. It is used to identify where to send the payment and, in the receiving country, which bank holds the account for international bank payment.

2.6.1.1.1.32.6.5.3.3.3 Payment Slip Reference Number: AI (8020)

The Application Identifier to indicate a Payment Slip Reference Number is AI (8020).

By their nature, payment slips need to be individually tailored for the invoicee and therefore require a unique reference number the Payment Slip Reference Number, AI (8020). Reminder notices should use the same number as the original notice. The Payment Slip Reference Number, (AI (8020)), is issued by the invoicing party and is a unique number in the system. Payment Slip Reference Numbers, AI (8020), should be sequentially allocated.

The Payment Slip Reference Number, AI (8020), uniquely identifies the payment slip when used in conjunction with the EAN.UCC Global Location Number (GLN) of the invoicing party. It is used to communicate details of payment between all the partners involved: invoicing party, invoicee, payment receiving agency, and bank(s). It is also used to access locally held information.

2.6.1.1.1.42.6.5.3.3.4 Amount Payable

There are two Application Identifiers to indicate the amount payable:

- AI (390n) = amount payable for a single monetary area
- AI (391n) = amount payable with ISO three-digit currency code

n = indicates the implied decimal point position

If the amount payable is expressed in a bar code symbol, AI (391n) should be used, as this ensures the currency of the payment can be automatically processed and verified by the system. However, if the currency is unambiguously implied by the system, AI (390n) may be used. To avoid ambiguity, only one AI encoding the amount payable shall be used, and the currency must be clearly indicated in human readable form.

Scanning systems should have the facility to override the amount payable. This functionality is required should the invoicee wish to make the minimum required payment, which could be less than the total amount due. The amount due is attribute information and, when used, must be processed with the EAN.UCC Global Location Number (GLN) of the invoicing party.

2.6.1.1.1.52.6.5.3.3.5 Due Date

The Application Identifier to indicate the due date is AI (12).

The due date indicates the date by which the invoice should be paid (by the invoicee). It is attribute information and, when used, must be processed with the EAN.UCC Global Location Number (GLN) of the invoicing party.

Note: The due date must be represented in the YYMMDD format in the bar code symbol; however the human readable data can be presented in whatever form is appropriate.

Formatted: Bullets and Numbering

Formatted: Bullets and Numbering

Formatted: Bullets and Numbering

2.6.5.4 Application Overview

2.6.5.4.1 Application Requirements

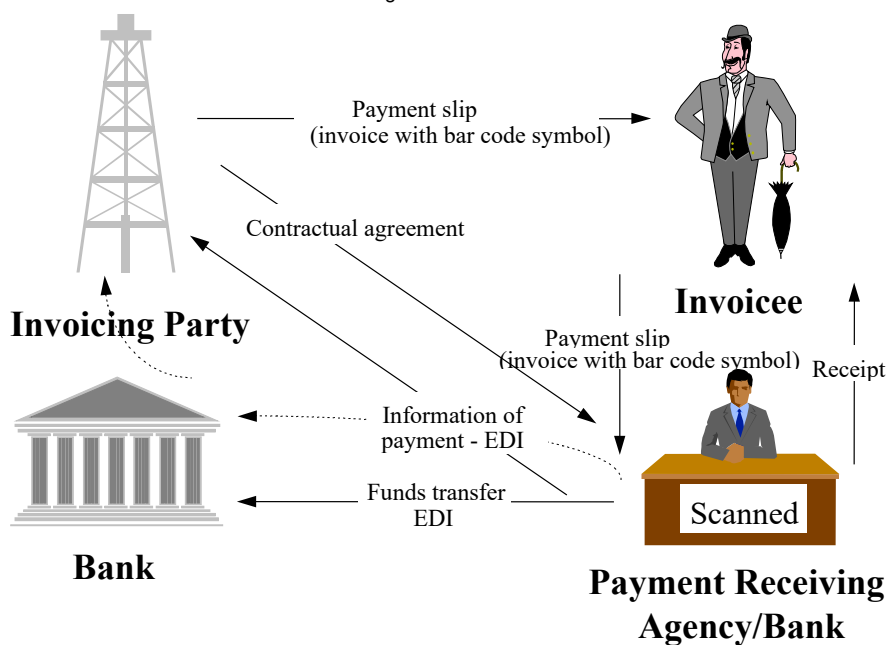
These international guidelines outline the EAN.UCC System standards for payment slips used in an open environment. The guidelines provide information on how to use bar code symbols on payment slips and how they can help automate the payment process.

Note: Legislation in certain countries may require that the payment receiving agency be a bank.

2.6.1.1.22.6.5.4.2 Overview of the Key Steps When Using Bar Code Symbols with Payment Slips

Formatted: Bullets and Numbering

Figure 2.6.5.4.2 – 1



Step 1: The invoicing party and payment receiving agency must conclude a working agreement, under the appropriate legal framework, regarding the system for receiving payment on an agency basis.

Step 2: The payment receiving agency informs and trains all receiving points on the processing of payment slips. The EAN.UCC Global Location Number (GLN) of the invoicing party is used to discriminate between payment slips that can and cannot be accepted.

Step 3: The invoicing party issues payment slips with bar code symbols to the customer (invoicee)

Step 4: The invoicee takes the payment slip to the payment receiving agency. The payment slip is scanned, the payment is made, and a receipt is issued.

Note: The working agreement between the invoicing party and payment receiving agency should cover the appropriate action if the due date has expired.

Step 5: The payment receiving agency logs all payment slips received using the Payment Slip Reference Number (8020). This information is centrally collated and transmitted to the relevant invoice issuing party directly or via the banking system after an agreed time frame. The funds are then transferred to the designated bank account.

Step 6: The invoicing party updates its database information using the Payment Slip Reference Number, AI (8020).

Note: This is a simplified model and may not be applicable in all countries or for international payments.

2.6.A.1 Appendix 1: Example of a Payment Slip

Figure 2.6.A.1 – 1

ABC-Electric Company	Mr A.N. Customer 45 Sunrise Drive Cape Town, TX 765444	PAY TO: 5412345678908 REF NO.: ABC123
Electricity consumption for period: 1 January 2001 to 31 March 2001		
Amount Payable South African Rand		
12.50		
DUE DATE 25 April 2001		

UCC/EAN-128 Symbols

To facilitate efficient scanning, all bar code symbols shall be printed at an X-dimension between 0.25 mm (0.00984 in.) and 0.495 mm (0.0195 in.) and be a minimum of 13 mm (0.5 in.) in height.

Payment slips should be carried by UCC/EAN-128 Bar Code Symbols.

Example: (415) 5412345678908

AI (415) indicates the EAN.UCC Global Location Number (GLN) of the invoicing party.

The GLN is a fixed length 13-digit number terminated by a standard Check Digit. The rules for allocating GLNs ensure that this number is unique worldwide. GLNs are used by the payment receiving agent to distinguish between payment slips that can and cannot be accepted.

Example: (12) 010425

AI (12) indicates the due date by which the payment should made.

The due date is always encoded YYMMDD; however, other formats may be used for the Human Readable Interpretation equivalent. The use of the due date is optional, but if used, the payment receiving agent and the invoicing party should agree about what action will be taken if the due date has expired.

Example: (3911) 710125

AI (3911) indicates the amount payable with ISO currency number. From ISO 4217, "710" indicates South African Rand.

It is strongly recommended to use the ISO currency number when encoding this optional data element. The fourth digit of this AI is the decimal point indicator. For example, the digit 1 in this position would indicate one digit after the decimal point; a 2 would indicate two digits after the decimal point.

Example: (8020) ABC123

AI (8020) indicates the Payment Slip Reference Number.

The Payment Slip Reference Number, AI (8020) is a mandatory data element for this application. It is processed with the GLN of the invoicing party and provides a unique reference for all communications between the payment agent and the invoicing party.

2.6.A.2 Appendix 2: Guideline on the Use of EAN.UCC Global Location Numbers

2.6.A.2.1 Introduction

On a daily basis information related to parties and locations is generated and communicated throughout the business world in vast quantities. For example, names and addresses are put on envelopes, the delivery destination is noted on transport documentation, and the bank account number of the payee is identified on an invoice. These are just a few examples of the many applications in existence that identify parties in everyday business communications.

With the advent of electronic communication, and particularly Automatic Data Capture (ADC) and Electronic Data Interchange (EDI), the need for unambiguous and globally unique identification of parties and locations has become more acute. Using bar code symbol identification rather than exclusively using alphanumeric information is key to successfully implementing an automated payment project. EAN.UCC Global Location Numbers (GLNs) offer an internationally recognised standard solution to the identification of parties and locations.

Full information on GLNs is available from the Uniform Code Council (UCC™) or the local EAN Member Organisation. This appendix presents an overview of their use with payment slips.

2.6.A.2.2 What is an EAN.UCC Global Location Number?

EAN.UCC Global Location Numbers (GLNs) are reference keys to computer files. When scanned or received in an EDI transmission, the GLN is used as the key to look up all relevant information in a computer database.

GLNs are unique, non-significant, international in their application, and have strictly defined rules assigned to them. In short, a GLN must always be numeric and have a fixed length of 13 digits. Each location number contains, in the thirteenth position, a Check Digit, which ensures the correctness of the number. Once assigned, usually the invoicing party, the GLN becomes a unique and universal reference.

2.6.A.2.3 What Information is Associated with an EAN.UCC Global Location Number?

The attributes of an EAN.UCC Global Location Number (GLN) should be established on a computer file using the GLN as the key to the information. The type of attribute information held by the payment agent might be the invoicing party's full name and address, bank details and account number, contractual payment conditions, and the action to be taken if the due date has expired. Whenever any of the attribute information changes, the invoicing party should assign a new GLN.

The use of the GLN is based on the assumption that the payment agent maintains a computer database to reference information related to the invoicing party. Where the payment agent is a bank, the invoicing parties International Bank Account Number (IBAN), AI (8007), and Payment Slip Reference Number, AI (8020), may be sufficient to process the payment.

2.6.A.2.4 Are EAN.UCC Global Location Numbers Used in EDI?

The EDIFACT Interchange Header segment (UNB) is used in all EDI interchanges complying with the EDIFACT syntax rules. The identity of the sender and receiver of the interchange must be specified in this segment. The use of EAN.UCC Global Location Numbers (GLNs) is mandatory in *EANCOM*® for the identification of EDI parties at this level.

2.6.A.2.5 How to Obtain an EAN.UCC Global Location Number

EAN.UCC Global Location Numbers (GLNs) are available through any EAN Member Organisation or the Uniform Code Council (UCC™).

2.6.A.3 Appendix 3: Introduction to the International Bank Account Number (IBAN): AI (8007)

The International Bank Account Number (IBAN), AI (8007), is defined by *ISO 13616*. The standard specifies the elements of an IBAN that are used to facilitate international processing of data in financial environments and other industries.

The IBAN is constructed using the Basic Bank Account Number (BBAN). The BBAN is the identifier used by financial institutions in individual countries as part of the national account numbers scheme. This ensures the unique identification of a customer's bank account within a country. The BBAN is used to construct the IBAN as follows:

- The first two positions (a2) shall always be filled by the two-character country code (alpha version), as defined in *ISO 3166*, of the country in which the bank branch servicing/maintaining the IBAN resides.
- The third and fourth positions (n2) shall be filled by the Check Digits as calculated from the defined scheme (see *ISO 13616*).
- In electronic transmission of the IBAN (including in bar code symbol form), the remaining positions shall be filled by the BBAN without separators or special characters (see *ISO 13616*).

Examples:

Country: Canada (ISO 3166 two-character country code = CA)

BBAN : 012323456-123 123456789012

IBAN : CA95012323456123123456789012

Country: Belgium (ISO 3166 two-character country code = BE)

BBAN : 320-0347134-41

IBAN : BE88320034713441

Note that only the financial institution that services (maintains) the account is allowed to generate its IBAN (including the Check Digit).

2.6.6 Customer Specific Articles

2.6.6.1 Introduction

The EAN.UCC System guidelines for trade items (see [Section 2.1](#)) state that each item of trade is assigned a non-significant number that uniquely identifies the item in an unrestricted environment. The same number is used to identify a series of identical items, with every variant being allocated a separate unique identification number whenever the variation is apparent and significant between partners in the supply chain or to the final user.

This system enables the use of Automatic Data Capture (ADC) and Electronic Data Interchange (EDI) in an open environment, globally. However, in a number of business sectors, because of the vast number of possible different manifestations of certain made-to-order articles, pre-allocation of Global Trade Item Numbers™ (GTINs™) at the lowest level is not feasible.

For organisations that trade in such made-to-order products, EAN International, in association with trade representatives, has developed the following guideline. This guideline has been designed to improve supply chain efficiency by enabling ADC and, in particular, efficient ordering via EDI.

This guideline is fully compatible with, and should be treated as a special case of, the EAN.UCC System recommendations for the numbering and symbol marking of trade items.

2.6.6.2 Application Overview

2.6.6.2.1 Definition

A Customer Specific Article (CSA) is broadly defined as any item where the supplier defines all possible manifestations of the article from which the customer may choose, and pre-allocation of article numbers at the lowest level is not feasible. CSAs are never made for stock, and hence are always made to order. However, made-to-order articles are not necessarily customer specific, but could be standard.

A typical example of a CSA is a chair that is available in 300 different types of upholstery for the seat, back, and armrest. This list of available upholstery could also be used for other types of furniture the supplier offers. There are 27,000,000 ordering possibilities for this chair (300 x 300 x 300). Typically the supplier's catalogue lists a generic style of chair as well as the 300 different upholstery options. The customer chooses the style of chair and selects upholstery for the seat, back, and armrest.

On receipt of order, the supplier produces the customer specific chair and makes it available to the customer. Because the supplier defines the customer's options, and because the customer must specify his or her choices based on those options, the order contains all the information the supplier requires to manufacture the chair.

This example highlights four separate process steps:

- The supplier makes available all the possible manifestations of an article.
- The customer specifies the actual article required using the supplier catalogue.
- The supplier manufactures the article in accordance with the customer's specifications.
- The CSA is delivered.

The EAN.UCC System has formalized this process, enabling efficient Automatic Data Capture (ADC) and Electronic Data Interchange (EDI) throughout the supply chain. The CSA data model is based on the assumption that the supplier defines the possible components (either in a paper or electronic catalogue) and the customer specifies the actual article required.

The processes for identifying and ordering the article are dealt with separately. Although these processes are closely related, each requires separate consideration in an open system.

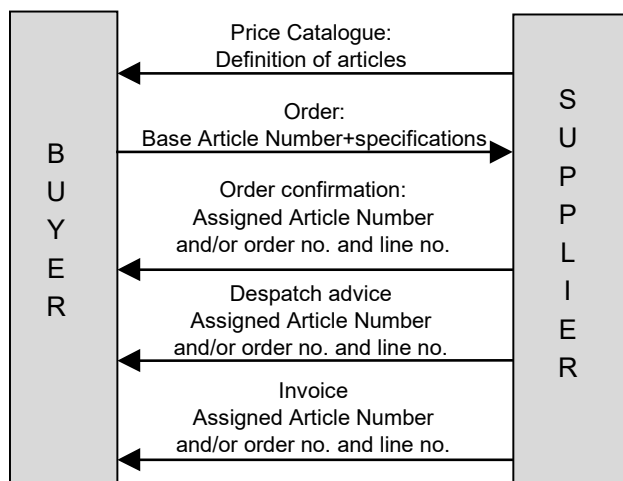
2.6.1.1-22.6.6.2.2 Customer Specific Articles Data Flow

Formatted: Bullets and Numbering

The data flow model is organised on a series of assumptions designed to ensure that the model is independent of the type of article and the sector: It is a generic model. Because many different procedures may be applied by various manufacturers, the generic model is meant to be a general guide. By using this model, companies can communicate in a standard way and (re)organise the automated handling of Customer Specific Article (CSA) specification according to this guideline.

The model assumes that the supplier informs the customer of all available ordering options and specifications. This is achieved by means of an electronic catalogue (see Figure 2.6.6.2.2 - 1). From this catalogue the customer can determine which article(s) to order. In the order message the Base Article Number and the chosen specifications are communicated.

Figure 2.6.6.2.2 – 1



In the order confirmation the supplier may confirm that the article ordered can be manufactured (that is, that the buyer has made a correct combination of specifications). This should be the case assuming the customer has up-to-date database information. The order confirmation may also be used to notify the customer of the assigned article number. The assigned article number may be used in all subsequent communications. For example, the despatch advice and invoice messages use the assigned article number and, if required, the order number plus the order line number to establish an unambiguous link with the CSA.

The article produced may not be numbered with a string of numbers representing the Base Article Number plus the applicable specifications (see [Section 2.6.6.3.3](#)).

2.6.6.3 Allocating EAN.UCC System Numbers for Customer Specific Articles

2.6.6.3.1 General Rule

Each different product must be identified by a unique number. This implies that each variant of a product is assigned a different number. For example, each different size or colour of a garment has its own individual identification number. Article numbers should be sequentially allocated for this purpose.

2.6.1.1.2.6.6.3.2 Ordering of Customer Specific Articles

The ordering process of Customer Specific Articles (CSAs), the customer specification process, is based on a supplier's catalogue definitions. Internal identification systems are often manual and become increasingly complex and prone to error as the number of trading partners increases. In addition, the use of internal codes can be cumbersome, inflexible, and prone to duplication between different suppliers. These recommendations, which are based on the open systems principle, seek to avoid internally-based systems. Catalogue products using EAN.UCC System identification numbers are guaranteed to be uniquely identifiable worldwide.

A Customer Specific Articles *EANCOM*[®] User Profile for the price catalogue (PRICAT), orders (ORDERS), and the response to order (ORDRSP) messages has been published that utilises the numbering system outlined below.

2.6.1.1.1.2.6.6.3.2.1 Base Article Number

A supplier assigned Base Article Number is given to each generic product type for ordering purposes. An EAN/UCC-13 Identification Number is used for this functionality. The EAN/UCC-13 ID Number is defined by the supplier and must be unique with respect to all other EAN.UCC System identification numbers. Because it does not identify an item, the Base Article Number will never be carried by a bar code symbol on an article. It is solely used for ordering purposes.

The Base Article Number indicates to the customer that a number of supplier defined questions have to be answered by the customer. These specifications (questions and associated answers), which are relevant to a Base Article Number, are communicated via an electronic catalogue. The specifications available for each different article are defined by the supplier.

Formatted: Bullets and Numbering

Formatted: Bullets and Numbering

2.6.1.1.1.22.6.3.2.2 Specifications

Specifications are linked to the different Base Article Numbers for the purposes of ordering. The same specifications may be used with different Base Article Numbers. Specifications fall into one of the categories described in the following subsections.

2.6.1.1.1.12.6.3.2.2.1 Option

An option is a specification with a discrete value that is pre-defined by the supplier and associated with a Base Article Number.

Each option may be identified with an EAN/UCC-13 Identification Number. The EAN/UCC-13 Identification Number is defined by the supplier and must be unique with respect to all other EAN.UCC System identification numbers. An ID number of an option will never be carried by a bar code symbol on an article. It solely is used for communication purposes.

Options, such as red leather seat cover, may be valid for different base articles.

2.6.1.1.1.12.6.3.2.2.2 Parameter

A parameter is a specification within a range of values (e.g., dimensions) ranging from a minimum to a maximum and including a step size.

Each parameter may be identified with an EAN/UCC-13 Identification Number. The EAN/UCC-13 Identification Number is defined by the supplier and must be unique with respect to all other EAN.UCC System identification numbers. The parameter identification will never be carried by a bar code symbol on an article. It is solely used for ordering purposes.

Parameters should be communicated using the standard EANCOM® syntax and should be related to a Base Article Number.

2.6.1.1.1.132.6.3.2.2.3 Part

A part is a physical article that may also be ordered separately.

Parts are identified within Global Trade Item Identification Numbers™ (GTINs™). The EAN/UCC-13 Identification Number for the part may be used in association with a Base Article Number to create a composite, an article made up of one or more individual parts.

A part may be associated with a number of different base articles.

2.6.6.3.2.2.4 External References

An external reference is often required for a customer-designed or custom-made item. External references are specified through a separate, non-EDI communication channel, such as a fax or CAD/CAM drawing. A secondary source can be used to communicate a set of customer-defined specifications (not pre-defined by the supplier).

Formatted: Bullets and Numbering

Formatted: Bullets and Numbering

Formatted: Bullets and Numbering

2.6.6.3.2.3 Data Carrier

EAN.UCC System identification numbers used to identify Customer Specific Articles (CSAs) for ordering purposes may never be carried by a bar code symbol on the physical article. However, suppliers may wish to utilise bar code scanning as part of the order process. This may be achieved by representing base articles and identification numbers in machine readable form in a paper catalogue. UCC/EAN-128 Bar Code Symbols, utilising an Application Identifier for internal applications, should be used for this purpose.

2.6.6.3.3 Identification of the Physical Article Actually Produced

In environments with automated systems the physical article needs to be identified and the identification of the produced article is required in machine readable form (as a bar code symbol). The identification of the physical article must be communicated from the supplier to the customer. Both supplier and customer should be able to use the same identification number and each needs to keep a record of this number.

For open systems, the most appropriate identification number is the EAN/UCC-13 Identification Number. Identifying a physical article with an EAN/UCC-13 ID Number and a bar code symbol allows Customer Specific Articles (CSAs) to be integrated within a system that manages all other items identified using the EAN.UCC System. During order confirmation, the supplier assigns an EAN/UCC-13 Identification Number to the product. It is not necessary to pre-assign numbers to all possible articles, only to those that are actually produced.

2.6.1.1.1.2.6.6.3.3.1 Data Carrier

The bar code symbol requirements for Customer Specific Articles (CSAs) are the same as those for trade items. The data carrier used to carry the EAN.UCC System identification number of a physical article shall be one of the following:

- EAN-13 or UPC-A Bar Code Symbol
- ITF-14 Bar Code Symbol
- UCC/EAN-128 Bar Code Symbol (attribute information always uses UCC/EAN-128 Bar Code Symbols)

With CSAs, the choice of data carrier is left to the discretion of the organisation responsible for issuing the EAN.UCC System identification number. Trade items that will be scanned at a Point-of-Sale always should be marked using the EAN/UPC Symbolology.

Formatted: Bullets and Numbering

Section 2.7:

Numbering and Symbol Marking for Very Small Healthcare Items

Table of Contents

2.7 Very Small Healthcare Items	3
2.7.1 Introduction	3
2.7.2 Scope	3
2.7.2.1 Purpose	3
2.7.2.2 Applicability	3
2.7.2.3 Who Should Use These Guidelines	3
2.7.3 References	3
2.7.4 Definitions	4
2.7.5 Marking Requirements	4
2.7.5.1 Mandatory Data Elements	5
2.7.5.2 Optional Data Elements	5
2.7.6 Data Representation	6
2.7.6.1 Syntax	6
2.7.6.1.1 RSS Containing the Mandatory GTIN™	6
2.7.6.1.2 Composite Component™ Symbol Containing Optional Data	6
2.7.6.2 Symbol Metrics	7
2.7.6.2.1 RSS	7
2.7.6.2.1.1 X-Dimension (Module Size) and Symbol Height (Y Dimension)	7
2.7.6.2.1.2 Symbol Size	7
2.7.6.2.2 Composite Component™	7
2.7.6.3 Human Readable Interpretation	8
2.7.6.3.1 RSS	8
2.7.6.3.1.1 Location	8
2.7.6.3.1.2 Font	8
2.7.6.3.1.3 Format	8
2.7.6.3.1.4 Data Overflow	8
2.7.6.3.2 Composite Component™	8
2.7.6.3.2.1 Location	8
2.7.6.3.2.2 Font	9

2.7.6.3.2.3	Format	9
2.7.6.3.2.4	Data Overflow	9
2.7.7	Print Quality	10
2.7.8	Label Location	10

2.7 Very Small Healthcare Items

2.7.1 Introduction

The Reduced Space Symbology® (RSS) and EAN.UCC Composite Symbology™ (see Section 5.5) were specially developed for applications where traditional bar codes symbols were limited or not available. At this time there use in open supply chain applications is limited by EAN.UCC to Very small healthcare items. This application guideline has been globally agreed as a standalone addition to these General EAN.UCC Specifications. Further work is underway to re-organise these General EAN.UCC Specifications to allow for flexible of new technologies according to business need. For this reason, this standalone application is not yet fully integrated with other Sections.

Very small healthcare items are an application for which there exists no encoding method today with traditional EAN.UCC bar code standards. Within the area of very small healthcare items, the unit-of-use items and unit dose items dispensed to the patient at the hospital bedside have a high importance for product identification. The lack of possibilities for automatic identification leads to high manual effort and errors during medication, documentation or at the stock control.

The following guidelines provide the current best practice for use and application of the Reduced Space and Composite Symbologies in healthcare applications with reduced space marking requirements.

2.7.2 Scope

2.7.2.1 Purpose

These guidelines provide a foundation for the implementation of RSS-14™ Stacked, RSS Limited™, RSS-14™ Stacked Omnidirectional, and Composite Symbologies in healthcare. They provide:

- Application requirements for RSS-14 Stacked, RSS Limited, RSS-14 Stacked Omnidirectional, and Composite Component Symbologies.
- Methods for evaluating RSS-14 Stacked, RSS Limited, RSS-14 Stacked Omnidirectional, and Composite Component readability and scannability.

2.7.2.2 Applicability

These guidelines are only for healthcare items. They apply to the appropriate use of RSS-14 Stacked, RSS Limited, RSS-14 Stacked Omnidirectional and Composite Component on healthcare items that are too small for other EAN.UCC System linear symbologies. The majority of uses for RSS will be on very small items, such as vials, ampoules, very small bottles, and blister packs.

2.7.2.3 Who Should Use These Guidelines

These guidelines are written for the entire healthcare supply chain, from the label printer to the healthcare provider and everyone in between. They provide sufficient information to implement this technology, assuming that the hardware and software being used supports the RSS and EAN.UCC Composite Symbology according to *ITS/99-001:1999* and *ITS/99-002:1999*.

2.7.3 References

The standards listed below are referenced in these guidelines. The relevant provisions contained in the referenced specifications constitute provisions of these guidelines.

ITS/99-001:1999	International Symbology Specification Reduced Space Symbology® (RSS)
ITS/99-002:1999	International Symbology Specification EAN.UCC Composite Symbology™
ISO/IEC 15416	Information technology – Automatic identification and data capture techniques – Bar code print quality test specification – Linear symbols
ISO 1073-2	Alphanumeric character sets for optical recognition – Part 2: Character set OCR-B – Shapes and dimensions of the printed image

2.7.4 Definitions

Terms and definitions

The terms and definitions provided here and those from the Glossary (see Section 8) apply to these guidelines:

Bar height	The dimension of a bar (line) measured from its top to its bottom.
Bar width	The thickness of a bar (line) measured from one of its edges to the other.
Bar Width Reduction / Increase	The uniform reduction / increase of each bar code symbol in the film master or digital image file to correct for anticipated bar growth / shrinkage in the imaging or printing process.
Very Small Healthcare Items	All kinds of very small pharmaceutical and medical products, mainly unit-of-use items and unit dose items, but also very small packages.
Selective Bar Height Reduction	The uniform bar height reduction of a bar code symbol in the film master or digital bar code file to correct for anticipated bar growth in the imaging or printing process.

Abbreviations

2D	Two-dimensional
CC	Composite Component
RSS	Reduced Space Symbology

2.7.5 Marking Requirements

RSS-14 Stacked, RSS Limited and RSS-14 Stacked Omnidirectional have been developed for small unit dosage/use healthcare packages and are designed to encode the GTIN. The optional Composite Component can contain additional data elements that refer to that particular item.

RSS-14 Stacked has the first priority to be used for identification of very small healthcare items. RSS Limited and RSS-14 Stacked Omnidirectional shall be used in exceptional cases for certain

application requirements. The RSS Limited can be used if the item needs a relatively long but limited height symbol. RSS-14 Stacked Omnidirectional is designed for omnidirectional scanning environments.

In general, all participants of the healthcare supply chain shall be able to read and process all of these variants of RSS symbols.

2.7.5.1 Mandatory Data Elements

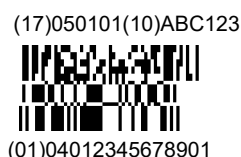
Item level marking shall contain the GTIN in the RSS-14 Stacked Symbol (or in the RSS Limited or RSS-14 Stacked Omnidirectional Symbol depending on the application requirements described above).

2.7.5.2 Optional Data Elements

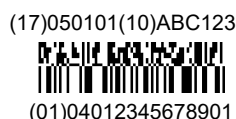
An item may also contain, if space allows, a Composite Component. At the discretion of the manufacturer, the Composite Component will contain additional information related to the product. It is recommended to use the Composite Component version A (CC-A) and to adopt the expiry date and the lot number, because they are legally required information, at least as human readable information on the item/package. Automatic handling of this data facilitates many maintenance and documentation duties. Within the Composite Component the secondary information is structured according to the rules of the UCC/EAN 128 Application Identifier Concept. Refer to the *General EAN.UCC Specifications* for complete Application Identifier information.

The Composite Component is not omnidirectionally scannable and, therefore, not suitable for omnidirectional scanning environments, particularly retail applications. Nevertheless, the automatic handling of secondary data offers several possibilities and benefits which may become important even in retail applications (e. g. scanning of best before or expiry dates, lot numbers in case of recalls, etc.).

Example¹: RSS-14 Stacked Composite Symbol, GTIN in RSS-14 Stacked, Application Identifiers (17) Expiry Date, and (10) Lot Number in Composite Component A



Example: RSS Limited Composite Symbol, GTIN in RSS Limited, Application Identifiers (17) Expiry Date, and (10) Lot Number in Composite Component A



Example: RSS-14 Stacked Omnidirectional Composite Symbol, GTIN in RSS-14 Stacked Omnidirectional, Application Identifiers (17) Expiry Date, and (10) Lot Number in Composite Component A

¹ Please note that all symbol examples shown in these guidelines are for illustration purposes and do not correspond to the metrics described in Chapter 2.6.7.6.2.1.1.



2.7.6 Data Representation

2.7.6.1 Syntax

2.7.6.1.1 RSS Containing the Mandatory GTIN™

The data syntax for the mandatory GTIN is:

- A two-digit Application Identifier (01) indicating a GTIN
- A 14 digit GTIN

As the RSS-14 Stacked, RSS Limited and RSS-14 Stacked Omnidirectional always exclusively contain a GTIN, the Application Identifier (01) indicating a GTIN is not encoded in these RSS symbols.

The 14-digit GTIN is structured as follows:

- A one-digit Indicator (value from 0 to 9). However, only 0 to 8 can be used as 9 is the variable measure prefix. The RSS Limited is restricted to the GTIN with Indicator value "0" or "1".
- The Company Prefix (designated by the responsible EAN Member Organisation or by the UCC)
- The Item Reference (designated by the holder of the Company Prefix)
- A Check Digit (calculated from the first 13 digits of the GTIN)

2.7.6.1.2 Composite Component™ Symbol Containing Optional Data

Any optional data shall be contained in the 2D Composite Component. The data syntax for each of the optional data fields is:

- A two- to four-digit Application Identifier to indicate data type and field size
- The data indicated by the Application Identifier. This may be a fixed or variable length field, depending upon the Application Identifier.

Multiple Application Identifier data elements may be concatenated in a single 2D Composite Component message. All Application Identifiers of pre-defined length² should precede the variable field Application Identifiers for the most efficient encoding in the 2D Composite Component. The FNC1 (Function Code 1) separator character shall separate variable length Application Identifier fields. Refer to the General EAN.UCC Specifications for guidelines on concatenation and for a complete list of EAN.UCC Application Identifiers.

In healthcare applications the following Application Identifier elements should be used as this data is legally required information and implies certain liabilities:

Expiry (Expiration) Date:

The data syntax for the expiry date is n2 + n6:

- A two-digit Application Identifier (17) indicating the maximum durability date
- A fixed length field of six digits indicating expiry date as YYMMDD

Lot / Batch Number:

² See Chapter 7.9.2

The data syntax for the lot number is n2 + an..20:

- A two digit Application Identifier (10) indicating lot number
- A variable length field of up to twenty alphanumeric characters of lot number data

2.7.6.2 Symbol Metrics

2.7.6.2.1 RSS

2.7.6.2.1.1 X-Dimension (Module Size) and Symbol Height (Y Dimension)

RSS Symbol	X-Dimension			Minimum Symbol Height			Quiet Zone
	Minimum	Nominal	Maximum	Minimum X	Nominal X	Maximum X	
RSS-14™ Stacked	0,17 mm (0,0067")	0,20 mm (0,008")	0,41 mm (0,016")	2,21 mm (0,087")	2,64 mm (0,104")	5,28 mm (0,208")	N. A.
RSS Limited™	0,17 mm (0,0067")	0,20 mm (0,008")	0,41 mm (0,016")	1,70 mm (0,067")	2,03 mm (0,080")	4,07 mm (0,160")	N. A.
RSS-14™ Stacked Omnidirectional	0,17 mm (0,0067")	0,20 mm (0,008")	0,41 mm (0,016")	11,73 mm (0,4623")	13,8 mm (0,552")	28,51 mm (1,104")	N. A.

2.7.6.2.1.2 Symbol Size

2.7.6.2.1.2.1 RSS-14™ Stacked

This symbol is, at minimum, 50X (50 modules) wide by 13X (13 modules) high. The top row is 5X (5 modules) high and the bottom row is 7X (7 modules) high. The separator pattern between rows is, at minimum, 1X (1 module) high. No Quiet Zones are required. The adjacent background colour can be the same as the guard bar, light on the left and dark on the right side of the symbol respectively.

2.7.6.2.1.2.2 RSS Limited™

This symbol is 74X (74 modules) wide by a minimum of 10X (10 modules) high. No Quiet Zones are required. The adjacent background colour can be the same as the guard bar, light on the left and dark on the right side of the symbol respectively.

2.7.6.2.1.2.3 RSS-14™ Stacked Omnidirectional

This symbol is, at minimum, 50X (50 modules) wide by 69X (69 modules) high. Each is 33X (33 modules) high minimum, with a 3X (3 modules) high separator pattern between the two rows. No Quiet Zones are required. The adjacent background colour can be the same as the guard bar, light on the left and dark on the right side of the symbol respectively.

2.7.6.2.2 Composite Component™

The X-dimension shall be nominally the same as the X-dimension of the associated primary RSS linear symbol. The overall dimensions of the Composite Component depend upon the data content. See *International Symbolology Specification EAN.UCC Composite Symbolology™* for details on calculating the dimension of a specific Composite Component Symbol and the allowed tolerances between the linear and the composite component.

2.7.6.3 Human Readable Interpretation

2.7.6.3.1 RSS

2.7.6.3.1.1 Location

The GTIN shall be printed in human-readable form underneath the symbol.

Example: RSS-14 Stacked Symbol containing the GTIN



2.7.6.3.1.2 Font

A clearly legible font shall be used for the human-readable digits, e. g. OCR-B as defined in *ISO 1073-2*. Reasonable alternative type fonts and character sizes are acceptable provided the interpretation is clearly legible. The font should be one that is considered as suitable and compatible with other printed materials. When necessary, the font used shall be in accordance with applicable government laws and regulations.

2.7.6.3.1.3 Format

The GTIN shall be printed as a single 14-digit number preceded by the corresponding Application Identifier (01) enclosed in a parenthesis. Although the Application Identifier (01) is not encoded in the RSS it shall be printed to ensure the consistent and unambiguous interpretation of data in the case of a Composite Symbol. The parentheses are not part of the data and are not encoded in the bar code symbol.



2.7.6.3.1.4 Data Overflow

There will be instances where there is insufficient space on the very small healthcare item for the RSS Symbol and the human readable GTIN. When this situation occurs and this information is already printed on the label because of government mandates or by trade practice, then, at the supplier's discretion, the identification number's Human Readable Interpretation requirement can be waived.

For a consistent representation of the GTIN printed independently from the symbology, the EAN.UCC data title should be used:

AI	Full Title	Data Title
01	Global Trade Item Number	GTIN

2.7.6.3.2 Composite Component™

2.7.6.3.2.1 Location

If there is sufficient space to print the human readable interpretation of the composite component, it shall be printed above the symbol in proper sequence of the Application Identifiers (the RSS Human Readable Interpretation is printed below). The data shall be printed from top to bottom and left to right. A single Application Identifier with accompanying data shall be displayed on one line and not broken into two lines.

Example: RSS-14 Stacked Composite Symbol - GTIN printed below RSS-14 Stacked, Application Identifiers (17) Expiry Date and (10) Lot Number printed above the Composite Component in one single line.



Example: RSS-14 Stacked Composite Symbol – GTIN printed below RSS-14 Stacked, Application Identifiers (17) Expiry Date and (10) Lot Number printed above the Composite Component from top to bottom and left to right.

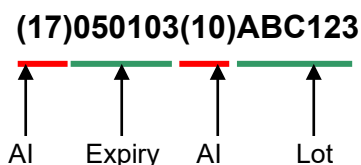


2.7.6.3.2.2 Font

The font should be one that is considered as suitable and compatible with other printed materials and the RSS Human Readable Interpretation. The font size should be scaled for easy legibility. The font used shall be in accordance with applicable government laws and regulations.

2.7.6.3.2.3 Format

The data should be printed with the proceeding AIs enclosed in parenthesis. The order of the data should be the same as encoded in the Composite Component according to the rules in the *General EAN.UCC Specifications*. The parentheses are not part of the data and are not encoded in the bar code symbol, though the AIs are.



2.7.6.3.2.4 Data Overflow

On many packages there will be insufficient space to print both the Human Readable Interpretation for RSS (GTIN) and the Composite Component information. Printing the RSS (GTIN) information shall take precedence over the Human Readable Interpretation for the Composite Component.

The GTIN, expiry date and lot number are already routinely printed on the label because of government mandates or by trade practice. In the case that there is no space for printing the encoded

data above or below the symbol, the data not belonging directly to the symbology should be consistently represented using the EAN.UCC data titles:

AI	Full Title	Data Title
01	Global Trade Item Number	GTIN
17	Maximum Durability Date	USE BY or EXPIRY
10	Batch or Lot Number	BATCH/LOT

Note: If the RSS Composite Symbol fails to scan, manual input of the data is necessary. As expiry date and lot number should always be part of the information stored in the Composite Symbol and as this information is already printed on the label because of legal requirements, a software solution can be implemented to prompt the user for this data after keying in the GTIN.

2.7.7 Print Quality

The minimum print quality grade for RSS-14 Stacked, RSS Limited and RSS-14 Stacked Omnidirectional Symbols in healthcare applications shall be a 1,5/6/660 overall symbol grade when measured in accordance with *ISO/IEC 15416*. The measurement of the quality parameters shall be made by a verifier conforming with *ISO/IEC 15416*, using a 0,15 mm (0,006 in.) aperture at a nominal illumination wavelength of 660 ± 10 nanometers. According to this standard an overall grade is shown in the form:

1,5 / 6 / 660

where

- 1,5 is the overall symbol quality grade
- 6 is the measuring aperture reference number (corresponding to an 0,15 mm or 0,006 in. diameter aperture)
- 660 is the peak response wavelength in nanometers.

For the 2D Composite Component, ink spread in the direction of the bar y-axis (perpendicular to the bar width or x direction) requires a compensating Bar Width Reduction in the y direction.

2.7.8 Label Location

General principles on placement of bar code labels are described in Section 6 and apply to the label location of RSS/Composite Symbols.

The majority of uses for RSS will be on very small items with curved surfaces such as vials, ampoules, and very small bottles. For guidance in locating the RSS/Composite Symbol on curved surfaces, refer to Section 6.2.3.2.

Examples of RSS Symbols Applied to Curved Surface



Section 3.0:

Definitions of the Element Strings

Table of Contents

3.1 Introduction.....	6
3.2 UPC-A, UPC-E, and EAN-13 Bar Code Symbols	7
3.2.1 Identification of a Fixed Measure Trade Item (GTIN)	7
3.2.2 Identification of a Trade Item for Restricted Distribution - Fixed Measure	8
3.2.3 Identification of a Trade Item Within a Company - Fixed Measure	9
3.2.4 Short Identification Number with Price or Measure of a Trade Item for Restricted Distribution	10
3.2.5 EAN.UCC Coupon Identification for Restricted Distribution	12
3.2.6 UCC Coupon Identification for Restricted Geographic Distribution	13
3.2.7 EAN.UCC Common Currency Coupon Code Identification for Restricted Distribution	14
3.2.8 EAN.UCC Identification of Refund Receipts - Restricted Distribution	15
3.3 EAN-8 Bar Code Symbols	16
3.3.1 Identification of a Fixed Measure Trade Item (GTIN)	16
3.3.2 Identification of a Trade Item Within a Company - Fixed Measure	17
3.4 Two-Digit and Five-Digit Add-On Symbols.....	18
3.4.1 Serial Number for Serial Publications.....	18
3.4.2 Supplementary Information for Books, Paperbacks, and Serials	19
3.5 ITF-14 Symbols	20
3.5.1 EAN/UCC-13 Identification Number: Identification of a Fixed Measure Trade Item (GTIN)	20

3.5.2 EAN/UCC-14 Identification Number: Identification of a Fixed Measure Trade Item (GTIN)	21
3.5.3 EAN/UCC-14 Identification of a Variable Measure Trade Item (GTIN)	22
3.6 UCC/EAN-128 Bar Code Symbols	23
3.6.1 Identification of a Logistic Unit: AI (00)	23
3.6.2 Identification of a Fixed Measure Trade Item (GTIN): AI (01)	24
3.6.3 Identification of a Variable Measure Trade Item (GTIN): AI (01).....	25
3.6.4 Identification of Trade Items Contained in a Logistic Unit - Fixed Measure: AI (02)	26
3.6.5 Identification of Trade Items Contained in a Logistic Unit - Variable Measure: AI (02)	27
3.6.6 Batch or Lot Number: AI (10).....	28
3.6.7 Production Date: AI (11).....	29
3.6.8 Due Date for Amount on Payment Slip: AI (12).....	30
3.6.9 Packaging Date: AI (13).....	31
3.6.10 Minimum Durability Date (Quality): AI (15)	32
3.6.11 Maximum Durability Date (Safety): AI (17).....	33
3.6.12 Product Variant: AI (20).....	34
3.6.13 Serial Number: AI (21)	35
3.6.14 Secondary Data for Specific Health Industry Products: AI (22).....	36
3.6.15 Lot Number (Transitional Use): AI (23n)	37
3.6.16 Additional Product Identification Assigned by the Manufacturer: AI (240).....	38
3.6.17 Customer Part Number: AI (241)	39
3.6.18 Secondary Serial Number: AI (250)	40
3.6.19 Reference to Source Entity: AI (251).....	41
3.6.20 Variable Count: AI (30)	42
3.6.21 Trade Measures: AIs (31nn, 32nn, 35nn, 36nn)	43

3.6.22 Logistic Measures: AIs (33nn, 34nn, 35nn, 36nn)	45
3.6.23 Kilograms Per Square Metre: AI (337n)	47
3.6.24 Count of Trade Items Contained in a Logistic Unit: AI (37).....	48
3.6.25 Amount Payable - Single Monetary Area: AI (390n).....	49
3.6.26 Amount Payable and ISO Currency Code: AI (391n)	50
3.6.27 Amount Payable for a Variable Measure Trade Item – Single Monetary Area: AI (392n).....	51
3.6.28 Amount Payable for a Variable Measure Trade Item and ISO Currency Code: AI (393n).....	52
3.6.29 Customer's Purchase Order Number: AI (400).....	53
3.6.30 Consignment Number: AI (401)	54
3.6.31 Shipment Identification Number: AI (402)	55
3.6.32 Routing Code: AI (403)	56
3.6.33 Ship to - Deliver to EAN.UCC Global Location Number: AI (410).....	57
3.6.34 Bill to - Invoice to EAN.UCC Global Location Number: AI (411)	58
3.6.35 Purchased from EAN.UCC Global Location Number: AI (412).....	59
3.6.36 Ship for - Deliver for - Forward to EAN.UCC Global Location Number: AI (413)	60
3.6.37 Identification of a Physical Location - EAN.UCC Global Location Number: AI (414)	61
3.6.38 EAN.UCC Global Location Number of the Invoicing Party: AI (415)	62
3.6.39 Ship to - Deliver to Postal Code Within a Single Postal Authority: AI (420).....	63
3.6.40 Ship to - Deliver to Postal Code with Three-Digit ISO Country Code: AI (421).....	64
3.6.41 Country of Origin of a Trade Item: AI (422)	65
3.6.42 Country of Initial Processing: AI (423).....	66
3.6.43 Country of Processing: AI (424)	67
3.6.44 Country of Disassembly: AI (425).....	68

3.6.45 Country Covering full Process Chain: AI (426)	69
3.6.46 Seventy Series AIs - Cautionary Note	70
3.6.46.1 NATO Stock Number (NSN): AI (7001)	70
3.6.46.2 UN/ECE Meat Carcasses and Cuts Classification: AI (7002)	71
3.6.46.3 Approval Number of Processor with Three-Digit ISO Country Code: AI (703s)	72
3.6.47 Roll Products - Width, Length, Core Diameter, Direction, Splices: AI (8001)	73
3.6.48 Cellular Mobile Telephone Identifier: AI (8002)	74
3.6.49 EAN.UCC Global Returnable Asset Identifier (GRAI): AI (8003)	75
3.6.50 EAN.UCC Global Individual Asset Identifier (GIAI): AI (8004)	76
3.6.51 Price Per Unit of Measure: AI (8005)	77
3.6.52 Identification of the Components of a Trade Item: AI (8006)	78
3.6.53 International Bank Account Number (IBAN): AI (8007)	79
3.6.54 Date and Time of Production: AI (8008)	80
3.6.55 EAN.UCC Global Service Relation Number (GSRN): AI (8018)	81
3.6.56 Payment Slip Reference Number: AI (8020)	82
3.6.57 UCC/EAN-128 Coupon Extended Code: AIs (8100 - 8102)	83
3.6.58 Information Mutually Agreed Between Trading Partners (Including FACT Data Identifiers): AI (90)	84
3.6.59 Company Internal Information: AIs (91 - 99)	85
3.6.60 Global Identifier Serialised for Trade (GIST) (AI 242)	86
3.6.60.1 Application of Global Identifier Serialised for Trade (GIST)	86
3.6.60.2 Definition of Global Identifier Serialised for Trade (GIST) (AI 242)	86
3.6.60.3 Use of Global Identifier Serialised for Trade (GIST) with other EAN.UCC keys	87
3.A.1 Appendix 1: Check Digit Calculations	88
3.A.1.1 Standard Check Digit Calculations for EAN.UCC Data Structures	88
3.A.1.2 Check Digit Calculation for Price/Weight Fields	89

3.A.1.3 Check Digit Calculation for the Four-Digit Price Field	90
3.A.1.4 Check Digit Calculation for the Five-Digit Price Field	91
3.A.2 Appendix 2: UCC-12 Identification Numbers in a UPC-E Bar Code Symbol	92
3.A.3 Appendix 3: The International Standard ISO/IEC 646	95
3.A.4 Appendix 4: EAN.UCC Data Titles	96
3.A.4.1 All Application Identifiers	96
3.A.4.2 Metric Trade Measures	99
3.A.4.4 Metric Logistic Measures	101
3.A.4.5 Non-Metric Logistic Measures	102
3.A.5 Appendix 5: Determination of Century in Dates	103

3.1 Introduction

This section describes the meaning, structure, and function of the EAN.UCC System Element Strings so they can be correctly processed in users' application programmes.

Automatic processing of Element Strings in business applications requires information about the type of transaction to which the transferred data refers. See [Section 7.0](#) for an explanation of this process. [Section 4.0](#) provides details on associations between Element Strings. Element Strings are grouped according to their symbology identifier (see Section 5.0 for details on symbology identifiers)

3.2 UPC-A, UPC-E, and EAN-13 Bar Code Symbols

This section describes Element Strings that begin with symbology identifier JE0.

3.4.13.2.1 Identification of a Fixed Measure Trade Item (GTIN)

This Element String is based on the UCC-12 or EAN/UCC-13 Data Structure (see Section 1.3).

Figure 3.2.1 – 1

Format of the Element String														
EAN.UCC Company Prefix →										← Item Reference				Check Digit
(EAN/UCC-13)	N ₁	N ₂	N ₃	N ₄	N ₅	N ₆	N ₇	N ₈	N ₉	N ₁₀	N ₁₁	N ₁₂	N ₁₃	
(UCC-12)	0	N ₁	N ₂	N ₃	N ₄	N ₅	N ₆	N ₇	N ₈	N ₉	N ₁₀	N ₁₁	N ₁₂	

The EAN.UCC Company Prefix is allocated by either the Uniform Code Council (UCC™) or an EAN Member Organisation to a system user. It makes the ID number unique worldwide but does not identify the origin of the item. EAN.UCC Company Prefixes starting with EAN.UCC Prefixes* 000 to 019, 030 to 039, 060 to 099, 100 to 139, 300 to 969, or 977 to 979 in the first three digits are used in this Element String.

The Item Reference is assigned by the system user, who must observe the rules in Section 2.1.

The Check Digit is explained in Section 3.A.1. Its verification, carried out automatically by the bar code reader, ensures that the number is correctly composed.

The data carriers for this Element String are:

- UPC-A Bar Code Symbol (carrying a UCC-12 ID Number)
- UPC-E Bar Code Symbol** (carrying a UCC-12 ID Number)
- EAN-13 Bar Code Symbol (carrying an EAN/UCC-13 ID Number)

The system recognises this Element String by the symbology identifier JE0 and the EAN.UCC Prefixes starting with 000 to 019, 030 to 039, 060 to 099, 100 to 139, 300 to 969, or 977 to 979.

The data transmitted from the bar code reader means that one Fixed Measure Trade Item with an EAN/UCC-13 ID Number has been captured.

GTIN format of this number for processing in a 14-digit field	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆	T ₇	T ₈	T ₉	T ₁₀	T ₁₁	T ₁₂	T ₁₃	T ₁₄
	0	N ₁	N ₂	N ₃	N ₄	N ₅	N ₆	N ₇	N ₈	N ₉	N ₁₀	N ₁₁	N ₁₂	N ₁₃
	0	0	N ₁	N ₂	N ₃	N ₄	N ₅	N ₆	N ₇	N ₈	N ₉	N ₁₀	N ₁₁	N ₁₂

* Some EAN.UCC Prefixes require Element Strings be constructed according to particular rules, which can be found in Sections 3.2.4 and 2.1.2.1.3.

**For information on representing an ID number in a UPC-E Bar Code Symbol, see Section 3.A.2.

3.2.2 Identification of a Trade Item for Restricted Distribution - Fixed Measure

Although this Element String is mainly used for the identification of trade items, it may be used for any purpose as long as it is kept within a restricted environment (see [Section 2.6.4.4](#)).

This Element String is for use within the Uniform Code Council's (UCC™) or an EAN Member Organisation's geographic region. The UCC or EAN Member Organisation may assign a company an EAN.UCC Prefix for use externally throughout a region or may assign the prefix for use internally within a region. The numbers are never unique if they leave the region and, if assigned for a company's internal use, are not unique if they leave the company or region.

Figure 3.2.2 – 1

Format of the Element String													
EAN.UCC Prefix		Item Reference										Check Digit	
2	N ₂	N ₃	N ₄	N ₅	N ₆	N ₇	N ₈	N ₉	N ₁₀	N ₁₁	N ₁₂	N ₁₃	

The EAN.UCC Prefix must be in the series 20 to 29. A particular prefix may be assigned either for use on Fixed Measure Trade Items for restricted distribution, Variable Measure Trade Items (see [Section 3.2.4](#)), or for special applications (see [Section 2.6.4.4](#)).

The Item Reference is assigned by the company that uses the Element String. Positions N₃ to N₁₂ may contain any digit.

The Check Digit is explained in [Section 3.A.1](#). Its verification, carried out automatically by the bar code reader, ensures that the number is correctly composed.

The data carrier for this Element String is an EAN-13 Bar Code Symbol.

The system recognises this Element String by the symbology identifier JE0 and the EAN.UCC Prefix assigned by the relevant EAN Member Organisation or the UCC.

The data transmitted from the bar code reader means that one Fixed Measure Trade Item with an EAN/UCC-13 ID Number has been captured.

The format of this number for processing in a 14-digit field

T ₁	T ₂	T ₃	T ₄	T ₅	T ₆	T ₇	T ₈	T ₉	T ₁₀	T ₁₁	T ₁₂	T ₁₃	T ₁₄
0	N ₁	N ₂	N ₃	N ₄	N ₅	N ₆	N ₇	N ₈	N ₉	N ₁₀	N ₁₁	N ₁₂	N ₁₃

3.2.3 Identification of a Trade Item Within a Company - Fixed Measure

Although this Element String is mainly used for the identification of trade items, it may be used for any purpose as long as it is kept within a restricted environment (see [Section 2.6.4.4](#)).

This Element String is for a company's internal use. Because any company may use this Element String, it does not provide unique identification of a trade item if it leaves the company's premises.

Figure 3.2.3 – 1

Format of the Element String													
EAN.UCC Prefix		Item Reference										Check Digit	
0	4	N ₃	N ₄	N ₅	N ₆	N ₇	N ₈	N ₉	N ₁₀	N ₁₁	N ₁₂	N ₁₃	
0	0	0	I ₄	N ₅	N ₆	N ₇	N ₈	N ₉	N ₁₀	N ₁₁	N ₁₂	N ₁₃	

The EAN.UCC Prefix 04 is a system identifier showing that the identification number is under the sole control of the assigning company and that it is for internal trade item distribution. The same applies to EAN.UCC Prefix 00 when I₄ has any value from 1 to 7.

The Item Reference is assigned by the company that uses the Element String. Positions N₃ to N₁₂ may contain any digit.

The Check Digit is explained in [Section 3.A.1](#). Its verification, carried out automatically by the bar code reader, ensures that the number is correctly composed.

The data carrier for this Element String is the UPC-A Bar Code Symbol.

The system recognises this Element String by the symbology identifier JE0 and EAN.UCC Prefix 04 or 00 with the digits 01 to 07 in the next two positions.

The data transmitted from the bar code reader means that one Fixed Measure Trade Item with an EAN/UCC-13 ID Number has been captured.

The formats of these numbers for processing in a 14-digit field

T ₁	T ₂	T ₃	T ₄	T ₅	T ₆	T ₇	T ₈	T ₉	T ₁₀	T ₁₁	T ₁₂	T ₁₃	T ₁₄
0	0	4	N ₃	N ₄	N ₅	N ₆	N ₇	N ₈	N ₉	N ₁₀	N ₁₁	N ₁₂	N ₁₃
0	0	0	0	I ₄	N ₅	N ₆	N ₇	N ₈	N ₉	N ₁₀	N ₁₁	N ₁₂	N ₁₃

3.2.4 Short Identification Number with Price or Measure of a Trade Item for Restricted Distribution

The first row in Figure 3.2.4 – 1 shows the structure specified by the Uniform Code Council (UCC™) for North America. The same structure is used by many EAN Member Organisations. The next two rows do not show predetermined structures. Examples of recommended structures are given in Figure 3.2.4 – 2. EAN Member Organisations choose appropriate structures for use within their geographic area.

Figure 3.2.4 – 1

Format of the Element String

EAN.UCC Prefix	Item Reference	Price Verifier-Digit	Item Price	Check Digit
0 2	N ₃ N ₄ N ₅ N ₆ N ₇	N ₈	N ₉ N ₁₀ N ₁₁ N ₁₂	N ₁₃
0 2	N ₃ N ₄ N ₅ N ₆ N ₇ N ₈ N ₉ N ₁₀ N ₁₁ N ₁₂			N ₁₃
2 N ₂	N ₃ N ₄ N ₅ N ₆ N ₇ N ₈ N ₉ N ₁₀ N ₁₁ N ₁₂			N ₁₃

The EAN.UCC Prefix must be 02 or 20 to 29. EAN.UCC Prefixes 20 to 29 may be assigned for use on restricted distribution Variable Measure Trade Items with price or measure (see [Section 2.6.4](#)).

The Item Reference is usually assigned by the company that scans the Element String at its Point-of-Sale. However, some countries may specify their own standard numbering systems for variable measure products administered by their EAN Member Organisation or by a trade association.

The price verifier-digit is the result of a special calculation, and its verification ensures correct reading of the price. For details, see [Section 3.A.1](#). Security of reading this Element String without a price verifier-digit depends on the Element String's Check Digit (see [Section 3.A.1](#)).

The item price is the price of the trade item in the relevant currency with an implied decimal point defined by the trading partners, EAN Member Organisation, or the UCC. A different format is required for each position of the implied decimal point. Multiple formats require an unambiguous way to differentiate each format, and separate EAN.UCC Prefixes may be assigned to accomplish this.

The Check Digit is explained in [Section 3.A.1](#). Its verification, carried out automatically by the bar code reader, ensures that the data corresponds with the verification rules.

Figure 3.2.4 – 2

Examples of Alternative Data Structures		
Item Reference	Price verifier-digit	Item price
Item Reference		Item price
Item Reference	Measure verifier-digit	Item measure
Item Reference		Item measure

When the price (or weight) of an item is encoded using this Element String, a price verifier-digit or a measure verifier-digit should be used. The measure verifier-digit is calculated from the digits in the item measure field in the same way that the price verifier-digit is calculated from the item price digits (see [Section 3.A.1](#)).

The item measure is a measurement of the trade item with a defined unit of measure and an implied decimal point position. The unit of measure and decimal point position are defined within the relevant geographic area for each EAN.UCC Prefix and/or format code. The item measure may be weight only if local weights and measures regulations permit.

The data carriers for this Element String are:

- UPC-A Bar Code Symbols
- EAN-13 Bar Code Symbols

The system recognises this Element String by the symbology identifier JE0, the EAN.UCC Prefix 02 or 20 to 29, and the structure defined by the EAN Member Organisation in which it is operating. Note that some of the prefixes 20 to 29 may have been assigned by EAN Member Organisations to the Element String as described in [Section 3.2.2](#).

The data transmitted from the bar code reader means that data about a Variable Measure Trade Item has been captured. The bar code reader normally performs the price verifier-digit and the measure verifier-digit calculation. Failing this, the calculation must take place in the application software.

The formats of these numbers for processing in a 14-digit field

T ₁	T ₂	T ₃	T ₄	T ₅	T ₆	T ₇	T ₈	T ₉	T ₁₀	T ₁₁	T ₁₂	T ₁₃	T ₁₄
0	0	2	N ₃	N ₄	N ₅	N ₆	N ₇	0	0	0	0	0	C *
0	0	2	Item Reference								Zeros		C *
0	2	N ₂	Item Reference								Zeros		C *

* The Check Digit is to be recalculated.

3.2.5 EAN.UCC Coupon Identification for Restricted Distribution

A coupon is a voucher with a cash value that is deducted at the Point-of-Sale. It is sometimes associated with a specific trade item. Coupon identification is organised on a national level and is therefore not unique worldwide. The specification of the coupon data structure in the Element String is the responsibility of the Uniform Code Council (UCC™) and each EAN Member Organisation.

Figure 3.2.5 – 1

Format of the Element String												
EAN.UCC Prefix		Coupon Data										Check Digit
9	9	N ₃	N ₄	N ₅	N ₆	N ₇	N ₈	N ₉	N ₁₀	N ₁₁	N ₁₂	N ₁₃

The EAN.UCC Prefix 99 denotes the Element String for EAN.UCC coupon identification.

The structure of the coupon data field is determined according to the needs of a particular country. Mandatory components are the coupon issuer number and the coupon reference number. Other useful data are the redemption value in real or encoded format and codes for the decimal point or tax rates.

The Check Digit is explained in [Section 3.A.1](#). Its verification, carried out automatically by the bar code reader, ensures that the data corresponds with the verification rules.

The data carrier for this Element String is the EAN-13 Bar Code Symbol.

The system recognises this Element String by the symbology identifier JE0 and the EAN.UCC Prefix.

The data transmitted from the bar code reader means that the data of a coupon has been captured. Processing of coupons at a Point-of-Sale usually consists of validity checks and deduction of its value.

3.2.6 UCC Coupon Identification for Restricted Geographic Distribution

Uniform Code Council (UCC™) coupon identification consists of the actual coupon identification data and supplementary information represented in a UCC/EAN-128 Coupon Extended Code. The *Application Standard for UCC Coupon Codes* provides detailed information on data contents and applied codes.

Note: UCC coupon identification is used in the United States and Canada and cannot be used beyond their boundaries.

Figure 3.2.6 – 1

Format of the Element String				
UCC Prefix	Company Number	Family Code	Value Code	Check Digit
5	N ₂ N ₃ N ₄ N ₅ N ₆	N ₇ N ₈ N ₉	N ₁₀ N ₁₁	N ₁₂

The UCC Prefix 5 denotes the Element String for UCC coupon identification.

The Company Number is that of the company issuing the coupon for redemption if a product symbol marked with the same Company Number in the item identification number has been purchased.

The Family Code is used to validate the coupon.

The Value Code is the redemption value of the coupon in encoded format.

The Check Digit is explained in [Section 3.A.1](#). Its verification, carried out automatically by the bar code reader, ensures that the data corresponds with the verification rules.

The data carrier for this Element String is the UPC-A Bar Code Symbol.

The system recognises this Element String by the symbology identifier JE0 and the UCC Prefix 5.

Note: The Company Number N₂ to N₆ uses the implied UCC Prefix 0 (zero). If the coupon is applicable to a Global Trade Item Number™ (GTIN™) beginning with a UCC Prefix other than zero, an AI (8100) to (8102) (UCC/EAN-128 Coupon Extended Code) must be present.

3.2.7 EAN.UCC Common Currency Coupon Code Identification for Restricted Distribution

A coupon is a voucher with a cash value that is deducted at the Point-of-Sale. It is sometimes associated with a specific trade item. Coupon identification is normally organised on a national level using the EAN.UCC Prefix 99. However, for a common currency area, coupon identification is organised between participating countries. Determining the coupon data structure in the Element String is the responsibility of all the EAN Member Organisations in the common currency area.

Figure 3.2.7 – 1

Format of the Element String												
EAN.UCC Prefix			Coupon Data									
9	8	1	N ₄	N ₅	N ₆	N ₇	N ₈	N ₉	N ₁₀	N ₁₁	N ₁₂	N ₁₃
9	8	2	N ₄	N ₅	N ₆	N ₇	N ₈	N ₉	N ₁₀	N ₁₁	N ₁₂	N ₁₃

The EAN.UCC Prefixes 981 and 982 denote the Element String for EAN.UCC Common Currency Coupon Numbers.

The structure of the coupon data positions is determined according to the needs of a particular set of countries. Mandatory components are the coupon issuer number and the coupon reference number. Further useful data is the redemption value in real or encoded format and numbers for the decimal point or tax rates.

The Check Digit is explained in [Section 3.A.1](#). Its verification, carried out automatically by the bar code reader, ensures that the data corresponds with the verification rules.

The data carrier for this Element String is the EAN-13 Bar Code Symbol.

The system recognises this Element String by the symbology identifier JEO and the EAN.UCC Prefix. The data transmitted from the bar code reader means that the data of a common currency coupon has been captured. Processing of coupons at a Point-of-Sale usually consists of validity checks and deduction of its value.

The only application of EAN.UCC Prefixes 981 and 982 are for the euro. The euro is a currency that began to replace the national currencies of some countries on 1 January 1999. A migration period of several years is planned, with notes and coins being introduced in 2002. Within the euro-areas, coupon issuer numbers are administered by:

EAN BELGIUM•LUXEMBOURG
Rue Royale 29, B-1000 Brussels, BELGIUM
Tel: + 32.2.229.18.80, Fax: + 32.2.217.43.47,
Email: info@eanbelgilux.be

3.2.8 EAN.UCC Identification of Refund Receipts - Restricted Distribution

Refund Receipts are vouchers produced by equipment handling empty containers (bottles and crates), automatically. These receipts have a cash value that is refunded when the receipt is scanned at the Point-of-Sale.

Figure 3.2.8 – 1

Format of the Element String													
EAN.UCC Prefix	Identification						Value					Check Digit	
	9	8	0	N ₄	N ₅	N ₆	N ₇	N ₈	N ₉	N ₁₀	N ₁₁		N ₁₂
9	8	0		N ₄	N ₅	N ₆	N ₇	N ₈	N ₉	N ₁₀	N ₁₁	N ₁₂	N ₁₃

The EAN.UCC Prefix 980 denotes the Element String for the identification of Refund Receipts.

The identification and value positions contain an identification number and the value of the voucher. It may be structured by a particular system user to meet his needs or by the Uniform Code Council (UCC™) or an EAN Member Organisation as a standard for its sphere of jurisdiction. The identification number may be of any structure and shall provide a certain protection against invalid redemption.

The Check Digit is explained in [Section 3.A.1](#). Its verification, carried out automatically by the bar code reader, ensures that the data corresponds with the verification rules.

The data carrier for this Element String is the EAN-13 Bar Code Symbol.

The system recognises this Element String by the symbology identifier JE0 and the EAN.UCC Prefix 980.

The data transmitted from the bar code reader means that the data of a Refund Receipt has been captured.

3.3 EAN-8 Bar Code Symbols

This section describes the full strings beginning with symbology identifier J|E4 (EAN-8 Bar Code Symbol).

3.4.13.3.1 Identification of a Fixed Measure Trade Item (GTIN)

Formatted: Bullets and Numbering

This Element String is based on the EAN/UCC-8 Data Structure (see [Section 1.3](#)).

Figure 3.3.1 – 1

Format of the Element String							
EAN/UCC-8 Prefix			Item Reference				Check Digit
N ₁	N ₂	N ₃	N ₄	N ₅	N ₆	N ₇	N ₈

The EAN/UCC-8 Prefix is a one-, two-, or three-digit index number, co-administered by EAN International and the Uniform Code Council (UCC™). It does not identify the origin of the item. EAN.UCC Prefixes 100 to 139 and 300 to 969 in positions N₁ to N₃ are used in this Element String. Others may be added in the future.

The Item Reference is assigned by the EAN Member Organisation or UCC. The UCC and the EAN Member Organisations provide procedures for obtaining EAN/UCC-8 Identification Numbers.

The Check Digit is explained in [Section 3.A.1](#). Its verification, carried out automatically by the bar code reader, ensures that the number is correctly composed.

The data carrier for this Element String is the EAN-8 Bar Code Symbol.

The system recognises this Element String by the symbology identifier J|E4 and by N₁ not being 0 or 2.

The data transmitted from the bar code reader means that one Fixed Measure Trade Item with an EAN/UCC-8 ID Number has been captured.

GTIN format of this number for	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆	T ₇	T ₈	T ₉	T ₁₀	T ₁₁	T ₁₂	T ₁₃	T ₁₄
processing in a 14-digit field	0	0	0	0	0	0	N ₁	N ₂	N ₃	N ₄	N ₅	N ₆	N ₇	N ₈

3.3.2 Identification of a Trade Item Within a Company - Fixed Measure

Although this Element String is mainly used for identifying trade items, it may be used for any purpose as long as it is kept within a restricted environment (see [Section 2.6.4.4](#)).

This Element String is for internal use in a company. The numbers are assigned by individual companies and do not provide unique identification if they leave the company premises.

Figure 3.3.2 – 1

Format of the Element String							
EAN/UCC-8 Prefix	Item Reference						Check Digit
N ₁	N ₂	N ₃	N ₄	N ₅	N ₆	N ₇	N ₈

The EAN/UCC-8 Prefixes 0 or 2 are system identifiers that show that the item identification number is under the sole control of the assigning company and that it is for internal item distribution.

The Item Reference is allocated by the company that uses the Element String. The positions N₂ to N₇ may contain any digit.

The Check Digit is explained in [Section 3.A.1](#). Its verification, carried out automatically by the bar code reader, ensures that the number is correctly composed.

The data carrier for this Element String is the EAN-8 Bar Code Symbol.

The system recognises this Element String by the symbology identifier JE4 and by N₁ being 0 or 2.

The data transmitted from the bar code reader means that one Fixed Measure Trade Item with an EAN/UCC-8 ID Number has been captured.

The format of this number for processing in a 14-digit field

T ₁	T ₂	T ₃	T ₄	T ₅	T ₆	T ₇	T ₈	T ₉	T ₁₀	T ₁₁	T ₁₂	T ₁₃	T ₁₄
0	0	0	0	0	0	N ₁	N ₂	N ₃	N ₄	N ₅	N ₆	N ₇	N ₈

3.4 Two-Digit and Five-Digit Add-On Symbols

This section describes the full strings beginning with symbology identifier JE1 (two-digit Add-On Symbol) and JE2 (five-digit Add-On Symbol).

These Element Strings may be transmitted with the data normally following the symbology identifier JE0, in which case the symbology identifier JE1 (two-digit Add-On Symbol) or JE2 (five-digit Add-On Symbol) is required. A single full string with the symbology identifier JE3 is followed by the data from the main symbol and the Add-On Symbol (see Section 5.0).

3.4.13.4.1 Serial Number for Serial Publications

A serial publication is identified by a trade item number as described in Section 2.1.2.1.5.5. Together the item identification number and serial number identify a particular issue of a particular serial publication.

Figure 3.4.1 – 1

Format of the Element String	
Serial Number for Serial Publications	
N ₁	N ₂

The serial number for serial publications always refers to the corresponding item identification number and has meaning as described in Figure 3.4.1 – 2.

Figure 3.4.1 – 2

Appearance	Applied Serial Numbers
Daily	Number of the week (01 - 53)
Weekly	Number of the week (01 - 53)
Bi-weekly	Number of the first week of the covered period (01 - 53)
Monthly	Number of the month (01 - 12)
Bi-monthly	Number of the first month of the covered period (01 - 12)
Quarterly	Number of the first month of the covered period (01 - 12)
Seasonally	N ₁ = last digit of the year N ₂ = 1 summer, 2 autumn, 3 winter, 4 spring
Bi-annually	N ₁ = last digit of the year N ₂ = number of the first season of the covered period
Annually	N ₁ = last digit of the year N ₂ = digit 5
Special intervals	Consecutively numbered from 01 - 99

The data carrier for this Element String is the two-digit Add-On Symbol.

The system recognises this Element String by the symbology identifier JE1. The two-digit Add-On Symbol must be jointly used with a UPC-A, UPC-E, or EAN-13 Bar Code Symbol. It is never scanned alone, and the data from both bar code symbols can be used together for processing.

Formatted: Bullets and Numbering

3.1.23.4.2 Supplementary Information for Books, Paperbacks, and Serials

Books, paperbacks, and serial publications are identified by a Global Trade Item Number™ (GTIN™) as described in [Section 2.1.2.1.5](#). This Element String provides more information about a particular publication of the printed item, but it is not required for the identification of the title itself.

Figure 3.4.2 – 1

Format of the Element String				
Supplementary Information				
N ₁	N ₂	N ₃	N ₄	N ₅

The supplementary information consists of numeric data of any structure and meaning. It is the publisher's responsibility to define the numbering scheme.

The data carrier for this Element String is the two-digit Add-On Symbol.

The system recognises this Element String by the symbology identifier JE2. The two-digit Add-On Symbol must be jointly used with a UPC-A, UPC-E or EAN-13 Bar Code Symbol. It is never scanned alone, and the data from both bar code symbols can be used together for processing.

3.5 ITF-14 Symbols

This section describes the full strings beginning with symbology identifier J11.

The J11 symbology identifier not only indicates that an ITF-14 Symbol has been scanned but that the bar code reader has verified the Check Digit. If the bar code reader has not been set to verify the Check Digit, the symbology identifier will be J10. If this is the case, Check Digit verification must be carried out in the application programme.

3.4.13.5.1 EAN/UCC-13 Identification Number: Identification of a Fixed Measure Trade Item (GTIN)

Formatted: Bullets and Numbering

This Element String is based on the UCC-12 or EAN/UCC-13 Data Structure (see Section 1.3).

Figure 3.5.1 – 1

(EAN/UCC-13)	Format of the Element String													
	EAN.UCC Company Prefix and Item Reference													Check Digit
	0	N ₁	N ₂	N ₃	N ₄	N ₅	N ₆	N ₇	N ₈	N ₉	N ₁₀	N ₁₁	N ₁₂	N ₁₃
	0	0	N ₁	N ₂	N ₃	N ₄	N ₅	N ₆	N ₇	N ₈	N ₉	N ₁₀	N ₁₁	N ₁₂
(UCC-12)														

The EAN.UCC Company Prefix is allocated by either the Uniform Code Council (UCC™) or an EAN International Member Organisation to a system user. The Item Reference is assigned by the system user, who must observe the rules in Section 2.1. Leading zeros are used to create a 14-digit number, which is required by the data carrier.

The Check Digit is explained in Section 3.A.1. Its verification, usually carried out automatically by the bar code reader, ensures that the number is correctly composed. The symbology identifier shows whether or not the Check Digit has been validated. If it has not, the Check Digit verification must be programmed in the application software.

The data carrier for this Element String is the ITF-14 Bar Code Symbol.

The system recognises this Element String by the symbology identifier J11 and the number of the decoded digits (14).

The data transmitted from the bar code reader means that one Fixed Measure Trade Item with either an EAN/UCC-13 ID Number or a UCC-12 ID Number has been captured.

This Element String might not be supported at the Point-of-Sale.

GTIN format of this number for processing in a 14-digit field	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆	T ₇	T ₈	T ₉	T ₁₀	T ₁₁	T ₁₂	T ₁₃	T ₁₄
	0	N ₁	N ₂	N ₃	N ₄	N ₅	N ₆	N ₇	N ₈	N ₉	N ₁₀	N ₁₁	N ₁₂	N ₁₃
	0	0	N ₁	N ₂	N ₃	N ₄	N ₅	N ₆	N ₇	N ₈	N ₉	N ₁₀	N ₁₁	N ₁₂

3.5.2 EAN/UCC-14 Identification Number: Identification of a Fixed Measure Trade Item (GTIN)

This Element String is based on the EAN/UCC-14 Data Structure (see [Section 1.3](#)). It may only be used for the identification of trade items that contain two or more trade items that share the same identification number.

Figure 3.5.2 – 1

	Format of the Element String														
	Global Trade Item Number™ (GTIN™)														
	Indicator	GTIN of Contained Trade Items (Without Check Digit)												Check Digit	
	(EAN/UCC-8)	N ₁	0	0	0	0	0	N ₇	N ₈	N ₉	N ₁₀	N ₁₁	N ₁₂	N ₁₃	N ₁₄
	(UCC-12)	N ₁	0	N ₃	N ₄	N ₅	N ₆	N ₇	N ₈	N ₉	N ₁₀	N ₁₁	N ₁₂	N ₁₃	N ₁₄
(EAN/UCC-13)	N ₁	N ₂	N ₃	N ₄	N ₅	N ₆	N ₇	N ₈	N ₉	N ₁₀	N ₁₁	N ₁₂	N ₁₃	N ₁₄	

The Indicator is a digit with a value of 1 to 8. It is assigned as required by the company that constructs the identification number. It can provide up to eight separate EAN/UCC-14 Identification Numbers to identify groupings of trade items.

The GTIN of the trade items contained must always be the EAN/UCC-13, UCC-12, or EAN/UCC-8 Identification Number of the relevant level of packaging contained, usually the lowest level. GTINs for restricted distribution must not be used in this Element String.

The Check Digit is explained in [Section 3.A.1](#). Its verification, usually carried out automatically by the bar code reader, ensures that the number is correctly composed. The symbology identifier shows whether or not the Check Digit has been validated. If it has not, the Check Digit calculation must be programmed in the application software.

The data carrier for this Element String is the ITF-14 Bar Code Symbol.

The system recognises this Element String by the symbology identifier]I1 and the number of digits decoded (14).

The data transmitted from the bar code reader means that one Fixed Measure Trade Item with a GTIN has been captured. It is important that the EAN/UCC-14 Identification Number is always processed in its entirety.

This Element String might not be supported at the Point-of-Sale.

GTIN format of this number for

T ₁	T ₂	T ₃	T ₄	T ₅	T ₆	T ₇	T ₈	T ₉	T ₁₀	T ₁₁	T ₁₂	T ₁₃	T ₁₄
N ₁	N ₂	N ₃	N ₄	N ₅	N ₆	N ₇	N ₈	N ₉	N ₁₀	N ₁₁	N ₁₂	N ₁₃	N ₁₄

processing in a 14-digit field

3.5.3 EAN/UCC-14 Identification of a Variable Measure Trade Item (GTIN)

The identification of a Variable Measure Trade Item is usually represented in Element Strings using Application Identifiers as described in Sections 3.6.3, 3.6.20, and 3.6.21.

The Element String described in this section is an alternative that may be adequate in circumstances where an ITF-14 Symbol must be used to represent the identification number of the trade item.

Figure 3.5.3 – 1

Format of the Element String			
Global Trade Item Number™ (GTIN™)			
Indicator	EAN.UCC Company Prefix →	← Item Reference	Check digit
(UCC-12)	9	0 N ₃ N ₄ N ₅ N ₆ N ₇ N ₈ N ₉ N ₁₀ N ₁₁ N ₁₂ N ₁₃	N ₁₄
(EAN/UCC-13)	9	N ₂ N ₃ N ₄ N ₅ N ₆ N ₇ N ₈ N ₉ N ₁₀ N ₁₁ N ₁₂ N ₁₃	N ₁₄

The digit 9 in the Indicator position indicates that the identification number is for a Variable Measure Trade Item.

The EAN.UCC Company Prefix and the Item Reference are applied as described in Section 3.2.1. When the trade item contained is identified by an EAN/UCC-8 Identification Number and this product is sold in bulk, these two fields may be replaced by the EAN/UCC-8 Identification Number padded with five leading zeros without the Check Digit.

The Check Digit is explained in Section 3.A.1. Its verification, usually carried out automatically by the bar code reader, ensures that the number is correctly composed. The symbology identifier shows whether or not the Check Digit has been validated. If it has not, the Check Digit verification must be programmed in the application software.

The data carrier for this Element String is the ITF-14 Bar Code Symbol.

The system recognises this Element String by the symbology identifier J11, the number of digits decoded (14), and the digit 9 in the Indicator position.

The data transmitted from the bar code reader means that the EAN/UCC-14 Identification Number of a Variable Measure Trade Item has been captured. To complete the item identification, the corresponding variable information must be present at the same time (see Sections 3.6.20 and 3.6.21).

This Element String might not be supported at the Point-of-Sale.

GTIN format of this number for

processing in a 14-digit field

T ₁	T ₂	T ₃	T ₄	T ₅	T ₆	T ₇	T ₈	T ₉	T ₁₀	T ₁₁	T ₁₂	T ₁₃	T ₁₄
9	N ₂	N ₃	N ₄	N ₅	N ₆	N ₇	N ₈	N ₉	N ₁₀	N ₁₁	N ₁₂	N ₁₃	N ₁₄

3.6 UCC/EAN-128 Bar Code Symbols

This section describes the full strings beginning with symbology identifier]C1

The sub-sections for the Element Strings are in order of Application Identifier. When the full string is made up from concatenated Element Strings, each Element String must be processed separately in association with the symbology identifier]C1 from the full string.

3.4.13.6.1 Identification of a Logistic Unit: AI (00)

Formatted: Bullets and Numbering

Figure 3.6.1 – 1

		Format of the Element String																	
		SSCC (Serial Shipping Container Code)																	
Application Identifier		Extension Digit	EAN.UCC Company Prefix										Serial Reference						Check Digit
(EAN)	0 0	N ₁	N ₂	N ₃	N ₄	N ₅	N ₆	N ₇	N ₈	N ₉	N ₁₀	N ₁₁	N ₁₂	N ₁₃	N ₁₄	N ₁₅	N ₁₆	N ₁₇	N ₁₈
(UCC)	0 0	N ₁	0	N ₃	N ₄	N ₅	N ₆	N ₇	N ₈	N ₉	N ₁₀	N ₁₁	N ₁₂	N ₁₃	N ₁₄	N ₁₅	N ₁₆	N ₁₇	N ₁₈

The Application Identifier (00) indicates that the data field contains an SSCC.

The Extension digit is used to increase the capacity of the Serial Reference within the SSCC. It is assigned by the company that constructs the SSCC.

The EAN.UCC Company Prefix is allocated by either the Uniform Code Council (UCC) or an EAN International Member Organisation to a system user (see [Section 1.2](#)). It makes the SSCC unique worldwide but does not identify the origin of the unit.

The structure and content of the Serial Reference is at the discretion of the system user responsible for its assignment.

The Check Digit is explained in [Section 3.A.1](#). Its verification, which must be carried out in the application software, ensures that the number is correctly composed.

The data carrier for this Element String is the UCC/EAN-128 Bar Code Symbol.

The system recognises this Element String by the symbology identifier]C1 and the Application Identifier.

The data transmitted from the bar code reader means that the identification number of a logistic unit has been captured.

3.6.2 Identification of a Fixed Measure Trade Item (GTIN): AI (01)

This Element String is based on the UCC-12, EAN/UCC-8, EAN/UCC-13, or EAN/UCC-14 Data Structure (see [Section 1.3](#)).

Figure 3.6.2 – 1

	Format of the Element String															
	Application Identifier	Global Trade Item Number™ (GTIN™)												Check Digit		
	(EAN/UCC-8)	0 1	0	0	0	0	0	N ₁	N ₂	N ₃	N ₄	N ₅	N ₆	N ₇	N ₈	
	(UCC-12)	0 1	0	0	N ₁	N ₂	N ₃	N ₄	N ₅	N ₆	N ₇	N ₈	N ₉	N ₁₀	N ₁₁	N ₁₂
	(EAN/UCC-13)	0 1	0	N ₁	N ₂	N ₃	N ₄	N ₅	N ₆	N ₇	N ₈	N ₉	N ₁₀	N ₁₁	N ₁₂	N ₁₃
(EAN/UCC-14)	0 1	N ₁	N ₂	N ₃	N ₄	N ₅	N ₆	N ₇	N ₈	N ₉	N ₁₀	N ₁₁	N ₁₂	N ₁₃	N ₁₄	

The Application Identifier (01) indicates that the data field contains a GTIN .

The GTIN can include an EAN/UCC-8, UCC-12, or EAN/UCC-13 Identification Number (described in [Sections 3.2.1](#) and [3.3.1](#)) or an EAN/UCC-14 Identification Number (described in [Section 3.5.2](#)).

The Check Digit is explained in [Section 3.A.1](#). Its verification, which must be carried out in the application software, ensures that the number is correctly composed.

The data carrier for this Element String is the UCC/EAN-128 Bar Code Symbol.

The system recognises this Element String by the symbology identifier JC1 and the Application Identifier.

The data transmitted from the bar code reader means that the identification number of a Fixed Measure Trade Item has been captured

	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆	T ₇	T ₈	T ₉	T ₁₀	T ₁₁	T ₁₂	T ₁₃	T ₁₄
GTIN format of these numbers for	0	0	0	0	0	0	N ₁	N ₂	N ₃	N ₄	N ₅	N ₆	N ₇	N ₈
processing in a 14-digit field	0	0	N ₁	N ₂	N ₃	N ₄	N ₅	N ₆	N ₇	N ₈	N ₉	N ₁₀	N ₁₁	N ₁₂
	0	N ₁	N ₂	N ₃	N ₄	N ₅	N ₆	N ₇	N ₈	N ₉	N ₁₀	N ₁₁	N ₁₂	N ₁₃
	N ₁	N ₂	N ₃	N ₄	N ₅	N ₆	N ₇	N ₈	N ₉	N ₁₀	N ₁₁	N ₁₂	N ₁₃	N ₁₄

3.6.3 Identification of a Variable Measure Trade Item (GTIN): AI (01)

This Element String is a special application of the EAN/UCC-14 Data Structure.

Figure 3.6.3 – 1

Format of the Element String													
Application Identifier	Global Trade Item Number™ (GTIN™)												
	Indicator	EAN.UCC Company Prefix						Item Reference					Check Digit
(UCC-12)	0 1	9	0	N ₃	N ₄	N ₅	N ₆	N ₇	N ₈	N ₉	N ₁₀	N ₁₁	N ₁₂ N ₁₃
(EAN/UCC-13)	0 1	9	N ₂	N ₃	N ₄	N ₅	N ₆	N ₇	N ₈	N ₉	N ₁₀	N ₁₁	N ₁₂ N ₁₃

The Application Identifier (01) indicates that the data field contains a GTIN.

The digit 9 in the Indicator position indicates that the item identified is a Variable Measure Trade Item.

The EAN.UCC Company Prefix and the Item Reference are described in [Section 3.2.1](#). When the trade item contained is identified by an EAN/UCC-8 Identification Number and this product is sold in bulk, these two fields may be replaced by the EAN/UCC-8 Identification Number padded with five leading zeros without the Check Digit.

The Check Digit is explained in [Section 3.A.1](#). Its verification, which must be carried out in the application software, ensures that the number is correctly composed.

The data carrier for this Element String is the UCC/EAN-128 Bar Code Symbol.

The system recognises this Element String by the symbology identifier JC1, the Application Identifier, and the digit 9 in the Indicator position.

The data transmitted from the bar code reader means that the EAN/UCC-14 Identification Number of a Variable Measure Trade Item has been captured. To complete the item identification, the variable information must be present at the same time (see [Sections 3.6.20](#) and [3.6.21](#)).

GTIN format of this number for

processing in a 14-digit field

T ₁	T ₂	T ₃	T ₄	T ₅	T ₆	T ₇	T ₈	T ₉	T ₁₀	T ₁₁	T ₁₂	T ₁₃	T ₁₄
9	N ₂	N ₃	N ₄	N ₅	N ₆	N ₇	N ₈	N ₉	N ₁₀	N ₁₁	N ₁₂	N ₁₃	N ₁₄

3.6.4 Identification of Trade Items Contained in a Logistic Unit - Fixed Measure: AI (02)

Note: This Element String may be used only on a logistic unit that is not itself a trade item and if all trade items that are contained at the same level have the same Global Trade Item Number™ (GTIN™).

Figure 3.6.4 – 1

Format of the Element String														
Application Identifier	GTIN of the Contained Trade Items													Check Digit
0 2	N ₁	N ₂	N ₃	N ₄	N ₅	N ₆	N ₇	N ₈	N ₉	N ₁₀	N ₁₁	N ₁₂	N ₁₃	N ₁₄

The Application Identifier (02) indicates that the data field includes the GTIN of the contained trade items.

The GTIN of the trade items contained represents the identification number of the highest level of trade item contained in the logistic unit.

The Check Digit is explained in [Section 3.A.1](#). Its verification, which must be carried out in the application software, ensures that the number is correctly composed.

The data carrier of this Element String is the UCC/EAN-128 Bar Code Symbol.

The system recognises this Element String by the symbology identifier JC1 and the Application Identifier.

The data transmitted from the bar code reader means that the identification number of Fixed Measure Trade Items contained in a logistic unit has been captured. It must be processed together with Element String AI (37) that must appear on the same unit (see [Section 3.6.24](#)).

3.6.5 Identification of Trade Items Contained in a Logistic Unit - Variable Measure: AI (02)

Note: This Element String may be used only on a logistic unit that is not itself a trade item and if all trade items that are contained at the same level have the same Global Trade Item Number™ (GTIN™). If the trade items are variable measure retail items, then this GTIN will be the implied item number that does not appear on the items contained.

Figure 3.6.5 – 1

Format of the Element String														
Application Identifier	GTIN of the Contained Trade Item													Check Digit
0 2	9	N ₂	N ₃	N ₄	N ₅	N ₆	N ₇	N ₈	N ₉	N ₁₀	N ₁₁	N ₁₂	N ₁₃	N ₁₄

The Application Identifier (02) indicates that the data field includes the GTIN of the contained trade items.

The GTIN of the trade items contained represents the identification number of the highest level of items contained in the logistic unit.

The Check Digit is explained in [Section 3.A.1](#). Its verification, which must be carried out in the application software, ensures that the number is correctly composed.

The data carrier for this Element String is the UCC/EAN-128 Bar Code Symbol.

The system recognises this Element String by the symbology identifier JC1 and the Application Identifier.

The data transmitted from the bar code reader means that the EAN/UCC-14 Identification Number of a Variable Measure Trade Item contained in a logistic unit has been captured. It must be processed with Element String AI (37) and a valid trade measure that must appear on the same unit (see [Sections 3.6.20, 3.6.21, and 3.6.24](#)).

3.6.6 Batch or Lot Number: AI (10)

Figure 3.6.6 – 1

Format of the Element String	
Application Identifier	Batch or Lot Number
1 0	X ₁ ————— variable length —————> X ₂₀

The Application Identifier (10) indicates that the data field contains a batch or lot number.

The batch or lot number gives whatever information the manufacturer (the party with responsibility for traceability of the trade item) considers relevant to the trade item to which the Element String is applied. The data may refer to the trade item itself or to items contained. The number may be, for example, a production lot number, a shift number, a machine number, a time, or an internal production code. The data is alphanumeric and may include all characters contained in [Figure 3.A.3 – 1](#).

The data carrier for this Element String is the UCC/EAN-128 Bar Code Symbol.

The system recognises this Element String by the symbology identifier JC1 and the Application Identifier.

The data transmitted by the bar code reader means that the Element String denoting a batch or lot number has been captured. As it is an attribute of a particular item, the batch or lot number should not be processed on its own, but together with the Global Trade Item Number™ (GTIN™) of the trade item to which it relates.

Note: The batch or lot number is not part of the unique identification of a trade item.

3.6.7 Production Date: AI (11)

Figure 3.6.7 – 1

Format of the Element String			
Application Identifier	Production Date		
	Year	Month	Day
1 1	N ₁ N ₂	N ₃ N ₄	N ₅ N ₆

The Application Identifier (11) indicates that the data fields contain a production date.

The production date is the production or assembly date determined by the manufacturer. The date may refer to the trade item itself or to items contained.

The structure is:

Year: the tens and units of the year (e.g., 2003 = 03), which is mandatory.

Month: the number of the month (e.g., January = 01), which is mandatory.

Day: the number of the day of the relevant month (e.g., second day = 02); if it is not necessary to specify the day, the field must be filled with two zeros

The data carrier for this Element String is the UCC/EAN-128 Bar Code Symbol.

The system recognises this Element String by the symbology identifier JC1 and the Application Identifier.

The data transmitted from the bar code reader means that the Element String denoting a production date has been captured. As it is an attribute of a trade item, the production date should not be processed on its own, but together with the Global Trade Item Number™ (GTIN™) of the trade item to which it relates.

Note: This Element String can only specify dates ranging from 49 years in the past to 50 years in the future. Determination of the correct century is explained in [Section 3.A.5](#).

3.6.8 Due Date for Amount on Payment Slip: AI (12)

Figure 3.6.8 – 1

Format of the Element String						
Application Identifier		Due Date				
		Year	Month	Day		
1	2	N ₁ N ₂	N ₃ N ₄	N ₅ N ₆		

The Application Identifier (12) indicates that the data fields contain the date by which an invoice should be paid.

The structure is:

Year: the tens and units of the year (e.g., 1998 = 98), which is mandatory.

Month: the number of the month (e.g., January = 01), which is mandatory.

Day: the number of the day of the relevant month (e.g., second day = 02); if it is not necessary to specify the day, the field must be filled with two zeros

The data carrier for this Element String is the UCC/EAN-128 Bar Code Symbol.

The system recognises this Element String by the symbology identifier]C1 and the Application Identifier.

The data transmitted from the bar code reader means that a due date has been captured. Since this data element represents an attribute of a Payment Slip Reference Number, AI (8020), and a EAN.UCC Global Location Number (GLN) of the invoicing party, it should not be processed on its own.

Note: This Element String can only specify dates ranging from 49 years in the past to 50 years in the future. Determination of the correct century is explained in [Section 3.A.5](#).

3.6.9 Packaging Date: AI (13)

Figure 3.6.9 – 1

Format of the Element String			
Application Identifier	Packaging Date		
	Year	Month	Day
1 3	N ₁ N ₂	N ₃ N ₄	N ₅ N ₆

The Application Identifier (13) indicates that the data fields contain a packaging date.

The packaging date is the date when the goods were packed as determined by the packager. The date may refer to the trade item itself or to items contained.

The structure is:

Year: the tens and units of the year (e.g., 2003 = 03), which is mandatory.

Month: the number of the month (e.g., January = 01), which is mandatory.

Day: the number of the day of the relevant month (e.g., second day = 02); if it is not necessary to specify the day, the field must be filled with two zeros

The data carrier of this Element String is the UCC/EAN-128 Bar Code Symbol.

The system recognises this Element String by the symbology identifier JC1 and the Application Identifier.

The data transmitted from the bar code reader means that the Element String denoting a packaging date has been captured. As it is an attribute of a trade item, the packaging date should not be processed on its own, but together with the Global Trade Item Number™ (GTIN™) of the trade item to which it relates.

Note: This Element String can only specify dates ranging from 49 years in the past to 50 years in the future. Determination of the correct century is explained in [Section 3.A.5](#).

3.6.10 Minimum Durability Date (Quality): AI (15)

Figure 3.6.10 – 1

Format of the Element String			
Application Identifier	Minimum Durability Date		
	Year	Month	Day
1 5	N ₁ N ₂	N ₃ N ₄	N ₅ N ₆

The Application Identifier (15) indicates that the data fields contain a minimum durability date.

The minimum durability date indicates the ideal consumption or best effective use date of a product. It is a statement about quality. It is often referred to as a sell by date or a best before date.

The structure is:

Year: the tens and units of the year (e.g., 2003 = 03), which is mandatory.

Month: the number of the month (e.g., January = 01), which is mandatory.

Day: the number of the day of the relevant month (e.g., second day = 02); if it is not necessary to specify the day, the field must be filled with two zeros

The data carrier for this Element String is the UCC/EAN-128 Bar Code Symbol.

The system recognises this Element String by the symbology identifier JC1 and the Application Identifier.

The data transmitted from the bar code reader means that the Element String denoting a minimum durability date has been captured. As it is an attribute of a trade item, the minimum durability date should not be processed on its own, but together with the Global Trade Item Number™ (GTIN™) of the trade item to which it relates.

Note: This Element String can only specify dates ranging from 49 years in the past to 50 years in the future. Determination of the correct century is explained in [Section 3.A.5](#).

3.6.11 Maximum Durability Date (Safety): AI (17)

Figure 3.6.11 – 1

Format of the Element String			
Application Identifier	Maximum Durability Date		
	Year	Month	Day
1 7	N ₁ N ₂	N ₃ N ₄	N ₅ N ₆

The Application Identifier (17) indicates that the data fields contain a maximum durability date.

The maximum durability date is the date that determines the limit of consumption or use of a product. It is a statement about safety. It is often referred to as "use by date" or "expiration date."

The structure is:

Year: the tens and units of the year (e.g., 2003 = 03), which is mandatory.

Month: the number of the month (e.g., January = 01), which is mandatory.

Day: the number of the day of the relevant month (e.g., second day = 02); if it is not necessary to specify the day, the field must be filled with two zeros

The data carrier of the Element String is the UCC/EAN-128 Bar Code Symbol.

The system recognises this Element String by the symbology identifier JC1 and the Application Identifier.

The data transmitted from the bar code reader means that the Element String denoting a maximum durability date has been captured. Since the Element String represents an attribute of a trade item, the maximum durability date should not be processed on its own, but together with the Global Trade Item Number™ (GTIN™) of the trade item to which it relates.

Note: This Element String can only specify dates ranging from 49 years in the past to 50 years in the future. Determination of the correct century is explained in [Section 3.A.5](#).

3.6.12 Product Variant: AI (20)

This Element String is used to distinguish a variant from the standard item if the variation is not sufficiently significant to require a separate Global Trade Item Number™ (GTIN™) and if the difference is relevant only to the manufacturer.

The product variant is only for use by the manufacturer, and not for the dealings with business partners.. Although the Element String will not have meaning outside the company who issued it, the Element String may remain on the item throughout distribution.

Figure 3.6.12 – 1

Format of the Element String	
Application Identifier	Variant Number
2 0	N ₁ N ₂

The Application Identifier (20) indicates that the data field contains a variant number.

The variant number is assigned by the user of the Element String. It forms a subsidiary numbering facility that can be used in addition to the item's identification number and allows the creation of 100 variants of a particular item.

The data carrier for this Element String is the UCC/EAN-128 Bar Code Symbol.

The system recognises this Element String by the symbology identifier]C1 and the Application Identifier.

The data transmitted from the bar code reader means that the Element String denoting a product variant has been captured. The product variant must always be decoded and processed together with the GTIN from the same item. Outside of the applying company, it is decoded and ignored.

3.6.13 Serial Number: AI (21)

Figure 3.6.13 – 1

Format of the Element String	
Application Identifier	Serial Number
2 1	X ₁ ————— variable length —————→ X ₂₀

The Application Identifier (21) indicates that the data field contains a serial number.

A serial number is assigned to an entity for its lifetime. When combined with a Global Trade Item Number™ (GTIN™), a serial number uniquely identifies an individual item. The serial number field is alphanumeric and may include all characters contained in [Figure 3.A.3 – 1](#). The manufacturer determines the serial number.

The data carrier of this Element String is the UCC/EAN-128 Bar Code Symbol.

The system recognises this Element String by the symbology identifier JC1 and the Application Identifier.

The data transmitted from the bar code reader means that the Element String denoting a serial number has been captured. The Element String represents an attribute of a trade item and, therefore, the serial number should not be processed on its own, but together with the identification number of the trade item to which it relates.

3.6.14 Secondary Data for Specific Health Industry Products: AI (22)

Figure 3.6.14 – 1

Format of the Element String	
Application Identifier	Secondary Data Fields
2 2	X ₁ ————— variable length —————> X ₂₉

The Application Identifier (22) indicates that the data field contains the secondary data for specific health industry products (quantity, expiration date, and lot number). The secondary data fields are described in [Section 7.8](#).

The data carrier for this Element String is the UCC/EAN-128 Bar Code Symbol. The system recognises this Element String by the symbology identifier JC1 and the Application Identifier.

Note: This Element String was developed to accommodate an existing, non-EAN.UCC System, standard used for specific healthcare products. The Element String is not recommended for new applications or other industries. The use of the Element Strings denoting maximum durability date and lot number are recommended instead.

3.6.15 Lot Number (Transitional Use): AI (23n)

This Element String has been released for use in some applications where there was a need to concatenate several variable length Element Strings into one bar code symbol and where the Function 1 Character (FNC1), used as a separator character, was not available. Currently it is used by the American meat industry instead of the Element String with AI (10) (see [Section 3.6.6](#)). It is considered a temporary system component that eventually will be discontinued.

Figure 3.6.15 – 1

Format of the Element String	
Application Identifier	Lot Number
2 3 n	N ₁ ——— variable length ———> N ₁₉

The Application Identifier (23n) indicates that the data field contains a lot number. The digit “n” indicates the length of the data field according to the following formula:

$$\text{Number of digits in the lot number} = 2n + 1 \text{ (e.g., lot number 1234567 = 233 1234567)}$$

The digit “n” is used to determine the length of the Element String when applied in concatenated form.

The lot number field has a variable length and always contains an odd number of digits. If the lot number originally had an even number of digits, a leading zero should be added to the lot number.

The data carrier for this Element String is the UCC/EAN-128 Bar Code Symbol.

The system recognises this Element String by the symbology identifier]C1 and the Application Identifier.

The data transmitted from the bar code reader means that the Element String denoting a lot number has been captured. Since the Element String represents an attribute of a particular item, the lot number should not be processed on its own, but together with the Global Trade Item Number™ (GTIN™) of the trade item to which it relates.

3.6.16 Additional Product Identification Assigned by the Manufacturer: AI (240)

The purpose of this Element String is to enable identification data other than the Global Trade Item Number™ (GTIN™) to be represented in an EAN.UCC System data carrier. It is a cross-reference to previously used catalogue numbers. The additional item identification is considered an attribute of the GTIN (e.g., it facilitates migration to the EAN.UCC System during a transitional period). However, it must not be used to replace the GTIN.

Figure 3.6.16 – 1

Format of the Element String	
Application Identifier	Additional Item Identification
2 4 0	X ₁ ————— variable length —————> X ₃₀

The Application Identifier (240) indicates that the data field contains additional item identification.

The additional item identification field is alphanumeric and may include all characters contained in [Figure 3.A.3 – 1](#). Its content and structure are at the discretion of the company applying the Element String.

The data carrier for this Element String is the UCC/EAN-128 Bar Code Symbol.

The system recognises this Element String by the symbology identifier JC1 and the Application Identifier.

The data transmitted from the bar code reader means that the Element String denoting an additional item identification has been captured.

3.6.17 Customer Part Number: AI (241)

The purpose of this Element String is to enable identification data other than the Global Trade Item Number™ (GTIN™) to be represented in an EAN.UCC System data carrier. The Element String should only be used between trading partners that are currently using the customer part number for ordering and who have agreed on a timetable to convert to the GTIN for their business purposes. Therefore, the use of the GTIN and the AI (241) on trade items is for transitional use during the conversion. The customer part number must not be used in place of the GTIN.

Figure 3.6.17 – 1

Format of the Element String	
Application Identifier	Customer Part Number
2 4 1	X ₁ ————— variable length —————> X ₃₀

The Application Identifier (241) indicates that the data field contains a customer part number.

The customer part number field is alphanumeric and may include all characters contained in [Figure 3.A.3 – 1](#).

The data carrier for this Element String is the UCC/EAN-128 Bar Code Symbol.

The system recognises this Element String by the symbology identifier JC1 and the Application Identifier.

The data transmitted from the bar code reader means that the Element String denoting a customer part number has been captured.

3.6.18 Secondary Serial Number: AI (250)

While the Element String using AI (21) (see [Section 3.6.13](#)) contains the serial number of the trade item, the Element String denoting a secondary serial number represents the serial number of a component of that item. The company applying the Element String determines which component the Element String refers to for a given trade item. The recognition of the meaning of the secondary serial number is accomplished via the Global Trade Item Number™ (GTIN™) and information provided by the issuer regarding the component to which the secondary serial number refers.

If this Element String is being used, the trade item must be symbol marked with the following Element Strings:

- AI (01): representing the GTIN of the trade item
- AI (21): representing the serial number of the trade item
- AI (250): representing the serial number of a component of the trade item

Only one Element String with AI (250) may be associated with a particular GTIN.

Figure 3.6.18 – 1

Format of the Element String	
Application Identifier	Secondary Serial Number
2 5 0	X ₁ ————— variable length —————> X ₃₀

The Application Identifier (250) indicates that the data field contains a secondary serial number.

The secondary serial number field is alphanumeric and may include all characters contained in [Figure 3.A.3 – 1](#). The number and to what component it relates is determined by the issuer.

The data carrier for this Element String is the UCC/EAN-128 Bar Code Symbol.

The system recognises this Element String by the symbology identifier JC1 and the Application Identifier.

The data transmitted from the bar code reader means that the Element String denoting a secondary serial number has been captured.

3.6.19 Reference to Source Entity: AI (251)

Reference to source entity is an attribute of a trade item used to refer to the original item from which the trade item was derived. The issuer of the trade item must indicate through other means the source entity to which the data refers.

For example, the original item could be an animal from which a carcass of beef is derived. This Element String would enable reference to the original animal, so that, if the animal was found to be contaminated, all derived products could be isolated. In addition, it could also be used for regulatory compliance when recycling parts from various white goods, such as refrigerators, where it is necessary to refer to the original appliance.

Figure 3.6.19 – 1

Format of the Element String	
Application Identifier	Reference to Source Entity
2 5 1	X ₁ ————— variable length —————> X ₃₀

The Application Identifier (251) indicates that the data field consists of a reference to the original item.

The reference to the source entity field is alphanumeric and may include all characters contained in [Figure 3.A.3 – 1](#).

The data carrier for this Element String is the UCC/EAN-128 Bar Code Symbol.

The system recognises this Element String by symbology identifier]C1 and the Application Identifier.

The data transmitted by the bar code reader means that the Element String denoting a reference to source entity has been captured. Since this Element String represents an attribute of a Global Trade Item Number™ (GTIN™), the reference to the source entity should not be processed on its own.

3.6.20 Variable Count: AI (30)

This Element String is used to complete the identification of a Variable Measure Trade Item. It contains the number of items contained in such a unit and, therefore, should never be applied in isolation.

Figure 3.6.20 – 1

Format of the Element String	
Application Identifier	Count of Items
3 0	N ₁ — variable length —→ N ₈

The Application Identifier (30) indicates that the data field contains the number of items contained in a Variable Measure Trade Item.

The count of items field represents the quantity contained in the respective trade item. It is of variable length and may have up to eight digits.

The data carrier for this Element String is the UCC/EAN-128 Bar Code Symbol.

The system recognises this Element String by the symbology identifier]C1 and the Application Identifier. The data transmitted from the bar code reader means that the quantity (count of items), which can be considered part of the identification of a Variable Measure Trade Item, has been captured. The variable count must be processed with the Global Trade Item Number™ (GTIN™) of the trade item to which it relates.

Note: This Element String must not be used to indicate the contained quantity of a Fixed Measure Trade Item. However, if this Element String appears on a Fixed Measure Trade Item (in error) it should not invalidate the item identification but should be treated as redundant data.

3.6.21 Trade Measures: Als (31nn, 32nn, 35nn, 36nn)

These Element Strings are used to complete the identification of a Variable Measure Trade Item. They contain information such as the weight, size, volume, or dimension of a variable measure trade item and, therefore, should never be applied alone. Several Element Strings are possible if the variables required are dimensions or weights expressed in kilograms and pounds.

Figure 3.6.21 – 1

Format of the Element String									
Application Identifier				Applicable Value					
A ₁	A ₂	A ₃	A ₄	N ₁	N ₂	N ₃	N ₄	N ₅	N ₆

The Application Identifier digits (A₁ to A₃) (see [Figure 3.6.21 – 2](#)) indicate that the data field contains the quantity or dimension of a Variable Measure Trade Item. It also denotes the unit of measure.

The Application Identifier digit A₄ indicates the implied decimal point position, where, for example, the digit 0 means that there is no decimal point, and the digit 1 means that the decimal point is between N₅ and N₆.

The Application Identifiers used with this Element String are shown in [Figure 3.6.21 – 2](#).

Figure 3.6.21 – 2

A ₁	A ₂	A ₃	Trade Measure	Unit of Measure
3	1	0	Net weight	Kilograms
3	1	1	Length or first dimension	Metres
3	1	2	Width, diameter, or second dimension	Metres
3	1	3	Depth, thickness, height, or third dimension	Metres
3	1	4	Area	Square metres
3	1	5	Net volume	Litres
3	1	6	Net volume	Cubic metres
3	2	0	Net weight	Pounds
3	2	1	Length or first dimension	Inches
3	2	2	Length or first dimension	Feet
3	2	3	Length or first dimension	Yards
3	2	4	Width, diameter, or second dimension	Inches
3	2	5	Width, diameter, or second dimension	Feet
3	2	6	Width, diameter, or second dimension	Yards
3	2	7	Depth, thickness, height, or third dimension	Inches
3	2	8	Depth, thickness, height, or third dimension	Feet
3	2	9	Depth, thickness, height, or third dimension	Yards
3	5	0	Area	Square inches
3	5	1	Area	Square feet
3	5	2	Area	Square yards
3	5	6	Net weight	Troy ounces
3	5	7	Net weight (or volume)	Ounces
3	6	0	Net volume	Quarts
3	6	1	Net volume	Gallons (U.S.)
3	6	4	Net volume	Cubic inches
3	6	5	Net volume	Cubic feet
3	6	6	Net volume	Cubic yards

The applicable value field contains the variable measure that applies to the respective trade item.

The data carrier for this Element String is the UCC/EAN-128 Bar Code Symbol.

The system recognises this Element String by the symbology identifier]C1 and the Application Identifier.

The data transmitted from the bar code reader means that the quantity, which can be considered part of the identification of a Variable Measure Trade Item, has been captured. It must be processed with the Global Trade Item Number™ (GTIN™) of the trade item to which it relates.

Note: Other values of AI (3nnn) specify gross measures and logistic measures.

Note: The approval number of processor is usually assigned by a national or pluri-national authority.

3.6.22 Logistic Measures: Als (33nn, 34nn, 35nn, 36nn)

Note: The EAN.UCC System provides standards for logistic weights and measures in metric and other units of measure. In principle, a particular logistic measure should be applied in only one unit of measure on a given logistic unit. However, application of the same attribute in several units of measure does not impede the correct processing of the transmitted data.

Figure 3.6.22 – 1

Format of the Element String									
Application Identifier				Applicable Value					
A ₁	A ₂	A ₃	A ₄	N ₁	N ₂	N ₃	N ₄	N ₅	N ₆

The Application Identifier digits (A₁ to A₃) (see [Figure 3.6.22 – 2](#)) indicate that the data field contains the logistic quantity or dimension of a Logistic Unit or a Variable Measure Trade Item. It also denotes the unit of measure.

The Application Identifier digit A₄ indicates the implied decimal point position, where, for example, the digit 0 means that there is no decimal point, and the digit 1 means that the decimal point is between N₅ and N₆.

The Application Identifiers used with this Element String are shown in [Figure 3.6.22 – 2](#).

Figure 3.6.22 – 2

A ₁	A ₂	A ₃	Definition of Logistic Measures	Unit of Measure
3	3	0	Logistic weight	Kilograms
3	3	1	Length or first dimension	Metres
3	3	2	Width, diameter, or second dimension	Metres
3	3	3	Depth, thickness, height, or third dimension	Metres
3	3	4	Area	Square metres
3	3	5	Logistic volume	Litres
3	3	6	Logistic volume	Cubic metres
3	4	0	Logistic weight	Pounds
3	4	1	Length or first dimension	Inches
3	4	2	Length or first dimension	Feet
3	4	3	Length or first dimension	Yards
3	4	4	Width, diameter, or second dimension	Inches
3	4	5	Width, diameter, or second dimension	Feet
3	4	6	Width, diameter, or second dimension	Yards
3	4	7	Depth, thickness, height, or third dimension	Inches
3	4	8	Depth, thickness, height, or third dimension	Feet
3	4	9	Depth, thickness, height, or third dimension	Yards
3	5	3	Area	Square inches
3	5	4	Area	Square feet
3	5	5	Area	Square yards
3	6	2	Logistic volume	Quarts
3	6	3	Logistic volume	Gallons (U.S.)
3	6	7	Logistic volume	Cubic inches
3	6	8	Logistic volume	Cubic feet
3	6	9	Logistic volume	Cubic yards

The applicable value field represents the measures of the respective unit.

The data carrier for this Element String is the UCC/EAN-128 Bar Code Symbol.

The system recognises this Element String by the symbology identifier JC1 and the Application Identifier.

The data transmitted from the bar code reader means that a logistic measure has been captured. It must be processed with the SSCC or the Global Trade Item Number™ (GTIN™) of the Variable Measure Trade Item appearing on the same unit.

3.6.23 Kilograms Per Square Metre: AI (337n)

This Element String is used to indicate the exact weight per square metre of a particular trade item.

Figure 3.6.23 – 1

Format of the Element String						
Application Identifier	Kilograms Per Square Metre					
3 3 7 n	N ₁	N ₂	N ₃	N ₄	N ₅	N ₆

The Application Identifier digits (337) indicate that the data field contains kilograms per square metre.

The Application Identifier digit shown as “n” indicates the implied decimal point position, where, for example, the digit 0 means that there is no decimal point, and the digit 1 means that the decimal point is between N₅ and N₆.

The kilograms per square metre field contains the weight per area of the respective trade item. The unit of measure is kilograms.

The data carrier for this Element String is the UCC/EAN-128 Bar Code Symbol. The system recognises this Element String by the symbology identifier JC1 and the Application Identifier.

The data transmitted from the bar code reader means that the Element String denoting kilograms per square metre has been captured. Since the Element String represents an attribute of a trade item, it should not be processed on its own, but together with the Global Trade Item Number™ (GTIN™) of the trade item to which it relates.

3.6.24 Count of Trade Items Contained in a Logistic Unit: AI (37)

This Element String is a mandatory completion of the identification described in Sections [3.6.4](#) and [3.6.5](#).

Figure 3.6.24 – 1

Format of the Element String	
Application Identifier	Count of Trade Items
3 7	N ₁ ——— variable length ———> N ₈

The Application Identifier (37) indicates that the data field contains the number of trade items contained in a logistic unit.

The count of trade items field contains the number of trade items contained in the respective logistic unit. This information refers to the identification number of the contained trade items.

The data carrier for this Element String is the UCC/EAN-128 Bar Code Symbol. The system recognises this Element String by the symbology identifier JC1 and the Application Identifier.

The data transmitted from the bar code reader means that the number of trade items contained in a logistic unit has been captured. This number must be processed with the identification number represented in AI (02) (see Sections [3.6.4](#) and [3.6.5](#)) appearing on the same logistic unit.

3.6.25 Amount Payable - Single Monetary Area: AI (390n)

Note: To aid unambiguous processing AI (391n), described in [Section 3.6.26](#), should be used to indicate the currency in which the amount is expressed.

Figure 3.6.25 – 1

Format of the Element String	
Application Identifier	Applicable Amount Payable
3 9 0 n	N ₁ ————— variable length —————> N ₁₅

The Application Identifier digits(390) indicate that the data field contains the amount payable of a payment slip.

The Application Identifier digit shown as “n” indicates the implied decimal point position, where the digit 0 means that there is no decimal point, and the digit 1 means that the decimal point is before the last position of the amount payable. See examples in [Figure 3.6.25 – 2](#).

The applicable amount payable contains the sum to be paid with the respective payment slip.

The data carrier for this Element String is the UCC/EAN-128 Bar Code Symbol. The system recognises this Element String by the symbology identifier]C1 and the Application Identifier.

The data string transmitted from the bar code reader means that the amount payable of a payment slip has been captured. Since this Element String represents an attribute of a Payment Slip Reference Number and a EAN.UCC Global Location Number (GLN) of the invoicing party, the amount payable should not be processed on its own.

See [Figure 3.6.25 – 2](#) for an example of the decimal point indication.

Figure 3.6.25 – 2

Application Identifier	Encoded Value	Actual Value
3 9 0 2	1 2 3 4 5 6 7	1 2 3 4 5 . 6 7
3 9 0 1	1 2 3 4 5 6 7	1 2 3 4 5 6 . 7 0
3 9 0 0	1 2 3 4 5	1 2 3 4 5 . 0 0

3.6.26 Amount Payable and ISO Currency Code: AI (391n)

Figure 3.6.26 – 1

Format of the Element String		
Application Identifier	ISO Currency Code	Applicable Amount Payable
3 9 1 n	N ₁ N ₂ N ₃	N ₄ ——— variable length ———> N ₁₈

The Application Identifier digits(391) indicate that the data fields consist of an ISO currency code and an applicable amount payable.

The Application Identifier digit shown as "n" indicates the implied decimal point position in the applicable amount payable field, where the digit 0 means that there is no decimal point, and the digit 1 means that the decimal point is before the last position of the amount payable. See examples in [Figure 3.6.26 – 2](#).

The ISO country code field contains the three-digit currency number of the numerical international standard ISO 4217 (data readily available on the Internet) and indicates the currency in which the amount payable is expressed.

The applicable amount payable contains the sum to be paid with the respective payment slip.

The data carrier for this Element String is the UCC/EAN-128 Bar Code Symbol. The system recognises this Element String by the symbology identifier]C1 and the Application Identifier.

The data string transmitted from the bar code reader means that the amount payable has been captured. Since this Element String represents an attribute of a Payment Slip Reference Number and a EAN.UCC Global Location Number (GLN) of the invoicing party, it should not be processed on its own.

See Figure 3.6.26 – 2 for an example of the decimal point indication. Figure 3.6.26 – 2

Application Identifier	ISO Currency Code	Encoded Value	Actual Value
3 9 1 2	7 1 0*	1 2 3 0	1 2 . 3 0
3 9 1 1	7 1 0*	1 2 3 0	1 2 3 . 0 0
3 9 1 0	0 4 0**	1 2 3	1 2 3 . 0 0

*South African rand

**Austrian shilling

3.6.27 Amount Payable for a Variable Measure Trade Item – Single Monetary Area: AI (392n)

The amount payable refers to an item identified by the Global Trade Item Number™ (GTIN™) of a Variable Measure Trade Item and is expressed in local currency. This AI is an attribute of the GTIN and is always used in conjunction with it.

Figure 3.6.27 – 1

Format of the Element String	
Application Identifier	Applicable Amount Payable
3 9 2 n	N ₁ ————— variable length —————> N ₁₅

The Application Identifier digits (392) indicate that the data field contains the amount payable for a Variable Measure Trade Item.

The Application Identifier digit shown as “n” indicates the implied decimal point position, where the digit 0 means that there is no decimal point, and the digit 1 means that the decimal point is before the last position of the amount payable.

The applicable amount payable contains the total to be paid for the Variable Measure Trade Item.

The data carrier for this Element String is the UCC/EAN-128 Bar Code Symbol. The system recognises this Element String by the symbology identifier JC1 and the Application Identifier.

The data transmitted by the bar code reader means that the Element String denoting amount payable of a Variable Measure Trade Item has been captured. Since this Element String represents an attribute of a GTIN, the amount payable should not be processed on its own.

See Figure 3.6.27 – 2 for an example of the decimal point indication.

Figure 3.6.27 – 2

Application Identifier	Encoded Value	Actual Value
3 9 2 2	1 2 3 4 5 6 7	1 2 3 4 5 . 6 7
3 9 2 1	1 2 3 4 5 6 7	1 2 3 4 5 6 . 7 0
3 9 2 0	1 2 3 4 5	1 2 3 4 5 . 0 0

3.6.28 Amount Payable for a Variable Measure Trade Item and ISO Currency Code: AI (393n)

The amount payable refers to an item identified with the Global Trade Item Number™ (GTIN™) of a Variable Measure Trade Item and is expressed in the indicated currency. This AI is an attribute of the GTIN and is always expressed in conjunction with it.

Figure 3.6.28 – 1

Format of the Element String		
Application Identifier	ISO Currency Code	Applicable Amount Payable
3 9 3 n	N ₁ N ₂ N ₃	N ₄ — variable length —→ N ₁₈

The Application Identifier (393) indicates that the data field consists of an ISO currency code and an applicable amount payable.

The Application Identifier digit shown as “n” indicates the implied decimal point in the applicable amount payable field, where the digit 0 means that there is no decimal point, and the digit 1 means that the decimal point is before the last position of the amount payable.

The ISO currency code field contains the three-digit currency number of the numerical international standard ISO/IEC 4217 (data readily available on the Internet) and indicates the currency in which the amount payable is expressed.

The applicable amount payable field contains the sum to be paid for the Variable Measure Trade Item.

The data carrier of this Element String is the UCC/EAN-128 Bar Code Symbol. The system recognises this Element String by the symbology identifier]C1 and the Application Identifier.

The data transmitted by the bar code reader means that the Element String denoting amount payable of a Variable Measure Trade Item has been captured. Since this Element String represents an attribute of a GTIN, the amount payable should not be processed on its own.

See Figure 3.6.28 – 2 for an example of the decimal point indication.

Figure 3.6.28 – 2

Application Identifier	ISO Currency Code	Encoded Value	Actual Value
3 9 3 2	7 1 0*	1 2 3 0	1 2 . 3 0
3 9 3 1	7 1 0*	1 2 3 0	1 2 3 . 0 0
3 9 3 0	0 4 0**	1 2 3	1 2 3 . 0 0

*South African rand

**Austrian shilling

3.6.29 Customer's Purchase Order Number: AI (400)

Figure 3.6.29 – 1

Format of the Element String	
Application Identifier	Customer's Purchase Order Number
4 0 0	X ₁ ← variable length → X ₃₀

The Application Identifier (400) indicates that the data field contains the customer's purchase order number, restricted for use between two trading partners.

The customer's purchase order number field is alphanumeric and may include all characters contained in [Figure 3.A.3 – 1](#). It contains the number of the purchase order assigned by the company that issued the order. The composition and content of the order number is left to the discretion of the customer. For example, the purchase order number may include release and line numbers.

The data carrier of this Element String is the UCC/EAN-128 Bar Code Symbol. The system recognises this Element String by the symbology identifier]C1 and the Application Identifier.

The data transmitted by the bar code reader means that the Element String denoting a customer's purchase order number has been captured. It may be processed as stand-alone information where applicable or processed with the identification data of the same unit.

Warning: This Element String must be removed from the unit before the unit leaves the premises of the customer.

3.6.30 Consignment Number: AI (401)

The consignment number identifies a logical grouping of goods (one or more physical entities) that has been consigned to a freight forwarder and is intended to be transported as a whole. The consignment number must be allocated by a freight forwarder (or carriers acting as a freight forwarder) or a consignor, but only if the prior agreement of the freight forwarder is given. Typically AI (401) encodes a House Way Bill (HWB) number.

A freight forwarder (as per *Multi Industry Scenario for Transport – MIST*) is a party that arranges the carriage of goods including connected services and/or associated formalities on behalf of a shipper or consignee.

A carrier (as per *MIST*) is a party that undertakes the transportation of goods from one point to another.

A consignor (as per *MIST*) is the party that sends the goods.

Figure 3.6.30 – 1

Format of the Element String	
Application Identifier	Consignment Number
	EAN.UCC Company Prefix Consignment Information
4 0 1	$N_1 \dots N_i$ $X_{i+1} \dots$ variable length $X_j (j \leq 30)$

The Application Identifier (401) indicates that the data field contains a consignment number.

The consignment number is composed of the EAN.UCC Company Prefix of the carrier and the actual consignment information. The structure of the consignment information following the EAN.UCC Company Prefix is left to the discretion of the user of the Element String. It may contain all characters contained in [Figure 3.A.3 – 1](#).

The data carrier of this Element String is the UCC/EAN-128 Bar Code Symbol. The system recognises this Element String by the symbology identifier JC1 and the Application Identifier.

The data transmitted by the bar code reader means that the Element String denoting a consignment number has been captured. The consignment number may be processed as stand-alone information where applicable or with other identification data appearing on the same unit.

Note: If a new consignment is created, previously bar coded consignment number Element Strings must be removed from the physical units.

3.6.31 Shipment Identification Number: AI (402)

The Shipment Identification Number (Bill of Lading) is a number assigned by a consignor. It provides a globally unique number that identifies a logical grouping of physical units for the purpose of a transport shipment. It may be used by all parties in the transport chain as a communication reference, for example, in Electronic Data Interchange (EDI) messages where it can be used as a shipment reference and/or a consignor's loading list.

Figure 3.6.31 – 1

Format of the Element String		
Application Identifier	Shipment Identification Number	
	EAN.UCC Company Prefix	Shipper Reference Check Digit
4 0 2	N ₁ N ₂ N ₃ N ₄ N ₅ N ₆ N ₇ N ₈ N ₉ N ₁₀ N ₁₁ N ₁₂ N ₁₃ N ₁₄ N ₁₅ N ₁₆	N ₁₇

The Application Identifier (402) indicates that the data field contains a Shipment Identification Number.

The EAN.UCC Company Prefix in this Element String is the EAN.UCC Company Prefix of the consigner (see [Section 1.2](#))

The shipper reference is assigned by the consigner.

The Check Digit is explained in [Section 3.A.1](#). Its verification, which must be carried out in the application software, ensures that the number is correctly composed.

The data carrier for this Element String is the UCC/EAN-128 Bar Code Symbol. The system recognises this Element String by the symbology identifier JC1 and the Application Identifier.

The data transmitted by the bar code reader means that the Element String denoting a Shipment Identification Number has been captured. The Shipment Identification Number may be processed as stand-alone information where applicable or with other identification data appearing on the same unit.

Note: Numbers should be sequentially allocated.

3.6.32 Routing Code: AI (403)

The routing code is assigned by the parcel carrier and is an attribute of the SSCC (Serial Shipping Container Code). It is intended to provide a migration path to the adoption of a yet-to-be-defined international, multi-modal solution. The routing code must not be used to encode information for which other Element Strings have been created (such as a ship to postal code).

Figure 3.6.32 – 1

Format of the Element String	
Application Identifier	Routing Code
4 0 3	X ₁ ————— variable length —————> X ₃₀

The Application Identifier (403) indicates that the data field contains a routing code.

The routing code field is alphanumeric and may include all characters contained in [Figure 3.A.3 – 1](#). Its content and structure are at the discretion of the parcel carrier issuing the code. If parcel carriers wish to enter co-operative agreements with other parcel carriers, then a mutually agreed indicator is required to designate the structure of the routing code.

The data carrier for this Element String is the UCC/EAN-128 Bar Code Symbol. The system recognises this Element String by the symbology identifier JC1 and the Application Identifier.

The data transmitted from the bar code reader means that the Element String denoting a routing code has been captured. The routing code must be processed with the SSCC appearing on the same unit.

3.6.33 Ship to - Deliver to EAN.UCC Global Location Number: AI (410)

This Element String is based on the EAN/UCC-13 Data Structure (see [Section 1.3](#)).

Figure 3.6.33 – 1

Format of the Element String													
Application Identifier	EAN.UCC Company Prefix						Location Reference						Check Digit
4 1 0	N ₁	N ₂	N ₃	N ₄	N ₅	N ₆	N ₇	N ₈	N ₉	N ₁₀	N ₁₁	N ₁₂	N ₁₃

The Application Identifier (410) indicates that the data field contains EAN.UCC Global Location Number (GLN) of the consignee.

The EAN.UCC Company Prefix is the EAN.UCC Company Prefix of the addressee (see [Section 1.2](#)). It makes the number unique worldwide.

The Location Reference is assigned by the addressee's company.

The Check Digit is explained in [Section 3.A.1](#). Its verification, which must be carried out in the application software, ensures that the number is correctly composed.

The data carrier for this Element String is the UCC/EAN-128 Bar Code Symbol. The system recognises this Element String by the symbology identifier JC1 and the Application Identifier.

The data transmitted from the bar code reader means that the GLN of the consignee of a physical item has been captured. The GLN may be processed independently or together with related identifications.

3.6.34 Bill to - Invoice to EAN.UCC Global Location Number: AI (411)

This Element String is based on the EAN/UCC-13 Data Structure (see [Section 1.3](#)).

Figure 3.6.34 – 1

Format of the Element String													
Application Identifier	EAN.UCC Company Prefix						Location Reference						Check Digit
4 1 1	N ₁	N ₂	N ₃	N ₄	N ₅	N ₆	N ₇	N ₈	N ₉	N ₁₀	N ₁₁	N ₁₂	N ₁₃

The Application Identifier (411) indicates that the data field contains the EAN.UCC Global Location Number (GLN) of the addressee of an invoice.

The EAN.UCC Company Prefix is the EAN.UCC Company Prefix of the addressee (see [Section 1.2](#)). It makes the number unique worldwide.

The Location Reference is assigned by the addressee's company.

The Check Digit is explained in [Section 3.A.1](#). Its verification, which must be carried out in the application software, ensures that the number is correctly composed.

The data carrier for this Element String is the UCC/EAN-128 Bar Code Symbol. The system recognises this Element String by the symbology identifier JC1 and the Application Identifier.

The data transmitted from the bar code reader means that the GLN of the addressee of an invoice has been captured.

3.6.35 Purchased from EAN.UCC Global Location Number: AI (412)

This Element String is based on the EAN/UCC-13 Data Structure (see [Section 1.3](#)).

Figure 3.6.35 – 1

Format of the Element String													
Application Identifier	EAN.UCC Company Prefix						Location Reference						Check Digit
4 1 2	N ₁	N ₂	N ₃	N ₄	N ₅	N ₆	N ₇	N ₈	N ₉	N ₁₀	N ₁₁	N ₁₂	N ₁₃

The Application Identifier (412) indicates that the data field contains the EAN.UCC Global Location Number (GLN) of the company from which the respective trade item has been purchased.

The EAN.UCC Company Prefix is the EAN.UCC Company Prefix of the supplier (see [Section 1.2](#)). It makes the number unique worldwide.

The Location Reference is assigned by the company supplying the trade item.

The Check Digit is explained in [Section 3.A.1](#). Its verification, which must be carried out in the application software, ensures that the number is correctly composed.

The data carrier for this Element String is the UCC/EAN-128 Bar Code Symbol. The system recognises this Element String by the symbology identifier JC1 and the Application Identifier.

The data transmitted from the bar code reader means that the GLN of the company that supplied the trade item has been captured. The GLN may be processed independently or together with related identifications.

3.6.36 Ship for - Deliver for - Forward to EAN.UCC Global Location Number: AI (413)

This Element String is based on the EAN/UCC-13 Data Structure (see [Section 1.3](#)).

Figure 3.6.36 – 1

Format of the Element String													
Application Identifier	EAN.UCC Company Prefix						Location Reference						Check Digit
4 1 3	N ₁	N ₂	N ₃	N ₄	N ₅	N ₆	N ₇	N ₈	N ₉	N ₁₀	N ₁₁	N ₁₂	N ₁₃

The Application Identifier (413) indicates that the data field contains the EAN.UCC Global Location Number (GLN) of the internal or subsequent final destination.

The EAN.UCC Company Prefix is the EAN.UCC Company Prefix of the final recipient (see [Section 1.2](#)). It makes the number unique worldwide.

The Location Reference is assigned by the final recipient's company.

The Check Digit is explained in [Section 3.A.1](#). Its verification, which must be carried out in the application software, ensures that the number is correctly composed.

The data carrier for this Element String is the UCC/EAN-128 Bar Code Symbol. The system recognises this Element String by the symbology identifier JC1 and the Application Identifier.

The data transmitted from the bar code reader means that the GLN of the final recipient of a physical item has been captured. The GLN may be processed independently or together with related identifications.

Note: This Element String is for the internal use of the consignee and is not to be used by the carrier.

3.6.37 Identification of a Physical Location - EAN.UCC Global Location Number: AI (414)

This Element String is based on the EAN/UCC-13 Data Structure (see [Section 1.3](#)).

Figure 3.6.37 – 1

Format of the Element String													
Application Identifier	EAN.UCC Company Prefix						Location Reference						Check Digit
4 1 4	N ₁	N ₂	N ₃	N ₄	N ₅	N ₆	N ₇	N ₈	N ₉	N ₁₀	N ₁₁	N ₁₂	N ₁₃

The Application Identifier (414) indicates that the data field contains the EAN.UCC Global Location Number (GLN) of a physical location.

The EAN.UCC Company Prefix is the prefix of the holder of the location (see [Section 1.2](#)). It makes the number unique worldwide.

The Location Reference is assigned by the owner or user of the physical location.

The Check Digit is explained in [Section 3.A.1](#). Its verification, which must be carried out in the application software, ensures that the number is correctly composed.

The data carrier for this Element String is the UCC/EAN-128 Bar Code Symbol. The system recognises this Element String by the symbology identifier JC1 and the Application Identifier.

The data transmitted from the bar code reader means that the GLN of a physical location has been captured from the location itself. The GLN may be processed according to the particular application requirements.

3.6.38 EAN.UCC Global Location Number of the Invoicing Party: AI (415)

This Element String is based on the EAN/UCC-13 Data Structure (see [Section 1.3](#)).

Note: This Element String is mandatory on a payment slip. Together with the Payment Slip Reference Number, AI (8020), it uniquely identifies a payment slip.

Figure 3.6.38 – 1

Format of the Element String													
Application Identifier	EAN.UCC Company Prefix						Location Reference						Check Digit
4 1 5	N ₁	N ₂	N ₃	N ₄	N ₅	N ₆	N ₇	N ₈	N ₉	N ₁₀	N ₁₁	N ₁₂	N ₁₃

The Application Identifier (415) indicates that the data field contains the EAN.UCC Global Location Number (GLN) of the invoicing party.

The EAN.UCC Company Prefix is the EAN.UCC Company Prefix of the invoicing party (see [Section 1.2](#)). It makes the number unique worldwide.

The Location Reference is assigned by the invoicing party.

The Check Digit is explained in [Section 3.A.1](#). Its verification, which must be carried out in the application software, ensures that the number is correctly composed.

The data carrier for this Element String is the UCC/EAN-128 Bar Code Symbol. The system recognises this Element String by the symbology identifier]C1 and the Application Identifier.

The data transmitted from the bar code reader means that the GLN of the invoicing party has been captured. The GLN must be processed together with the Payment Slip Reference Number, AI (8020), on the same payment slip.

3.6.39 Ship to - Deliver to Postal Code Within a Single Postal Authority: AI (420)

Figure 3.6.39 – 1

Format of the Element String	
Application Identifier	Postal Code
4 2 0	X ₁ — variable length → X ₂₀

The Application Identifier (420) indicates that the data field contains the postal code of the addressee (national format).

The postal code field contains the postal code of the addressee as defined by the appropriate postal authority. It is left justified and must not contain any fill characters.

The data carrier for this Element String is the UCC/EAN-128 Bar Code Symbol. The system recognises this Element String by the symbology identifier JC1 and the Application Identifier.

The data transmitted from the bar code reader means that the national version of a postal code of the addressee of the consignment has been captured. The postal code is normally processed independently.

3.6.40 Ship to - Deliver to Postal Code with Three-Digit ISO Country Code: AI (421)

Figure 3.6.40 – 1

Format of the Element String		
Application Identifier	ISO Country Code	Postal Code
4 2 1	N ₁ N ₂ N ₃	X ₄ — variable length → X ₁₂

The Application Identifier (421) indicates that the data fields contain the postal code of the addressee (international format).

The ISO country code field contains the three-digit country number of the numerical international standard ISO 3166 (data readily available on the Internet) that relates to the national postal code that follows.

The national postal code field contains the postal code of the addressee as defined by the appropriate postal authority. It is left justified and must not contain any fill characters.

The data carrier for this Element String is the UCC/EAN-128 Bar Code Symbol. The system recognises this Element String by the symbology identifier JC1 and the Application Identifier.

The data transmitted from the bar code reader means that the international version of a postal code of the addressee of the consignment has been captured. The postal code is normally processed independently.

3.6.41 Country of Origin of a Trade Item: AI (422)

Figure 3.6.41 – 1

Format of the Element String	
Application Identifier	ISO Country Code
4 2 2	N ₁ N ₂ N ₃

The Application Identifier (422) indicates that the data field contains the ISO country code of the country of origin of the trade item.

The ISO country code field contains the three-digit country number of the numerical international standard ISO 3166 that is the country of origin (data readily available on the Internet).

The data carrier for this Element String is the UCC/EAN-128 Bar Code Symbol. The system recognises this Element String by the symbology identifier JC1 and the Application Identifier.

The data transmitted from the bar code reader means that the ISO country code denoting the country of origin of the respective trade item has been captured.

Note: The country of origin is normally the country in which the trade item has been produced or manufactured. However, due to a wide range of definitions for country of origin, which were created for different purposes, it is the manufacturer's responsibility to assign the correct country of origin.

3.6.42 Country of Initial Processing: AI (423)

Figure 3.6.42 – 1

Format of the Element String	
Application Identifier	ISO Country Code(s)
4 2 3	N ₁ N ₂ N ₃ ... N ₁₅

The Application Identifier (423) indicates that the data field contains the ISO country code(s) of the country or countries of initial processing of the trade item.

The ISO country code field contains the three-digit country code(s) from the numerical international standard ISO 3166 that indicates the country or countries of initial processing (data readily available on the Internet).

The data carrier for this Element String is the UCC/EAN-128 Bar Code Symbol. The system recognises this Element String by the symbology identifier JC1 and the Application Identifier.

The data transmitted from the bar code reader means that the ISO country code(s) denoting the country or countries of initial processing of the respective trade item has been captured.

Note: The country of initial processing is normally the country in which the trade item has been produced or manufactured. However, in certain applications, such as livestock fattening, the country of initial processing may include up to five different countries, all of which should be indicated. It is the responsibility of the supplier to allocate the correct country code(s).

3.6.43 Country of Processing: AI (424)

Figure 3.6.43 – 1

Format of the Element String	
Application Identifier	ISO Country Code
4 2 4	N ₁ N ₂ N ₃

The Application Identifier (424) indicates that the data field contains the ISO country code of the country of processing of the trade item.

The ISO country code field contains the three-digit country code of the numerical international standard ISO 3166 that is the country of processing (data readily available on the Internet).

The data carrier for this Element String is the UCC/EAN-128 Bar Code Symbol. The system recognises this Element String by the symbology identifier JC1 and the Application Identifier.

The data transmitted from the bar code reader means that the ISO country code denoting the country of processing of the respective trade item has been captured.

Note: It is the responsibility of the processor of the trade item to allocate the correct country code.

3.6.44 Country of Disassembly: AI (425)

Figure 3.6.44 – 1

Format of the Element String	
Application Identifier	ISO Country Code
4 2 5	N ₁ N ₂ N ₃

The Application Identifier (425) indicates that the data field contains the ISO country code of the country of disassembly of the trade item.

The ISO country code field contains the three-digit country code of the numerical international standard ISO 3166 that is the country of disassembly (data readily available on the Internet).

The data carrier for this Element String is the UCC/EAN-128 Bar Code Symbol. The system recognises this Element String by the symbology identifier JC1 and the Application Identifier.

The data transmitted from the bar code reader means that the ISO country code denoting the country of disassembly of the respective trade item has been captured.

Note: It is the responsibility of the party doing the disassembly of the trade item to allocate the correct country code.

3.6.45 Country Covering full Process Chain: AI (426)

Figure 3.6.45 – 1

Format of the Element String	
Application Identifier	ISO Country Code
4 2 6	N ₁ N ₂ N ₃

The Application Identifier (426) indicates that the data field contains the ISO country code of the country where all the processing of the trade item took place.

The ISO country code field contains the three-digit country code of the numerical international standard ISO 3166 that is the country of full processing (data readily available on the Internet).

The data carrier for this Element String is the UCC/EAN-128 Bar Code Symbol. The system recognises this Element String by the symbology identifier JC1 and the Application Identifier.

The data transmitted from the bar code reader means that the ISO country code denoting the country of full processing of the trade item has been captured.

Note: If this AI is used, the full processing of a trade item must have taken place in a single country. This is particularly important in certain applications, such as livestock (where it would cover things such as the animal's birth, fattening, and slaughter), where processing could take place in different countries. In situations like this, AI (426) may not be used. It is the responsibility of the supplier to allocate the correct country code.

3.6.46 Seventy Series AIs - Cautionary Note

Application Identifiers issued under the 70 series are assigned when an Application Identifier request meets all the normal criteria except one of the following:

- The application is not multi-sectoral.
- The application is restricted to a country or a region (e.g., is not global).

3.1.1.43.6.46.1 NATO Stock Number (NSN): AI (7001)

Figure 3.6.46.1 – 1

Application Identifier	Format of the Element String		
	NATO Supply Classification	Assigning Country	Sequential Number
7001	N ₁ N ₂ N ₃ N ₄	N ₅ N ₆	N ₇ N ₈ N ₉ N ₁₀ N ₁₁ N ₁₂ N ₁₃

Formatted: Bullets and Numbering

The Application Identifier (7001) indicates that the data field contains a NATO stock number.

The NATO stock number is the number allocated to any item of supply in the NATO Alliance. It is the responsibility of the country that manufactures or controls the design of the item to allocate the number.

The data carrier for this Element String is the UCC/EAN-128 Bar Code Symbol. The system recognises this Element String by the symbology identifier JC1 and the Application Identifier. As it is an attribute of a trade item, the NATO stock number should not be processed on its own, but together with the Global Trade Item Number™ (GTIN™) of the trade item to which it relates.

The data transmitted from the bar code reader means that the Element String denoting a NATO stock number has been captured

Note: This Element String is only for use within the context of the supply within the NATO Alliance. Use of it is subject to the rules and regulations of the Allied Committee 135 (AC/135), the NATO Group of National Directors on Codification.

3.6.46.2 UN/ECE Meat Carcasses and Cuts Classification: AI (7002)

Figure 3.6.46.2 – 1

Format of the Element String	
Application Identifier	UN/ECE Product Classification
7 0 0 2	X ₁ ————— variable length —————> X ₃₀

The Application Identifier (7002) indicates that the data field contains a UN/ECE meat carcasses and cuts classification code.

The UN/ECE meat carcasses and cuts code is an attribute of a Global Trade Item Number™ (GTIN™) that denotes the trade description of the product. It is an alphanumeric, variable length code up to 30 characters.

The data carrier for this Element String is the UCC/EAN-128 Bar Code Symbol. The system recognises this Element String by the symbology identifier JC1 and the Application Identifier. As it is an attribute of a trade item, the UN/ECE meat carcasses and cuts code should not be processed on its own, but together with the Global Trade Item Number™ (GTIN™) of the trade item to which it relates.

The data transmitted from the bar code reader means that the Element String denoting a UN/ECE meat carcasses and cuts code has been captured.

Note: This Element String is only for use within the context of UN/ECE standards for the quality of meat carcasses and cuts (bovine, porcine, ovine, and caprine).

3.6.46.3 Approval Number of Processor with Three-Digit ISO Country Code: AI (703s)

Figure 3.6.46.3 – 1

Format of the Element String		
Application Identifier	ISO Country Code	Approval Number of Processor
7 0 3 s	N ₁ N ₂ N ₃	AN ₄ ——— variable length ———→ X ₃₀

The Application Identifier (703s) indicates that the data field contains the ISO country code and approval number of the processor of a trade item. As many processors may be involved, each with an individual approval number, the fourth digit of the AI (s in Figure 3.6.46.3 – 1) indicates the sequence of the processors. For a typical meat supply chain, the following sequence would be used:

- 7030: slaughterhouse
- 7031: first deboning/cutting hall
- 7032 to 7039: second through ninth processing location (cutting hall)

The ISO country code contains the three-digit country number of the numerical international standard ISO 3166 that relates to the following approval number of processor (data readily available on the Internet).

The approval number of processor is an attribute to a Global Trade Item Number™ (GTIN™). The approval number of processor designates the approval number of the company who did the processing.

The data carrier for this Element String is the UCC/EAN-128 Bar Code Symbol.

The system recognises this element string by the symbology identifier JC1 and the Application Identifier.

The data transmitted from the bar code reader means that the Element String for ISO country code and approval number of processor has been captured. As it is an attribute of a trade item, the ISO country code and approval number of processor should not be processed on its own, but together with the Global Trade Item Number™ (GTIN™) of the trade item to which it relates.

Note: The approval number of processor is usually assigned by a national or pluri-national authority.

3.6.47 Roll Products - Width, Length, Core Diameter, Direction, Splices: AI (8001)

Owing to the method of production, some roll products cannot be numbered according to standard criteria which have been determined in advance. They are, therefore, classified as variable items. For those products where the standard trade measures are not sufficient, the following guidelines should be used.

The identification of a roll product consists of the Global Trade Item Number™ (GTIN™) and the variable attributes. The basic product (e.g., a certain type of paper) is included as data in the EAN/UCC-14 ID Number (see [Section 3.6.3](#)), and the variables contain information about the special features of the particular item that has been produced.

Figure 3.6.47 – 1

Format of the Element String														
Application Identifier	Variable Values of a Roll Product													
8 0 0 1	N ₁	N ₂	N ₃	N ₄	N ₅	N ₆	N ₇	N ₈	N ₉	N ₁₀	N ₁₁	N ₁₂	N ₁₃	N ₁₄

The Application Identifier (8001) indicates that the data fields contain the variable attributes of a roll product.

The variable values of a roll product, N₁ to N₁₄, consist of the following data:

- N₁ to N₄: slit width in millimetres (width of the roll)
- N₅ to N₉: actual length in metres
- N₁₀ to N₁₂: internal core diameter in millimetres
- N₁₃: winding direction (face out 0, face in 1, undefined 9)
- N₁₄: number of splices (0 to 8 = actual number, 9 = number unknown)

The data carrier for this Element String is the UCC/EAN-128 Bar Code Symbol.

The system recognises this Element String by the symbology identifier JC1 and the Application Identifier.

The data transmitted from the bar code reader means that the variable attributes of the identification of a roll product trade item have been captured. The variable attributes may be processed together with the simultaneously required GTIN of that trade item (see [Section 3.6.3](#)).

3.6.48 Cellular Mobile Telephone Identifier: AI (8002)

Figure 3.6.48 – 1

Format of the Element String	
Application Identifier	Serial Number
8 0 0 2	X ₁ ——— variable ———> X ₂₀

The Application Identifier (8002) indicates that the data field contains the serial number of a cellular mobile telephone.

The serial number field is alphanumeric and may contain all characters contained in [Figure 3.A.3 – 1](#). A national or pluri-national authority usually assigns the number. It uniquely identifies each mobile telephone within a given authority for special control purposes. It is not considered as an attribute of the identification of the telephone as a trade item.

The data carrier for this Element String is the UCC/EAN-128 Bar Code Symbol. The system recognises this Element String by the symbology identifier]C1 and the Application Identifier.

The data transmitted from the bar code reader means that the Element String denoting an electronic serial identifier of a cellular mobile telephone has been captured. The electronic serial identifier may be processed according to the particular application requirements.

3.6.49 EAN.UCC Global Returnable Asset Identifier (GRAI): AI (8003)

The EAN.UCC Global Returnable Asset Identifier (GRAI) is based on the EAN/UCC-13 or UCC-12 Data Structure (see [Section 1.3](#)).

Figure 3.6.49 – 1

Format of the Element String				
Application Identifier	GRAI			Serial Number (Optional)
	EAN.UCC Company Prefix	Asset Type	Check Digit	
(UCC-12)	8 0 0 3	0 0 N ₁ N ₂ N ₃ N ₄ N ₅ N ₆ N ₇ N ₈ N ₉ N ₁₀ N ₁₁	N ₁₂	X ₁ — variable → X ₁₆
(EAN/UCC-13)	8 0 0 3	0 N ₁ N ₂ N ₃ N ₄ N ₅ N ₆ N ₇ N ₈ N ₉ N ₁₀ N ₁₁ N ₁₂	N ₁₃	X ₁ — variable → X ₁₆

The Application Identifier (8003) indicates that the data fields contain the GRAI.

The EAN.UCC Company Prefix is the one allocated to the owner of the asset (see [Section 1.2](#)). It makes the number unique worldwide. The zero in the leftmost position is added to generate 14 digits in the asset identification number field.

The Asset Type is a number assigned by the owner of the asset to uniquely identify each type of asset.

The Check Digit is explained in [Section 3.A.1](#). Its verification, which must be carried out in the application software, ensures that the number is correctly composed.

The optional serial number is assigned by the owner of the asset. It identifies an Individual Asset within a given Asset Type. The field is alphanumeric and may contain all characters contained in [Figure 3.A.3 – 1](#).

The data carrier for this Element String is the UCC/EAN-128 Bar Code Symbol. The system recognises this Element String by the symbology identifier JC1, by the Application Identifier and by the length of the transmitted data.

The data transmitted from the bar code reader means that the GRAI has been captured. It may be processed according to the particular application requirements.

3.6.50 EAN.UCC Global Individual Asset Identifier (GIAI): AI (8004)

This Element String may be used for the unique identification of assets to provide a means to store relevant data.

Note: This Element String must never be used to identify the entity as a trade item or logistic unit. If an asset is transferred between parties, the EAN.UCC Global Individual Asset Identifier (GIAI) cannot be used for ordering the asset. However, asset identification may be exchanged between parties for the purpose of traceability.

Figure 3.6.50 – 1

Format of the Element String	
Application Identifier	GIAI
	EAN.UCC Company Prefix Individual Asset Reference
8 0 0 4	$N_1 \dots N_i$ $X_{i+1} \dots$ variable length $X_j \text{ (} j \leq 30 \text{)}$

The Application Identifier (8004) indicates that the data field contains a GIAI.

The GIAI uses the EAN.UCC Company Prefix of the company assigning the Individual Asset Reference. The structure and numbering of the individual asset reference is determined by the holder of the EAN.UCC Company Prefix. It may contain all characters contained in [Figure 3.A.3 – 1](#).

The data carrier for this Element String is the UCC/EAN-128 Bar Code Symbol. The system recognises this Element String by the symbology identifier JC1 and the Application Identifier.

The data transmitted from the bar code reader means that the Element String of a GIAI has been captured. It may be processed according to the particular application requirements.

3.6.51 Price Per Unit of Measure: AI (8005)

This Element String is used to indicate the price per unit of measure of price marked goods on a Variable Measure Trade Item to discriminate price variants of the same item. It is considered as an attribute of the respective trade item and not as part of its identification.

Figure 3.6.51 – 1

Format of the Element String						
Application Identifier	Price Per Unit of Measure					
8 0 0 5	N ₁	N ₂	N ₃	N ₄	N ₅	N ₆

The Application Identifier (8005) indicates that the data field contains a price per unit of measure.

Content and structure of the price per unit of measure field are left to the discretion of the trading partners.

The data carrier for this Element String is the UCC/EAN-128 Bar Code Symbol. The system recognises this Element String by the symbology identifier JC1 and the Application Identifier.

The data transmitted from the bar code reader means that the Element String denoting the price per unit of measure has been captured. This Element String must always be decoded and processed together with the Global Trade Item Number™ (GTIN™) from the same item.

3.6.52 Identification of the Components of a Trade Item: AI (8006)

Figure 3.6.52 – 1

Format of the Element String			
Application Identifier	Global Trade Item Number™ (GTIN™)	Relative Number of the Component Within the Assembly	Total Number of Components in the Assembly
8 0 0 6	N ₁ N ₂ N ₃ N ₁₁ N ₁₃ N ₁₄	N ₁₅ N ₁₆	N ₁₇ N ₁₈

The Application Identifier (8006) indicates that the data fields contain the identification of the trade item and the enumeration of its components.

The GTIN is the item number under which the whole item is traded. For the structures of the GTIN, see [Section 1.3](#).

The relative number field shows the consecutive number of a particular component within the assembly. A component of a given trade item must always be identical for the respective trade item.

The total number field shows the total number of components of the trade item.

The Check Digit is explained in [Section 3.A.1](#). Its verification, which must be carried out in the application software, ensures that the number is correctly composed.

The data carrier for this Element String is the UCC/EAN-128 Bar Code Symbol. The system recognises this Element String by the symbology identifier]C1 and the Application Identifier.

The data transmitted from the bar code reader means that the identification of a component of a trade item has been captured. Components may be processed according to the particular application requirements.

3.6.53 International Bank Account Number (IBAN): AI (8007)

Figure 3.6.53 – 1

Format of the Element String	
Application Identifier	International Bank Account Number
8 0 0 7	X ₁ ——— variable ———> X ₃₀

The Application Identifier (8007) indicates that the data field contains the international bank account identifier.

The International Bank Account Number (IBAN), AI (8007), defined as *ISO 13616*, indicates to which account the amount of the respective payment slip is to be transferred. The invoicing party determines the applicable bank account number. The data field is alphanumeric and may contain all characters contained in [Figure 3.A.3 – 1](#).

The data carrier for this Element String is the UCC/EAN-128 Bar Code Symbol. The system recognises this Element String by the symbology identifier JC1 and the Application Identifier.

The data string transmitted by the bar code reader means that an IBAN has been captured. The IBAN must be processed together with the Payment Slip Reference Number, AI (8020), and the EAN.UCC Global Location Number (GLN) of the invoicing party that is captured from the same payment slip.

3.6.54 Date and Time of Production: AI (8008)

Figure 3.6.54 – 1

Format of the Data Element						
Application Identifier	Date and Time of Production					
	YY	MM	DD	HH	MM	SS
8008	N ₁ N ₂	N ₃ N ₄	N ₅ N ₆	N ₇ N ₈	N ₉ N ₁₀	N ₁₁ N ₁₂

The Application Identifier (8008) indicates that the data fields contain a date and time of production.

The date and time of production is the date and time of production or assembly determined by the manufacturer. The date and time may refer to the trade item itself or to the items contained.

The structure is:

Year: the tens and units of the year (e.g., 2000 = 00), which is mandatory

Month: the number of the month (e.g., January = 01), which is mandatory

Day: the number of the day of the relevant month (e.g., second day = 02), which is mandatory.

Hour: the number of the hour based on local time (e.g., 2 p.m. = 14), which is mandatory

Minutes: may be dropped if not required

Seconds: may be dropped if not required

The data carrier for this Element String is the UCC/EAN-128 Bar Code Symbol. The system recognises this Element String by the symbology identifier JC1 and the Application Identifier.

The data transmitted from the bar code reader means that the Element String denoting date and time of production has been captured. As it is an attribute of a trade item, the date and time of production should not be processed on its own, but together with the Global Trade Item Number™ (GTIN™) of the trade item to which it relates.

Note: This Element String can only specify dates in the range from 49 years in the past to 50 years in the future. Determination of the correct century is explained in [Section 3.A.5](#).

3.6.55 EAN.UCC Global Service Relation Number (GSRN): AI (8018)

This Element String may be used to identify the recipient of services in the context of a service relationship. It provides a means for the service provider to store data relevant to services provided to the recipient.

Figure 3.6.55 – 1

Format of the Element String			
Application Identifier	EAN.UCC Global Service Relation Number (GSRN)		
	EAN.UCC Company Prefix	Service Reference	Check Digit
8 0 1 8	N ₁ N ₂ N ₃ N ₄ N ₅ N ₆ N ₇ N ₈ N ₉ N ₁₀ N ₁₁ N ₁₂ N ₁₃ N ₁₄ N ₁₅ N ₁₆ N ₁₇		N ₁₈

The Application Identifier (8018) indicates that the data field contains a GSRN.

The EAN.UCC Company Prefix is the one allocated to the service provider (see [Section 1.2](#)). It makes the number unique worldwide.

The Service Reference is assigned by the service provider. The structure and content of the Service Reference is at the discretion of the particular service provider.

The Check Digit is explained in [Section 3.A.1](#). Its verification, which must be carried out in the application software, ensures that the number is correctly composed.

The data carrier for this Element String is the UCC/EAN-128 Bar Code Symbol. The system recognises this Element String by the symbology identifier JC1 and the Application Identifier.

The data transmitted from the bar code reader means that the Element String for a GSRN has been captured. It may be processed according to the particular application requirements.

3.6.56 Payment Slip Reference Number: AI (8020)

Figure 3.6.56 – 1

Format of the Element String	
Application Identifier	Payment Slip Reference Number
8 0 2 0	X ₁ ——— variable ———> X ₂₅

The Application Identifier (8020) indicates that the data field contains a Payment Slip Reference Number.

The Payment Slip Reference Number, assigned by the invoicing party, identifies a payment slip within a given EAN.UCC Global Location Number (GLN) of an invoicing party. Together with the GLN of the invoicing party, the Payment Slip Reference Number uniquely identifies a payment slip. The data field is alphanumeric and may contain all characters contained in [Figure 3.A.3 – 1](#).

The data carrier for this Element String is the UCC/EAN-128 Bar Code Symbol. The system recognises this Element String by the symbology identifier JC1 and the Application Identifier.

The data string transmitted from the bar code reader means that a Payment Slip Reference Number has been captured. It must be processed together with the GLN of the invoicing party that is captured from the same payment slip.

3.6.57 UCC/EAN-128 Coupon Extended Code: AIs (8100 - 8102)

Figure 3.6.57 – 1

Formats of the Element Strings				
Application Identifier	Filler Digit	UCC Prefix	Offer Code	Expiration Date (Month + Year)
8 1 0 0		N ₁	N ₂ N ₃ N ₄ N ₅ N ₆	
8 1 0 1		N ₁	N ₂ N ₃ N ₄ N ₅ N ₆	N ₇ N ₈ N ₉ N ₁₀
8 1 0 2	0	N ₂		

The Application Identifiers (8100) to (8102) indicate that the data fields contain data supplementary to a Uniform Code Council (UCC™) coupon identification.

The filler digit 0 is used in AI (8102) to generate an even number of digits in the Element String.

The UCC Prefix is the digit that is preceded by a zero and followed by a Company Number to form the EAN.UCC Company Prefix. The Offer Code is assigned by the issuer and identifies a particular promotion.

The expiration date indicates the end of the redemption period of the coupon.

The data carrier for this Element String is the UCC/EAN-128 Bar Code Symbol. The system recognises this Element String by the symbology identifier JC1 and the respective Application Identifier.

3.6.58 Information Mutually Agreed Between Trading Partners (Including FACT Data Identifiers): AI (90)

Figure 3.6.58 – 1

Format of the Element String	
Application Identifier	Data Field
9 0	X ₁ ————— variable length —————> X ₃₀

The Application Identifier (90) indicates that the data field contains any information mutually agreed between trading partners.

The data field shows the information agreed between the two trading partners. The field is alphanumeric and may contain all characters contained in [Figure 3.A.3 – 1](#). It may also be used to incorporate data preceded by FACT Data Identifiers.

The data carrier for this Element String is the UCC/EAN-128 Bar Code Symbol. The system recognises this Element String by the symbology identifier]C1 and the Application Identifier.

The data transmitted from the bar code reader means that the Element String AI (90) has been captured. As the data field may contain any information, processing is subject to prior agreement between trading partners.

Warning: The bar code symbol carrying this Element String should be removed from any item that leaves the jurisdiction of the trading partners.

3.6.59 Company Internal Information: AIs (91 - 99)

Figure 3.6.59 – 1

Format of the Element String	
Application Identifier	Data Field
A ₁ A ₂	X ₁ ——— variable length ———→ X ₃₀

The Application Identifier (A₁ A₂) assigned to this Element String is AI (91 to 99).

The data field may contain any company internal information. The field is alphanumeric and may show all characters contained in [Figure 3.A.3 – 1](#).

The data carrier for this Element String is the UCC/EAN-128 Bar Code Symbol. The system recognises this Element String by the symbology identifier JC1 and the Application Identifier.

The data transmitted from the bar code reader means that the Element String containing company internal information has been captured. Processing is to be organised by the using company.

Warning: This Element String should be removed from any item that leaves the jurisdiction of the company.

3.6.60 Global Identifier Serialised for Trade (GIST) (AI 252)

3.6.60.1 Application of Global Identifier Serialised for Trade (GIST)

The Global Identifier Serialised for Trade (GIST) may be used to provide a standard identification number, that may then be bar coded on the physical product, for one-off traded products such as:

- Highly complex Configure To Order products that are built only once to meet a specific customer order.
- Intangible or unique items designed to meet an individual buyer's requirement.
- Extracts of intellectual property that are traded.

The GIST provides a unique data key that can be used to find all the details of the traded item, including the entire item's attributes, in the supplier's database. The GIST is the unique key used to access this information.

The GIST is typically assigned by the manufacturer (seller) of the product, and can then be communicated to the assembler and the buyer along with access to the master data.

Note: The assignment of a unique product identification number, assigned at source by the manufacturer, has a potential impact on business applications. EAN and UCC have launched a Global Project to examine these issues. The findings of this research will lead to additional clarification in the next release of these General EAN.UCC Specifications.

3.6.60.2 Definition of Global Identifier Serialised for Trade (GIST) (AI 252)

Definition: Identification of trade items that are conceived, built, or configured only once in time from a commercial viewpoint. Examples include: complex configure to order or build to order items that for all practical purposes will never be reordered; a "quotable quote" that is commercially traded, but conceived only once; an idea, sentence or section of a research paper that is commercially traded; etc.

Figure 3.6.60.2 – 1

Format of the Element String		
Application Identifier	GIST	
	EAN.UCC Company Prefix	Serialised Reference
	Check Digit	
2 5 2	N ₁ N ₂ N ₃ N ₄ N ₅ N ₆ N ₇ N ₈ N ₉ N ₁₀ N ₁₁ N ₁₂ N ₁₃ N ₁₄ N ₁₅ N ₁₆ N ₁₇ N ₁₈ N ₁₉ N ₂₀ N ₂₁ N ₂₂ N ₂₃ N ₂₄ N ₂₅ N ₂₆	N ₂₇

The Application Identifier 252 indicates that the data field contains the GIST.

The EAN.UCC Company Prefix is allocated by either the Uniform Code Council (UCC) or an EAN Member Organisation to a system user (see [Section 1.2](#)). It makes the GIST unique worldwide. The GIST is a reference number that is used to associate and retrieve related information. The GIST itself contains no supply chain information.

The structure and content of the Serialised Reference is at the discretion of the system user responsible for its assignment and uniqueness. It is numeric and non-repeatable in the context of an EAN.UCC Company Prefix.

The Check Digit is explained in [Section 3.A.1](#). Its verification, which must be carried out in the application software, ensures that the number is correctly composed.

Data carrier: UCC/EAN-128 Symbology, RSS Expanded.

System considerations: The system recognises this Element String by the Symbology Identifier]C1 and the Application Identifier.

The data transmitted from the bar code reader means that the GIST has been captured.

Note: This Element String identifies the entity for trading purposes. If such an entity later becomes a physical asset of an organisation, the Element String AI (252) must never be used to identify the asset.

3.6.60.3 Use of Global Identifier Serialised for Trade (GIST) with other EAN.UCC keys

The AI 252 has no mandatory associations with any other Element String.

[Figure 3.6.60.3 – 1](#) defines Element Strings that cannot appear on the same physical entity as AI 252.

Figure 3.6.60.3 – 1

Pair of Element Strings				Comment
AI	Designation	AI	Designation	
252	Global Identifier Serialised for Trade	GTIN	Identification of a trade item	Duplicate Trade Item Identification. AI 252 should only be used for one off products.
252	Global Identifier Serialised for Trade	21	Serial Number	Only one serial number may be applied on an item.

3.A.1 Appendix 1: Check Digit Calculations

3.A.1.1 Standard Check Digit Calculations for EAN.UCC Data Structures

Figure 3.A.1.1 – 1

	Digit Positions																			
EAN/ UCC-8											N ₁	N ₂	N ₃	N ₄	N ₅	N ₆	N ₇	N ₈		
UCC-12							N ₁	N ₂	N ₃	N ₄	N ₅	N ₆	N ₇	N ₈	N ₉	N ₁₀	N ₁₁	N ₁₂		
EAN/ UCC-13							N ₁	N ₂	N ₃	N ₄	N ₅	N ₆	N ₇	N ₈	N ₉	N ₁₀	N ₁₁	N ₁₂	N ₁₃	
EAN/ UCC-14							N ₁	N ₂	N ₃	N ₄	N ₅	N ₆	N ₇	N ₈	N ₉	N ₁₀	N ₁₁	N ₁₂	N ₁₃	N ₁₄
17 digits		N ₁	N ₂	N ₃	N ₄	N ₅	N ₆	N ₇	N ₈	N ₉	N ₁₀	N ₁₁	N ₁₂	N ₁₃	N ₁₄	N ₁₅	N ₁₆	N ₁₇		
18 digits	N ₁	N ₂	N ₃	N ₄	N ₅	N ₆	N ₇	N ₈	N ₉	N ₁₀	N ₁₁	N ₁₂	N ₁₃	N ₁₄	N ₁₅	N ₁₆	N ₁₇	N ₁₈		
	Multiply value of each position by																			
	x3	x1	x3	x1	x3	x1	x3	x1	x3	x1	x3	x1	x3	x1	x3	x1	x3			
	Accumulated results = sum																			
	Subtract sum from nearest equal or higher multiple of ten = Check Digit →																			

Figure 3.A.1.1 – 2

Example of a Check Digit Calculation for the 18-Digit Field																		
Positions	N ₁	N ₂	N ₃	N ₄	N ₅	N ₆	N ₇	N ₈	N ₉	N ₁₀	N ₁₁	N ₁₂	N ₁₃	N ₁₄	N ₁₅	N ₁₆	N ₁₇	N ₁₈
Number without Check Digit	3	7	6	1	0	4	2	5	0	0	2	1	2	3	4	5	6	
Step 1: multiply by	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
	3	1	3	1	3	1	3	1	3	1	3	1	3	1	3	1	3	
Step 2: add up results to sum	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	
	9	7	18	1	0	4	6	5	0	0	6	1	6	3	12	5	18	= 101
Step 3: Subtract sum from nearest equal or higher multiple of ten (110) = Check Digit (9)																		
Number with Check Digit	3	7	6	1	0	4	2	5	0	0	2	1	2	3	4	5	6	9

3.A.1.2 Check Digit Calculation for Price/Weight Fields

To increase the security of reading a price or weight from a bar code symbol, the Check Digit for these fields is not only calculated according to the methods described in the previous section, but also according to the procedure described in this section.

The basic principle of the Check Digit calculation is that each digit position in a price/weight field is assigned a weighting factor. Weighting factors are 2-, 3, 5+, and 5-. Each weighting factor affects the particular calculation for the position concerned. The result of such a calculation is called a weighted product.

The figures below show the weighted products of the various weighting factors.

Figure 3.A.1.2 – 1

Weighting Factor 2-										
Calculation rule: The digit is multiplied by 2. If the result has two digits, the tens digit is subtracted from the units digit. The units digit resulting is the weighted product.										
Digit	0	1	2	3	4	5	6	7	8	9
Weighted product	0	2	4	6	8	9	1	3	5	7

Figure 3.A.1.2 – 2

Weighting Factor 3										
Calculation rule: The digit is multiplied by 3. The units digit of the result is the weighted product.										
Digit	0	1	2	3	4	5	6	7	8	9
Weighted product	0	3	6	9	2	5	8	1	4	7

Figure 3.A.1.2 – 3

Weighting Factor 5+										
Calculation rule: The digit is multiplied by 5. The units digit and the tens digit of the result are added together. The result of this sum is the weighted product.										
Digit	0	1	2	3	4	5	6	7	8	9
Weighted product	0	5	1	6	2	7	3	8	4	9

Figure 3.A.1.2 – 4

Weighting Factor 5-										
Calculation rule: The digit is multiplied by 5. The tens digit of the result is subtracted from the result. The units digit of the result of this subtraction is the weighted product.										
Digit	0	1	2	3	4	5	6	7	8	9
Weighted product	0	5	9	4	8	3	7	2	6	1

3.A.1.3 Check Digit Calculation for the Four-Digit Price Field

Figure 3.A.1.3 – 1

Assigned Weighting Factors				
Digit position	1	2	3	4
Weighting factor	2-	2-	3	5-

Calculation step 1: Determine the weighted product for each number in Positions one to four according to the assigned weighting factors.

Calculation step 2: Add the products of step 1.

Calculation step 3: Multiply the result of step 2 by the factor 3. The units digit of the result is the Check Digit.

Figure 3.A.1.3 – 2

Example of a Check Digit Calculation				
Position of price field	1	2	3	4
Assigned weighting factor	2-	2-	3	5-
Amount	2	8	7	5
Step 1: weighted product according to figure	4	5	1	3
Step 2: sum	+	+	+	+
Step 3: multiply by 3				

Unit position is the Check Digit

3.A.1.4 Check Digit Calculation for the Five-Digit Price Field

Figure 3.A.1.4 – 1

Assigned Weighting Factors					
Digit positions	1	2	3	4	5
Weighting factor	5+	2-	5-	5+	2-

Calculation step 1: Determine the weighted product for each number in Positions one to five according to the assigned weighting factors.

Calculation step 2: Add the products of step 1.

Calculation step 3: Subtract the result from the nearest equal or higher multiple of 10.

Calculation step 4: Take the result and search for the same number in the weighted product row of [Figure 3.A.1.2 – 4](#). The Check Digit is the number in the digit row of the same column.

Figure 3.A.1.4 – 2

Example of a Check Digit Calculation					
Price field positions	1	2	3	4	5
Assigned weighting factor	5+	2-	5-	5+	2-
Amount	1	4	6	8	5
Step 1: weighted product according to figure	5	8	7	4	9
Step 2: sum	+	+	+	+	+
Step 3: result of subtraction (40 - 33)					
Step 4: weighted product 7 in the figure weighting factor 5- shows number 6 to be the Check Digit.					

3.A.2 Appendix 2: UCC-12 Identification Numbers in a UPC-E Bar Code Symbol

Some UCC-12 Identification Numbers beginning with the UCC Prefix 0 may be represented in a small symbol called the UPC-E Bar Code Symbol. The UCC-12 ID Number is condensed into a bar code symbol consisting of six symbol character positions. For application processing, the UCC-12 ID Number must be transformed into its full length by the bar code reader software or by the application software. There is no six-digit UPC-E Bar Code Symbol.

Figure 3.A.2 – 1

UPC-E Bar Code Symbol Option for the Identification of Global Trade Item Numbers™ (GTINs™)

UCC-12 Identification Number of Trade Item												Represented in UPC-E Symbol Positions						
UCC Company Prefix						Item Reference					Check Digit							
N ₁	N ₂	N ₃	N ₄	N ₅	N ₆	N ₇	N ₈	N ₉	N ₁₀	N ₁₁	N ₁₂		1	2	3	4	5	6
(0)	0	0	0	0	0	1	0	0	0	0	5	4	0	0	0	0	1	'5'
(0)	0	9	9	9	9	9	0	0	0	0	9	2	9	9	9	9	9	'9'
= 5 UPC-E Bar Code Symbol Applications																		
(0)	0	0	0	0	1	0	0	0	0	0	7	0	0	0	1	0	'4'	
(0)	0	9	9	9	9	0	0	0	0	9	1	9	9	9	9	9	'4'	
= 10 UPC-E Bar Code Symbol Applications																		
(0)	0	0	0	3	0	0	0	0	0	0	7	0	0	3	0	0	'3'	
(0)	0	9	9	9	0	0	0	0	0	9	9	5	9	9	9	9	'3'	
= 100 UPC-E Bar Code Symbol Applications																		
(0)	0	0	0	0	0	0	0	0	0	0	9	0	0	0	0	0	'0'	
(0)	0	9	9	2	0	0	0	0	9	9	9	9	9	9	9	9	'2'	
= 1000 UPC-E Bar Code Symbol Applications																		

Company Prefixes showing 000000 and 001000 to 007999 in positions N₁ to N₆ are not available in the UPC-E Bar Code Symbol option (see [Figure 3.A.2 – 2](#)).

Figure 3.A.2 – 2

UPC-E Bar Code Symbol Option

for the Identification of GTINs for Company Internal Distribution

UCC-12 Identification Number of Trade Item												Check Digit	Represented in UPC-E Symbol Positions					
N ₁	N ₂	N ₃	N ₄	N ₅	N ₆	N ₇	N ₈	N ₉	N ₁₀	N ₁₁	N ₁₂	1	2	3	4	5	6	
(0)	0	0	1	0	0	0	0	0	0	5	2	0	1	0	0	0	'5'	
(0)	0	<u>0</u>	<u>7</u>	<u>9</u>	<u>9</u>	<u>9</u>	0	0	0	0	<u>9</u>	7	<u>0</u>	<u>7</u>	<u>9</u>	<u>9</u>	<u>9</u>	'9'
LAC version = 35000 UPC-E Bar Code Symbol Applications																		
(0)	0	0	1	0	0	0	0	0	1	0	0	4	0	1	1	0	0	'0'
(0)	0	<u>0</u>	<u>5</u>	<u>0</u>	0	0	0	0	<u>9</u>	<u>9</u>	<u>9</u>	2	<u>0</u>	<u>5</u>	<u>9</u>	<u>9</u>	<u>9</u>	'0'
RZSC version = 4500 UPC-E Bar Code Symbol Applications																		
(0)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	'0'
(0)	0	<u>0</u>	<u>0</u>	<u>0</u>	0	0	0	0	<u>9</u>	<u>9</u>	<u>9</u>	7	<u>0</u>	<u>0</u>	<u>9</u>	<u>9</u>	<u>9</u>	'0'
Velocity version = 1000 UPC-E Bar Code Symbol Applications																		

Figure 3.A.2 – 2 shows the construction principle of the UPC-E Bar Code Symbol for trade item numbering for restricted distribution (company internal). These UCC-12 Identification Numbers are not unambiguous when leaving the applying company.

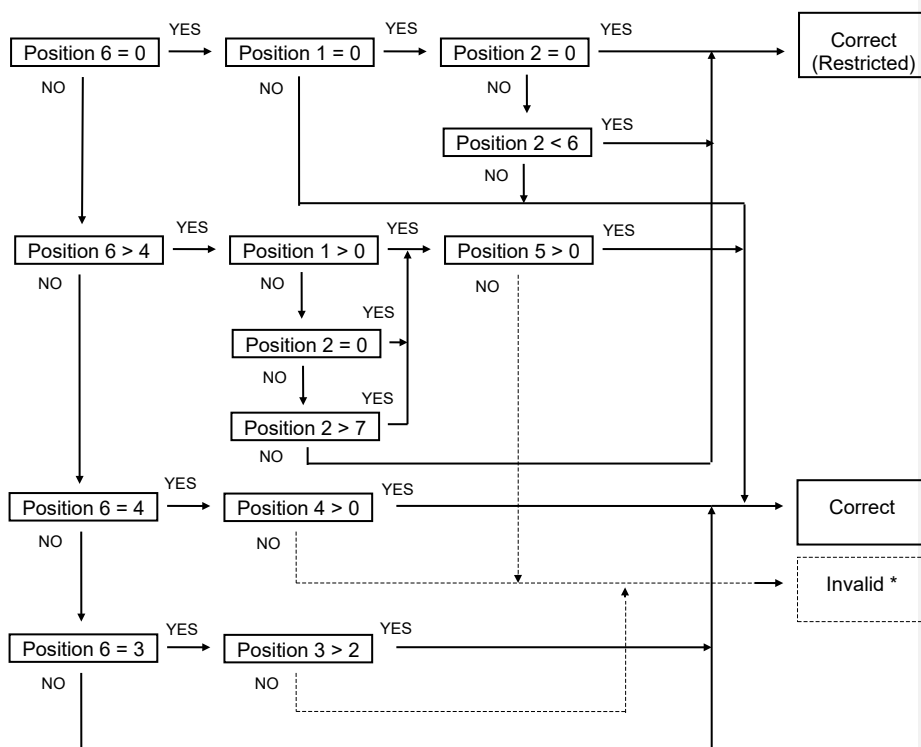
In Figures 3.A.2 – 1 and 3.A.2 – 2, each number position must only contain the digits shown in the upper and lower lines of each section and those in-between. On decoding, the extension to full length is determined by the value of the number in single quotes in the column represented in UPC-E Bar Code Symbol positions.

The Check Digit, calculated as described in [Section 3.A.1](#), applies to the entire length of the UCC-12 Identification Number. In the UPC-E Bar Code Symbol, it is implicitly represented by the parity combination of the six symbol characters that are actually encoded.

It is possible to create false UPC-E Bar Code Symbols if the encodation rules are not properly observed. Whether the digits represented in a UPC-E Bar Code Symbol can be expanded correctly to a UCC-12 Identification Number may be verified by the following tests.

Test 1: Verify the digits encoded in Positions 1 to 6 of the UPC-E Bar Code Symbol according to the diagram in Figure 3.A.2 – 3.

Figure 3.A.2 – 3



Note: These UPC-E Bar Code Symbols were valid in previous specifications. Provision for accepting them must be made during decoding only.

Test 2: Expand the digits encoded in the UPC-E Bar Code Symbol to the first 11 digits of the full length UCC-12 Identification Number, calculate the Check Digit, and compare it with the Check Digit decoded from the UPC-E Bar Code Symbol. If they do not match, it signifies an invalid symbol.

3.A.3 Appendix 3: The International Standard ISO/IEC 646

Figure 3.A.3 – 1

Unique Graphic Character Allocations

Graphic Symbol	Name	Coded Representation	Graphic Symbol	Name	Coded Representation
!	Exclamation mark	2/1	M	Capital letter M	4/13
"	Quotation mark	2/2	N	Capital letter N	4/14
%	Percent sign	2/5	O	Capital letter O	4/15
&	Ampersand	2/6	P	Capital letter P	5/0
'	Apostrophe	2/7	Q	Capital letter Q	5/1
(	Left parenthesis	2/8	R	Capital letter R	5/2
)	Right parenthesis	2/9	S	Capital letter S	5/3
*	Asterisk	2/10	T	Capital letter T	5/4
+	Plus sign	2/11	U	Capital letter U	5/5
,	Comma	2/12	V	Capital letter V	5/6
-	Hyphen/Minus	2/13	W	Capital letter W	5/7
.	Full stop	2/14	X	Capital letter X	5/8
/	Solidus	2/15	Y	Capital letter Y	5/9
0	Digit zero	3/0	Z	Capital letter Z	5/10
1	Digit one	3/1	—	Low line	5/15
2	Digit two	3/2	a	Small letter a	6/1
3	Digit three	3/3	b	Small letter b	6/2
4	Digit four	3/4	c	Small letter c	6/3
5	Digit five	3/5	d	Small letter d	6/4
6	Digit six	3/6	e	Small letter e	6/5
7	Digit seven	3/7	f	Small letter f	6/6
8	Digit eight	3/8	g	Small letter g	6/7
9	Digit nine	3/9	h	Small letter h	6/8
:	Colon	3/10	i	Small letter i	6/9
;	Semicolon	3/11	j	Small letter j	6/10
<	Less-than sign	3/12	k	Small letter k	6/11
=	Equals sign	3/13	l	Small letter l	6/12
>	Greater-than sign	3/14	m	Small letter m	6/13
?	Question mark	3/15	n	Small letter n	6/14
A	Capital letter A	4/1	o	Small letter o	6/15
B	Capital letter B	4/2	p	Small letter p	7/0
C	Capital letter C	4/3	q	Small letter q	7/1
D	Capital letter D	4/4	r	Small letter r	7/2
E	Capital letter E	4/5	s	Small letter s	7/3
F	Capital letter F	4/6	t	Small letter t	7/4
G	Capital letter G	4/7	u	Small letter u	7/5
H	Capital letter H	4/8	v	Small letter v	7/6
I	Capital letter I	4/9	w	Small letter w	7/7
J	Capital letter J	4/10	x	Small letter x	7/8
K	Capital letter K	4/11	y	Small letter y	7/9
L	Capital letter L	4/12	z	Small letter z	7/10

3.A.4 Appendix 4: EAN.UCC Data Titles

3.A.4.1 All Application Identifiers

Figure 3.A.4.1 – 1

AI	Full Title	Format	Data Title
00	SSCC (Serial Shipping Container Code)	n2+n18	SSCC
01	Global Trade Item Number™	n2+n14	GTIN™
02	GTIN of Trade Items Contained in a logistic unit	n2+n14	CONTENT
10	Batch or lot number	n2+an..20	BATCH/LOT
11*	Production date (YYMMDD)	n2+n6	PROD DATE
12*	Due date (YYMMDD)	n2+n6	DUE DATE
13*	Packaging date (YYMMDD)	n2+n6	PACK DATE
15*	Minimum durability date (YYMMDD)	n2+n6	BEST BEFORE or SELL BY
17*	Maximum durability date (YYMMDD)	n2+n6	USE BY OR EXPIRY
20	Product variant	n2+n2	VARIANT
21	Serial number	n2+an..20	SERIAL
22	Secondary data for specific health industry products	n2+an..29	QTY/DATE/BATCH
23**	Lot number (transitional use)	n3+n..19	BATCH/LOT
240	Additional product identification assigned by the manufacturer	n3+an..30	ADDITIONAL ID
241	Customer part number	n3+an..30	CUST. PART NO.
250***	Secondary serial number	n3+an..30	SECONDARY SERIAL
251***	Reference to source entity	n3+an..30	REF. TO SOURCE
30	Variable count	n2+n..8	VAR. COUNT

All Application Identifiers (*continued*)

AI	Full Title	Format	Data Title
310n-369n	(Trade and logistic measurements)	n4+n6	
337n	Kilograms per square metre	n4+n6	KG PER m ²
37	Count of trade items contained in a logistic unit	n2+n..8	COUNT
390(n)	Amount payable – single monetary area	n4+n..15	AMOUNT
391(n)	Amount payable – with ISO currency code	n4+n3+n..15	AMOUNT
392(n)	Amount payable for a Variable Measure Trade Item – single monetary unit	n4+n..15	PRICE
393(n)	Amount payable for a Variable Measure Trade Item – with ISO currency code	n4+n3+n..15	PRICE
400	Customer's purchase order number	n3+an..30	ORDER NUMBER
401	Consignment number	n3+an..30	CONSIGNMENT
402	Shipment Identification Number	n3+n17	SHIPMENT NO.
403	Routing code	n3+an..30	ROUTE
410	Ship to - deliver to EAN.UCC Global Location Number	n3+n13	SHIP TO LOC
411	Bill to - invoice to EAN.UCC Global Location Number	n3+n13	BILL TO
412	Purchased from EAN.UCC Global Location Number	n3+n13	PURCHASE FROM
413	Ship for - deliver for - forward to EAN.UCC Global Location Number	n3+n13	SHIP FOR LOC
414	Identification of a physical location EAN.UCC Global Location Number	n3+n13	LOC No
415	EAN.UCC Global Location Number of the Invoicing Party	n3+n13	PAY TO

All Application Identifiers (continued)

AI	Full Title	Format	Data Title
420	Ship to - deliver to postal code within a single postal authority	n3+an..20	SHIP TO POST
421	Ship to - deliver to postal code with Three-Digit ISO country code	n3+n3+an..9	SHIP TO POST
422	Country of origin of a trade item	n3+n3	ORIGIN
423	Country of initial processing	n3+n3+n..12	COUNTRY - INITIAL PROCESS.
424	Country of processing	n3+n3	COUNTRY - PROCESS.
425	Country of disassembly	n3+n3	COUNTRY - DISASSEMBLY
426	Country covering full process chain	n3+n3	COUNTRY – FULL PROCESS
7001	NATO stock number	n4+n13	NSN
7002	UN/ECE meat carcasses and cuts classification	n4+an..30	MEAT CUT
703(s)****	Approval number of processor with ISO country code	n4+n3+an..27	PROCESSOR # s ⁴
8001	Roll products - width, length, core diameter, direction, and splices	n4+n14	DIMENSIONS
8002	Electronic serial identifier for cellular mobile telephones	n4+an..20	CMT No
8003	EAN.UCC Global Returnable Asset Identifier	n4+n14+an..16	GRAI
8004	EAN.UCC Global Individual Asset Identifier	n4+an..30	GIAI
8005	Price per unit of measure	n4+n6	PRICE PER UNIT
8006	Identification of the component of a trade item	n4+n14+n2+n2	GCTIN
8007	International Bank Account Number	n4+an..30	IBAN
8008	Date and time of production	n4+n8+n..4	PROD TIME
8018	EAN.UCC Global Service Relation Number	n4+n18	GSRN
8020	Payment Slip Reference Number	n4+an..25	REF No
8100	UCC/EAN-128 Coupon Extended Code - NSC + Offer Code	n4+n1+n5	-
8101	UCC/EAN-128 Coupon Extended Code - NSC + Offer Code + end of offer code	n4+n1+n5+n4	-
8102	UCC/EAN-128 Coupon Extended Code – NSC	n4+n1+n1	-
90 ³	Information mutually agreed between trading partners (including FACT DIs)	n2+an..30	INTERNAL
91-99***	Company internal information	n2+an..30	INTERNAL

***The actual data title may be specified by the issuer of the data.

3.A.4.2 Metric Trade Measures

Figure 3.A.4.2 – 1

AI	Full Title	Unit of Measure	Data Title
	Data Format n6		
310 (n)*	Net weight	Kilograms	NET WEIGHT (kg)
311 (n)	Length or first dimension, trade	Metres	LENGTH (m)
312 (n)	Width, diameter, or second dimension, trade	Metres	WIDTH (m)
313 (n)	Depth, thickness, height, or third dimension, trade	Metres	HEIGHT (m)
314 (n)	Area, trade	Square metres	AREA (m ²)
315 (n)	Net volume	Litres	NET VOLUME (l)
316 (n)	Net volume	Cubic metres	NET VOLUME (m ³)

*(n) indicates the decimal point position outlined in [Section 7.5](#).

3.A.4.3 Non-Metric Trade Measures

Figure 3.A.4.3 – 1

AI	Full Title	Unit of Measure	Data Title
	Data Format n6		
320 (n)*	Net weight	Pounds	NET WEIGHT (lb)
321 (n)	Length or first dimension, trade	Inches	LENGTH (i)
322 (n)	Length or first dimension, trade	Feet	LENGTH (f)
323 (n)	Length or first dimension, trade	Yards	LENGTH (y)
324 (n)	Width, diameter, or second dimension, trade	Inches	WIDTH (i)
325 (n)	Width, diameter, or second dimension, trade	Feet	WIDTH (f)
326 (n)	Width, diameter, or second dimension, trade	Yards	WIDTH (y)
327 (n)	Depth, thickness, height, or third dimension, trade	Inches	HEIGHT (i)
328 (n)	Depth, thickness, height, or third dimension, trade	Feet	HEIGHT (f)
329 (n)	Depth, thickness, height, or third dimension, trade	Yards	HEIGHT (y)
350 (n)	Area, trade	Square inches	AREA (i ²)
351 (n)	Area, trade	Square feet	AREA (f ²)
352 (n)	Area, trade	Square yards	AREA (y ²)
356 (n)	Net weight	Troy ounces	NET WEIGHT (t)
357 (n)	Net volume (or weight)	Ounces (U.S.)	NET VOLUME (oz)
360 (n)	Net volume	Quarts	NET VOLUME (lb)
361 (n)	Net volume	Gallons (U.S.)	NET VOLUME (g)
364 (n)	Net volume	Cubic inches	NET VOLUME (i ³)
365 (n)	Net volume	Cubic feet	NET VOLUME (f ³)
366 (n)	Net volume	Cubic yards	NET VOLUME (y ³)

*(n) indicates the decimal point position outlined in [Section 7.5](#).

3.A.4.4 Metric Logistic Measures

Figure 3.A.4.4 – 1

AI	Full Title	Unit of Measure	Data Title
	Data Format n6		
330 (n)*	Gross weight	Kilograms	GROSS WEIGHT (kg)
331 (n)	Length or first dimension, logistics	Metres	LENGTH (m), log
332 (n)	Width, diameter, or second dimension, logistics	Metres	WIDTH (m), log
333 (n)	Depth, thickness, height, or third dimension, logistics	Metres	HEIGHT (m), log
334 (n)	Area, logistics	Square metres	AREA (m ²), log
335 (n)	Gross volume	Litres	VOLUME (l), log
336 (n)	Gross volume	Cubic metres	VOLUME (m ³), log

*(n) indicates the decimal point position outlined in [Section 7.5](#).

3.A.4.5 Non-Metric Logistic Measures

Figure 3.A.4.5 – 1

AI	Full Title	Unit of Measure	Data Title
	Data Format n6		
340 (n)*	Gross weight	Pounds	GROSS WEIGHT (lb)
341 (n)	Length or first dimension, logistics	Inches	LENGTH (i), log
342 (n)	Length or first dimension, logistics	Feet	LENGTH (f), log
343 (n)	Length or first dimension, logistics	Yards	LENGTH (y), log
344 (n)	Width, diameter, or second dimension, logistics	Inches	WIDTH (i), log
345 (n)	Width, diameter, or second dimension, logistics	Feet	WIDTH (f), log
346 (n)	Width, diameter, or second dimension, logistics	Yards	WIDTH (y), log
347 (n)	Depth, thickness, height, or third dimension, logistics	Inches	HEIGHT (i), log
348 (n)	Depth, thickness, height, or third dimension, logistics	Feet	HEIGHT (f), log
349 (n)	Depth, thickness, height, or third dimension, logistics	Yards	HEIGHT (y), log
353 (n)	Area, logistics	Square inches	AREA (i ²), log
354 (n)	Area, logistics	Square feet	AREA (f ²), log
355 (n)	Area, logistics	Square yards	AREA (y ²), log
362 (n)	Gross volume	Quarts	VOLUME (q), log
363 (n)	Gross volume	Gallons (U.S.)	VOLUME (g), log
367 (n)	Gross volume	Cubic inches	VOLUME (i ³), log
368 (n)	Gross volume	Cubic feet	VOLUME (f ³), log
369 (n)	Gross volume	Cubic yards	VOLUME (y ³), log

*(n) indicates the decimal point position outlined in [Section 7.5](#).

3.A.5 Appendix 5: Determination of Century in Dates

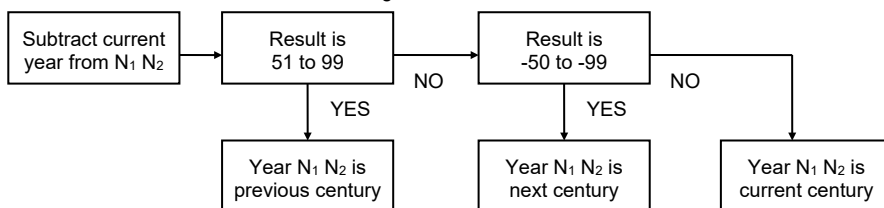
Element Strings are available for the following types of dates:

- Production date: AI (11)
- Due date: AI (12)
- Packaging date: AI (13)
- Minimum durability date (quality): AI (15)
- Maximum durability date (safety): AI (17)
- Date and time of production: AI (8008)

It is left to the discretion of the user to interpret a particular date type in the sense of his business practices. Such interpretation may change according to the product range for which a date is being applied

Since the year data field consists of two positions, the century is established by following the procedure in Figure 3.A.5 – 1.

Figure 3.A.5 – 1



Note: The Element String can only specify a date in the range from 49 years in the past to 50 years in the future of the current year.

Section 4.0:

Association of Element Strings to Form Valid Messages

Table of Contents

4.1 Introduction.....	2
4.2 Basic Considerations.....	2
4.3 Invalid Pairs of Element Strings.....	3
4.4 Mandatory Association of Element Strings.....	5

4.1 Introduction

The main purpose of automatic data capture (ADC) is to replace manual entry of visually captured information. This implies that an ADC message has to provide all information required for a transaction without human intervention. EAN.UCC System data may be used, for example, to record entities in computer files, to sort goods on conveyor belts, to check completeness of a consignment, to verify dates, and to record physical stock taking.

Element Strings may be applied directly on physical goods or printed in catalogues or documents. The scanning source and the type of transaction determine the required information in a given business application. Since all ADC data is being used in Electronic Data Processing (EDP) applications, strict validation of data to be processed is an absolute prerequisite.

For correct processing of scanned data, certain business applications may require the association of Element Strings representing a particular combination of identification data. The EAN.UCC System enables users to achieve the needed level of data accuracy through the use of adequate Element Strings.

The logical set up of the data standard of the EAN.UCC System enables system users to validate scanned data messages (see Section 7.0, System Processing in EDP Applications).

Validation is effected on two levels. The first is validation of the data for conformity with system rules (e.g., to provide a message that contains all information to be processed logically without human intervention). The second level is validation of the data for conformity with the requirements of a particular business application.

Figures 4.3 – 1 and 4.4 - 1 show the rules for the first verification level (e.g., validate data to conform with the system logic). Figure 4.3 - 1 defines the pairs of Element Strings that cannot appear on the same physical entity. Figure 4.4 – 1 defines the Element Strings that mandate the appearance of another Element String on the same physical entity. All other combinations of Element Strings are possible at the first level of verification, although they may not make sense at the second, the application level.

4.2 Basic Considerations

The Element Strings that require specialised software and/or scanner set up are not covered by these rules. These are the Element Strings with EAN.UCC Prefixes 0001 to 0007, 02, 04, 05, 20 to 29, 980, and 99; EAN/UCC-8 Prefixes 0 and 2; two-digit and five-digit Add-On Symbols; and AIs (8100) to (8102).

Duplicate Element Strings appearing on the same physical entity must have the same value.

In Figures 4.3 –1 and 4.4 –1, the term Global Trade Item Number™ (GTIN™) is used. The Element Strings that encode GTINs are defined in Sections 3.2.1, 3.3.1, 3.5.1, 3.5.2, 3.5.3, 3.6.2, 3.6.3, and 3.6.52. GTINs may be encoded in bar code symbols from the EAN/UPC Symbology family, ITF-14 Bar Code Symbols, and UCC/EAN-128 Bar Code Symbols using AI (01) or AI (8006).

4.3 Invalid Pairs of Element Strings

Figure 4.3 – 1 defines the pairs of Element Strings that cannot appear on the same physical entity.

Figure 4.3 – 1

Pair of Element Strings				Comment
AI	Designation	AI	Designation	
GTIN	Identification of a trade item	GTIN	Identification of a trade item	Duplicate Global Trade Item Numbers™ (GTINs™) with different values
GTIN	Identification of a trade item	02	Identification of logistic unit contents	AI (02) must not be used for the identification of trade items contained in a trade item.
10	Batch/lot number	23n	Lot number (transitional use)	Duplicate lot numbers with different values
22	Secondary data for the health industry	30	Count	Duplicate counts with different values
22	"	10	Batch/lot number	Duplicate lot numbers with different values
22	"	17	Maximum durability date	Duplicate expiration date with different values
22	"	21	Serial number	Duplicate serial numbers with different values
22	"	23n	Lot number (transitional use)	Duplicate lot numbers with different values
420	Ship to postal code, single postal authority	421	Ship to postal code with ISO country code	Only one ship to postal code may be applied on an item.
422	Country of origin of a trade item	426	Country of full processing	Duplication of country of origin of a trade item (covered by country of full processing)
423	Country of initial processing	426	Country of full processing	Duplication of country of initial processing (covered by country of full processing)
424	Country of processing	426	Country of full processing	Duplication of country of processing (covered by country of full processing)
425	Country of disassembly	426	Country of full processing	Duplication of country of disassembly (covered by country of full processing)
390n	Amount payable – single monetary area	391n	Amount payable – with ISO currency code	Only one amount payable Element String may be applied on a payment slip.

Pair of Element Strings				Comment
AI	Designation	AI	Designation	
8006	Component identification	GTIN	Identification of a trade item	Other GTINs cannot be used with AI (8006). The trade item is identified by a GTIN contained in the AI (8006).

4.4 Mandatory Association of Element Strings

Figure 4.4 – 1 defines the Element Strings that mandate the appearance of another Element String on the same physical entity.

Figure 4.4 – 1

If Element String AI Designation		Then Mandatory Associated Element String	Comment
GTIN™ with N ₁ = 9	Identification of a Variable Measure Trade Item	30, 3nnn ¹ or 3nnn ² or 8001	Mandatory association with variable measure information
02	Identification of logistic unit contents	00	Mandatory association with a Serial Shipping Container Code (SSCC)
02	Identification of logistic unit contents	37	Mandatory count of the contained trade items
10	Batch/lot number	GTIN or 02	Mandatory association with a Global Trade Item Number™ (GTIN) or with the identification of logistic unit contents
11, 13, 15, 17	Dates	GTIN or 02	Mandatory association with a GTIN or with the identification of logistic unit contents
12	Due date	8020 and 415	Mandatory association with the Payment Slip Reference Number (AI (8020)) and the EAN.UCC Global Location Number (GLN) of the invoicing party
20	Product variant	GTIN or 02	Mandatory association with a GTIN or with the identification of logistic unit contents
21	Serial number	GTIN	Mandatory association with a GTIN of a single trade item (a serial number cannot apply to a grouping of trade items)
22	Secondary data health industry	GTIN	Mandatory association with a GTIN
23n	Lot number	GTIN or 02	Mandatory association with a GTIN or with the identification of logistic unit contents
240	Additional product identification	GTIN or 02	Mandatory association with a GTIN or with the identification of logistic unit contents
241	Customer part number	GTIN or 02	Mandatory association with a GTIN or with the identification of logistic unit contents

If Element String		Then Mandatory Associated Element String	Comment
AI	Designation		
250	Secondary serial number	GTIN	Mandatory association with a GTIN (a secondary serial number cannot apply to a grouping of trade items)
251	Reference to source entity	GTIN	Mandatory association with GTIN of the trade item
30	Variable count	GTIN or 02	Mandatory association with a variable measure GTIN (e.g., an EAN/UCC-14 Identification Number starting with the digit 9) or the identification of variable measure content of a logistic unit
3nnn*	Trade measures which cannot be summed	GTIN	Mandatory association with a variable measure GTIN (e.g., an EAN/UCC-14 Identification Number starting with the digit 9)
3nnn**	Trade measures which can be summed	GTIN or 02	Mandatory association with a variable measure GTIN (e.g., an EAN/UCC-14 Identification Number starting with the digit 9) or the identification of variable measure content of a logistic unit
3nnn***	Logistic measures	00 or GTIN	Mandatory association with an SSCC or a variable measure GTIN (e.g., an EAN/UCC-14 Identification Number starting with the digit 9)
337n	Kilograms per square metre	GTIN	Mandatory association with a GTIN
37	Count of units contained	02	Mandatory association with the identification of logistic unit contents
390n	Amount payable – single monetary area	8020 and 415	Mandatory association with the Payment Slip Reference Number, AI (8020), and the GLN of the invoicing party
391n	Amount payable – with ISO currency code	8020 and 415	Mandatory association with the Payment Slip Reference Number, AI (8020), and the GLN of the invoicing party
392n	Amount payable – single monetary unit	GTIN	Mandatory association with variable measure GTIN (e.g., an EAN/UCC-14 Identification Number starting with the digit 9)
393n	Amount payable – with ISO currency code	GTIN	Mandatory association with variable measure GTIN (e.g., an EAN/UCC-14 Identification Number starting with the digit 9)
403	Routing code	00	Mandatory association with an SSCC

If Element String AI Designation		Then Mandatory Associated Element String	Comment
415	GLN of the invoicing party	8020	Mandatory association with Payment Slip Reference Number, AI (8020)
422	Country of origin	GTIN	Mandatory association with a GTIN
423	Country of initial processing	GTIN or 02	Mandatory association with a GTIN or with the identification of logistic unit contents
424	Country of processing	GTIN or 02	Mandatory association with a GTIN or with the identification of logistic unit contents
425	Country of disassembly	GTIN or 02	Mandatory association with a GTIN or with the identification of logistic unit contents
426	Country of full processing	GTIN or 02	Mandatory association with a GTIN or with the identification of logistic unit contents
7001	NATO Stock Number	GTIN or 02	Mandatory association with a GTIN or with the identification of logistic unit contents
7002	UN/ECE Meat Carcasses and Cuts Classification	GTIN or 02	Mandatory association with a GTIN or with the identification of logistic unit contents
703(s)	Approval number of processor	GTIN or 02	Mandatory association with a GTIN or with the identification of logistic unit contents
8001	Variables of roll products	GTIN	Mandatory association with a variable measure GTIN (e.g., an EAN/UCC-14 Identification Number starting with the digit 9)
8005	Price per unit of measure	GTIN or 02 with N ₁ = 9	Mandatory association with a variable measure GTIN or the identification of variable measure content of a logistic unit
8007	International Bank Account Number, AI (8007)	8020 and 415	Mandatory association with the Payment Slip Reference Number, AI (8020), and the GLN of the invoicing party
8008	Date and time of production	GTIN or 02	Mandatory association with a GTIN or with the identification of logistic unit contents
8020	Payment Slip Reference Number, AI (8020)	415	Mandatory association with the GLN of the invoicing party

*Als (3nnn) where the first three digits are 312, 313, 324, 325, 326, 327, 328, and 329.

**Als (3nnn) where the first three digits are 310, 311, 314, 315, 316, 320, 321, 322, 323, 350, 351, 352, 356, 357, 360, 361, 364, 365, and 366.

***Als (3nnn) where the first three digits are 330, 331, 332, 333, 334, 335, 336, 340, 341, 342, 343, 344, 345, 346, 347, 348, 349, 353, 354, 355, 362, 363, 367, 368, and 369.

Section 5.0:

Data Carriers

Table of Contents

5.0.1 Introduction	2
5.0.2 International Standards	3
5.0.3 Symbology Identifiers	4

5.0.1 Introduction

A data carrier is a means of representing data in machine readable form. Data carriers that are endorsed by EAN International and the Uniform Code Council (UCC™) are described in Sections [5.1](#), [5.2](#), and [5.3](#), and bar code production and quality assessment are covered in [Section 5.4](#).

The EAN.UCC System specifies the data carrier used to represent any given Element String. [Section 2.0](#) covers rules indicating which data carrier should be used to represent which Element Strings in particular applications.

The EAN.UCC System uses the following data carriers:

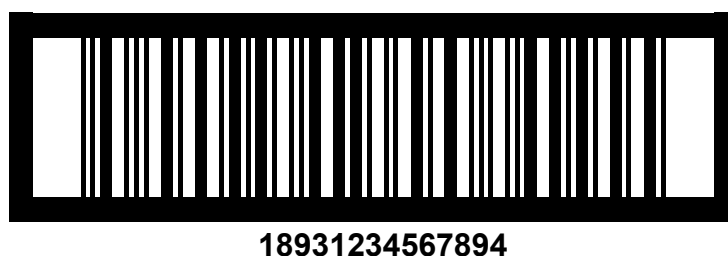
The EAN/UPC Symbology family of bar code symbols (UPC-A, UPC-E, EAN-13, and EAN-8 Bar Code Symbols and the two- and five-digit Add-On Symbols) can be read omnidirectionally. These symbols must be used for all items that are scanned at the Point-of-Sale and may be used on other trade items.

Figure 5.0.1 - 1



ITF-14 (Interleaved 2-of-5) Bar Code Symbols carry ID numbers only on trade items that are not expected to pass through the Point-of-Sale. ITF-14s are better suited for direct printing onto corrugated fibreboard.

Figure 5.0.1 – 2



The UCC/EAN-128 is a subset of the Code 128 Bar Code Symbology. Its use is exclusively licensed to EAN International and the UCC™. This extremely flexible symbology encodes Element Strings using Application Identifiers.

Figure 5.0.1 – 3



5.0.2 International Standards

A number of national and regional standardisation bodies have developed bar code symbol technical standards. The International Standards Organisation (ISO) has published standard bar code symbology specifications via a subcommittee of ISO/IEC JTC1 (International Standards Organisation/International Electronics Committee Joint Technical Committee 1).

EAN International, the Uniform Code Council (UCC™), and the EAN Member Organisations are actively involved in developing these standards. The objective is that EAN.UCC System standards remain fully compatible with relevant published national, regional, and international symbology standards. The pertinent documents for Sections [5.1](#), [5.2](#), and [5.3](#) include:

Section 5.1: ISO/IEC 15420 information technology; automatic identification and data capture techniques; bar code symbology specifications; EAN/UPC ref. number ISO/IEC 15420: 2000 (E)

Section 5.2: ISO/IEC 16390 information technology; automatic identification and data capture techniques; bar code symbology specifications; ITF-14 (Interleaved 2-of-5) ref. number ISO/IEC 16390:1999(E)

Section 5.3: ISO/IEC 15417 information technology; automatic identification and data capture techniques; bar code symbology specifications; Code 128 ref. number ISO/IEC 15417:2000(E)

5.0.3 Symbology Identifiers

The symbology identifier is not encoded in the bar code symbol, but is generated by the decoder after decoding and is transmitted as a preamble to the data message.

All scanning equipment has the ability to recognise the symbology that has been scanned. Some scanners have the optional feature of being able to transmit a symbology identifier. The symbology identifier is a three-character data string comprising a flag character, code character, and a modifier character.

] is the flag character (which has an ASCII value of 93). This denotes that the two characters following are symbol identifier characters.

c is the code character. This denotes the type of symbology.

m is the modifier character. This indicates the mode in which the symbology is used.

Note: If used, the symbology identifier is transmitted as a prefix to the data message.

The symbology identifiers used in the EAN.UCC System are as follows:

Figure 5.0.3 – 1

Symbology Identifier	Symbology Format	Content
] E 0*	EAN-13, UPC-A, or UPC-E	13 digits
] E 1	Two-digit Add-On Symbol	2 digits
] E 2	Five-digit Add-On Symbol	5 digits
] E 3	EAN-13, UPC-A, or UPC-E with Add-On Symbol	15 or 18 digits
] E 4	EAN-8	8 digits
] I 1	ITF-14	14 digits
] C 1	UCC/EAN-128	variable alphanumeric

*Note: Symbology identifiers are case sensitive (e.g., The symbology identifier “] e 1” is normally used for RSS family symbols).

Note: Bar code symbols with Add-On Symbols may be considered either as two separate symbols, each of which is transmitted separately with its own symbology identifier, or as a single data packet. The system designer shall select one of these methods, but the method using symbology identifier]E3 is preferable for data security.

Section 5.1:

EAN/UPC Symbology Specifications

Table of Contents

5.1.1 Symbology Characteristics	2
5.1.1.1 Symbol Types	2
5.1.1.2 Symbol Encodation.....	3
5.1.1.2.1 Symbol Character Encodation	3
5.1.1.2.2 Auxiliary Pattern Encodation	5
5.1.1.3 Symbol Formats	5
5.1.1.3.1 EAN-13 Bar Code Symbols	5
5.1.1.3.2 EAN-8 Bar Code Symbols.....	8
5.1.1.3.3 UPC-A Bar Code Symbols	9
5.1.1.3.4 UPC-E Bar Code Symbols	10
5.1.1.3.4.1 Encodation of a UPC-E Bar Code Symbol	11
5.1.1.3.4.2 Decoding a UPC-E Bar Code Symbol.....	15
5.1.1.3.5 Add-On Symbols	15
5.1.1.3.5.1 Two-Digit Add-On Symbol	16
5.1.1.3.5.2 Five-Digit Add-On Symbol	18
5.1.1.4 Dimensions and Tolerances	21
5.1.1.4.1 Nominal Dimensions of Characters	21
5.1.1.4.2 Symbol Height	22
5.1.1.4.3 Quiet Zone (Light Margin).....	22
5.1.1.4.4 X-Dimension (Magnification Factor)	23
5.1.1.4.5 Symbol Length	24
5.1.1.4.6 Positioning of the Add-On Symbol.....	24
5.1.2 Reference Decode Algorithm	24
5.1.3 Human Readable Interpretation	33

5.1.1 Symbology Characteristics

Characteristics of bar code symbols in the EAN/UPC Symbology family include:

- Numeric encodable character set (0 to 9) (e.g., ASCII characters 48 to 57 inclusive, in accordance with ISO 646)
- Symbology type: continuous
- Symbol character density: seven modules per symbol character
- Four elements per symbol character comprising two bars (dark bars) and two spaces (light bars), each of one, two, three, or four modules in width (auxiliary patterns have differing numbers of elements)
- Character self-checking
- Fixed data string length encodable: 8, 12, or 13 characters including Check Digit, depending on specific symbol type
- Omni-directionally decodable
- One mandatory Check Digit (described in [Section 3.A.1](#))
- Non-data overhead not including the Check Digit or Quiet Zones:
 - 11 modules for EAN-13, EAN-8, and UPC-A Bar Code Symbols (left Guard Bar Pattern/centre Guard Bar Pattern/right Guard Bar Pattern)
 - Nine modules for UPC-E Bar Code Symbols (left Guard Bar Pattern/right Guard Bar Pattern)

5.1.1.1 Symbol Types

The bar code symbols in the EAN/UPC Symbology family are:

- EAN-13, UPC-A, and UPC-E Bar Code Symbols, all of which may be accompanied by an Add-On Symbol
- EAN-8 Bar Code Symbols

The four symbol types are described in Sections [5.1.1.3.1](#), [5.1.1.3.2](#), [5.1.1.3.3](#), and [5.1.1.3.4](#), and the optional Add-On Symbols are described in [Section 5.1.1.3.5](#).

5.1.1.2 Symbol Encodation

5.1.1.2.1 Symbol Character Encodation

Symbol characters shall encode digit values in seven module characters selected from different number sets known as A, B, and C, as shown in Figure 5.1.1.2.1 – 1.

Figure 5.1.1.2.1 – 1

Number Sets A, B, and C

Digit Value	Set A Element Widths				Set B Element Widths				Set C Element Widths			
	S	B	S	B	S	B	S	B	B	S	B	S
0	3	2	1	1	1	1	2	3	3	2	1	1
1	2	2	2	1	1	2	2	2	2	2	2	1
2	2	1	2	2	2	2	1	2	2	1	2	2
3	1	4	1	1	1	1	4	1	1	4	1	1
4	1	1	3	2	2	3	1	1	1	1	3	2
5	1	2	3	1	1	3	2	1	1	2	3	1
6	1	1	1	4	4	1	1	1	1	1	1	4
7	1	3	1	2	2	1	3	1	1	3	1	2
8	1	2	1	3	3	1	2	1	1	2	1	3
9	3	1	1	2	2	1	1	3	3	1	1	2
Note: S denotes a space (light bar), B denotes a bar (dark bar), and the element widths are in modules.												

Figure 5.1.A.2 – 1 graphically illustrates Figure 5.1.1.2.1 – 1. The sum of the bar (dark bar) modules in any symbol character determines its parity. Symbol characters in number set A are odd parity characters. Symbol characters in number sets B and C are even parity characters. Number set C characters are mirror images of number set B characters.

Symbol characters in number sets A and B always begin on the left with a space module and end on the right with a dark module. Symbol characters in number set C begin on the left with a dark module and end on the right with a light module.

A data character shall normally be represented by a symbol character. However, in certain specific instances defined in [Sections 5.1.1.3.1](#), [5.1.1.3.4](#), and [5.1.1.3.5](#), the combination of number sets in a symbol may itself represent either data or a Check Digit value. This technique is referred to as variable parity encodation.

5.1.1.1-25.1.1.2.2 Auxiliary Pattern Encodation

Formatted: Bullets and Numbering

Auxiliary patterns shall be composed as shown in Figure 5.1.1.2.2 – 1.

Figure 5.1.1.2.2 – 1
Auxiliary Patterns

Auxiliary Pattern	Number of Modules	Element Widths in Modules					
		S	B	S	B	S	B
Normal Guard Bar Pattern	3		1	1	1		
Centre Guard Bar Pattern	5	1	1	1	1	1	
Special Guard Bar Pattern	6	1	1	1	1	1	1
Add-on Guard Bar Pattern	4		1	1	2		
Add-On delineator	2	1	1				
Note: S denotes a space (light) element and B denotes a bar (dark) element.							

Section 5.1.A.3 graphically illustrates these patterns.

The normal Guard Bar Pattern corresponds to the start and stop patterns in other symbologies, and the special Guard Bar Pattern is used as a stop pattern in UPC-E Bar Code Symbols.

5.1.1.3 Symbol Formats**5.1.1.3.1 EAN-13 Bar Code Symbols**

The EAN-13 Bar Code Symbol shall be made up as follows, reading from left to right:

- A left Quiet Zone
- A normal Guard Bar Pattern

- Six symbol characters from number sets A and B
- A centre Guard Bar Pattern
- Six symbol characters from number set C
- A normal Guard Bar Pattern
- A right Quiet Zone

The rightmost symbol character shall encode the Check Digit calculated in accordance with [Section 3.A.1](#).

Since the EAN-13 Bar Code Symbol comprises only 12 symbol characters but encodes 13 digits of data (including the Check Digit), the value of the additional digit, which is the character in the leftmost position in the data string, shall be encoded by the variable parity mix of number sets A and B for the six symbol characters in the left half of the symbol. The numbering system for values of the leading digit is specified in Figure 5.1.1.3.1 – 1. Figure 5.1.1.3.1 – 2 is an example of an EAN-13 Bar Code Symbol.

Figure 5.1.1.3.1 – 1

Left Half of an EAN-13 Bar Code Symbol

Leading Digit, Implicitly Encoded	Number Sets Used for Numbering Left Half of an EAN-13 Bar Code Symbol					
	Symbol Character Position					
	1	2	3	4	5	6
0*	A	A	A	A	A	A
1	A	A	B	A	B	B
2	A	A	B	B	A	B
3	A	A	B	B	B	A
4	A	B	A	A	B	B
5	A	B	B	A	A	B
6	A	B	B	B	A	A
7	A	B	A	B	A	B
8	A	B	A	B	B	A

9	A	B	B	A	B	A

*Note: The leading digit value "0" is reserved for symbols encoding UCC-12 Identification Number Element Strings.

Figure 5.1.1.3.1 – 2

EAN-13 Bar Code Symbol



5.1.1.1-25.1.1.3.2 EAN-8 Bar Code Symbols

The EAN-8 Bar Code Symbol shall be made up as follows, reading from left to right:

- A left Quiet Zone
- A normal Guard Bar Pattern
- Four symbol characters from number set A
- A centre Guard Bar Pattern
- Four symbol characters from number set C
- A normal Guard Bar Pattern
- A right Quiet Zone

The rightmost symbol character shall encode the Check Digit calculated in accordance with [Section 3.A.1](#). Figure 5.1.1.3.2 – 1 is an example of an EAN-8 Bar Code Symbol.

Figure 5.1.1.3.2 – 1

EAN-8 Bar Code Symbol



5.1.1.1-35.1.1.3.3 UPC-A Bar Code Symbols

The UPC-A Bar Code Symbol shall be made up as follows, reading from left to right:

- A left Quiet Zone
- A normal Guard Bar Pattern
- Six symbol characters from number set A
- A centre Guard Bar Pattern
- Six symbol characters from number set C
- A normal Guard Bar Pattern
- A right Quiet Zone

The rightmost symbol character shall encode the Check Digit calculated in accordance with [Section 3.A.1](#). A UPC-A Bar Code Symbol may be decoded as a 13-digit number by adding an implied leading zero to the UCC-12 Identification Number. Figure 5.1.1.3.3 – 1 is an example of a UPC-A Bar Code Symbol.

Figure 5.1.1.3.3 – 1

UPC-A Bar Code Symbol



5.1.1.1-45.1.1.3.4 UPC-E Bar Code Symbols

The UPC-E Bar Code Symbol shall be made up as follows, reading from left to right:

- A left Quiet Zone
- A normal Guard Bar Pattern
- Six symbol characters from number sets A and B
- A special Guard Bar Pattern
- A right Quiet Zone

The UPC-E Bar Code Symbol may only be used to encode UCC-12 Identification Number Element Strings which commence with a zero and contain a sequence of four or five zeroes in defined positions, as shown in [Figure 5.1.1.3.4.2 – 1](#). These zeros are removed from the data during encoding by the zero-suppression process described in [Section 5.1.1.3.4.1](#). Figure 5.1.1.3.4 – 1 is an example of a UPC-E Bar Code Symbol.

Figure 5.1.1.3.4 – 1

UPC-E Bar Code Symbol (Encoding 001234000057 by Zero-Suppression)



5.1.1.1.15.1.1.3.4.1 Encodation of a UPC-E Bar Code Symbol

The following algorithm describes the encodation of a data string suitable for zero-suppression:

1. Let D1, D2, and D3 through D12 denote the UCC-12 Identification Number data characters (including Check Digit). D1 shall always be zero. D12 shall be the Check Digit calculated according to the algorithm in [Section 3.A.1](#). Let X1 and X2 through X6 denote the six symbol characters in the final UPC-E Bar Code Symbol.

2. Convert D2 through D11 into a symbol character string by removing zeroes according to the following rules:

- If D11 equals 5, 6, 7, 8, or 9

and D7 to D10 inclusive are all 0

and D6 is not 0

then D7 to D10 are not encoded.

Symbol character: X1 X2 X3 X4 X5 X6

Data character: D2 D3 D4 D5 D6 D11

- If D6 to D10 inclusive are all 0

and D5 is not 0

then D6 to D10 are not encoded and X6 = 4.

Symbol character: X1 X2 X3 X4 X5 X6

Data character: D2 D3 D4 D5 D11 4

- If D4 is 0, 1, or 2

and D5 to D8 inclusive are all 0

then D5 to D8 are not encoded.

Symbol character: X1 X2 X3 X4 X5 X6

Data character: D2 D3 D9 D10 D11 D4

- If D4 is 3, 4, 5, 6, 7, 8, or 9

and D5 to D9 inclusive are all 0

then D5 to D9 are not encoded and X6 = 3.

Symbol character: X1 X2 X3 X4 X5 X6

Data character: D2 D3 D4 D10 D11 3

3. Determine the number sets for the implicit encodation of D12 from Figure 5.1.1.3.4.1 – 1.
4. Encode symbol characters X1 to X6 using number sets A and B as determined in Step 3.

Value of Check Digit D12	Number Sets Used for Numbering a UPC-E Bar Code Symbol					
	Symbol Character Position					
	1	2	3	4	5	6
0	B	B	B	A	A	A
1	B	B	A	B	A	A
2	B	B	A	A	B	A
3	B	B	A	A	A	B
4	B	A	B	B	A	A
5	B	A	A	B	B	A
6	B	A	A	A	B	B
7	B	A	B	A	B	A
8	B	A	B	A	A	B
9	B	A	A	B	A	B

Example 1:	Original Data	Zero-Suppressed	Rule
	0 1 2 3 4 5 0 0 0 0 5 8	1 2 3 4 5 5	2a
		B A B A A B	

Example 2:	Original Data	Zero-Suppressed	Rule
	0 4 5 6 7 0 0 0 0 0 8 0	4 5 6 7 8 4	2b
		B B B A A A	

Figure 5.1.1.3.4.1 – 4

Example 3:	Original Data	Zero-Suppressed	Rule
	0 3 4 0 0 0 0 5 6 7 3	3 4 5 6 7 0	2c
		B B A A A B	

Figure 5.1.1.3.4.1 – 5

Example 4:	Original Data	Zero-Suppressed	Rule
	0 9 8 4 0 0 0 0 7 5 1	9 8 4 7 5 3	2d
		B B A B A A	

Note: The number sets used to implicitly encode the Check Digit are shown in the zero-suppressed column.

5.1.1.1-1-25.1.1.3.4.2 Decoding a UPC-E Bar Code Symbol

Derivation of the 12-digit data string from the characters encoded in the UPC-E Bar Code Symbol can be performed according to Figure 5.1.1.3.4.2 – 1.

Figure 5.1.1.3.4.2 - 1

Decoding a UPC-E Bar Code Symbol

Encoded UPC-E Bar Code Symbol Digits								Decoded Number												
	P1	P2	P3	P4	P5	P6			D1	D2	D3	D4	D5	D6	D7	D8	D9	D10	D11	D12
(0)	X1	X2	X3	X4	X5	0	(C)		(0)	X1	X2	0	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	X3	X4	X5	(C)
(0)	X1	X2	X3	X4	X5	1	(C)		(0)	X1	X2	1	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	X3	X4	X5	(C)
(0)	X1	X2	X3	X4	X5	2	(C)		(0)	X1	X2	2	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	X3	X4	X5	(C)
(0)	X1	X2	X3	X4	X5	3	(C)		(0)	X1	X2	X3	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	X4	X5	(C)
(0)	X1	X2	X3	X4	X5	4	(C)		(0)	X1	X2	X3	X4	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	X5	(C)
(0)	X1	X2	X3	X4	X5	5	(C)		(0)	X1	X2	X3	X4	X5	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	5	(C)
(0)	X1	X2	X3	X4	X5	6	(C)		(0)	X1	X2	X3	X4	X5	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	6	(C)
(0)	X1	X2	X3	X4	X5	7	(C)		(0)	X1	X2	X3	X4	X5	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	7	(C)
(0)	X1	X2	X3	X4	X5	8	(C)		(0)	X1	X2	X3	X4	X5	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	8	(C)
(0)	X1	X2	X3	X4	X5	9	(C)		(0)	X1	X2	X3	X4	X5	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	9	(C)

Notes:

- The symbol characters at positions P1 and P2 through P5 of the UPC-E Bar Code Symbol are represented by X1 and X2 through X5.
- Re-inserted zeroes are indicated by underlining.
- The leading digit for UPC-E Bar Code Symbols, which is not encoded, is indicated by “0”.
- The Check Digit implicitly encoded in UPC-E Bar Code Symbols is indicated by “C”.

5.1.1.1-55.1.1.3.5 Add-On Symbols

The Add-On Symbols were designed to encode information supplementary to that in the main bar code symbol on periodicals and paperback books. Because they provide reduced security, use of Add-On Symbols shall be limited to applications where rules in the application specification governing data format and content provide appropriate safeguards.

Formatted: Bullets and Numbering

5.1.1.1.1.15.1.1.3.5.1 Two-Digit Add-On Symbol

A two-digit Add-On Symbol may be used in specific applications to accompany an EAN-13, UPC-A, or UPC-E Bar Code Symbol. The two-digit Add-On Symbol is positioned following the right Quiet Zone of the main symbol and consists of the following:

- Add-on Guard Bar Pattern
- First digit of the additional number from number sets A or B
- Add-on delineator
- Second digit of the additional number from number sets A or B
- A right Quiet Zone

The Add-On Symbol has no right Guard Bar Pattern. It does not have an explicit Check Digit. Checking is done through the mix of the number sets (A or B) used for the two digits. The choice of number sets is linked to the value of the additional number as shown by Figure 5.1.1.3.5.1 – 1.

Figure 5.1.1.3.5.1 – 1

Number Sets for Two-Digit Add-On Symbols

Value of the digits carried by the Add-On Symbol	Left-Hand Digit	Right-Hand Digit
Multiple of 4 (00,04,08,...96)	A	A
Multiple of 4+1 (01,05,...97)	A	B
Multiple of 4+2 (02,06,...98)	B	A
Multiple of 4+3 (03,07,...99)	B	B

Figure 5.1.1.3.5.1 – 2 is an example of an EAN-13 Bar Code Symbol with a two-digit Add-On Symbol.

Figure 5.1.1.3.5.1 - 2

EAN-13 Bar Code Symbol with Two-Digit Add-On Symbol



5.1.1.1.1-25.1.1.3.5.2 Five-Digit Add-On Symbol

A five-digit Add-On Symbol may be used in specific applications to accompany an EAN-13, UPC-A, or UPC-E Bar Code Symbol. The five-digit Add-On Symbol is positioned following the right Quiet Zone of the main symbol and consists of the following:

- Add-on Guard Bar Pattern
- First digit of the add-on number from number sets A or B
- Add-on delineator
- Second digit of the add-on number from number sets A or B
- Add-on delineator
- Third digit of the add-on number from number sets A or B
- Add-on delineator
- Fourth digit of the add-on number from number sets A or B
- Add-on delineator
- Fifth digit of the add-on number from number sets A or B
- A right Quiet Zone

The Add-On Symbol has no right Guard Bar Pattern. It does not have an explicit Check Digit. Checking is done through the mix of the number sets (A or B) used for the five digits. A value V is determined by the following procedure:

1. Sum the digits in Positions one, three, and five.
2. Multiply the result of step 1 by 3.
3. Sum the remaining digits (Positions two and four).
4. Multiply the result of step 3 by 9.
5. Sum the results of steps 2 and 4.
6. The value of V is the unit's position (lowest-order digit) of the result of step 5.

Example: To calculate the value of V for an Add-On Symbol carrying the number 86104, follow these steps:

1. $8 + 1 + 4 = 13$
2. $13 \times 3 = 39$
3. $6 + 0 = 6$
4. $6 \times 9 = 54$
5. $39 + 54 = 93$
6. $V = 3$

The number sets can then be determined by using Figure 5.1.1.3.5.2 – 1.

Figure 5.1.1.3.5.2 - 1

Number Sets for Five-Digit Add-On Symbol

Value of V	Number Sets Used for Symbol Characters				
	1	2	3	4	5
0	B	B	A	A	A
1	B	A	B	A	A
2	B	A	A	B	A
3	B	A	A	A	B
4	A	B	B	A	A
5	A	A	B	B	A
6	A	A	A	B	B
7	A	B	A	B	A
8	A	B	A	A	B
9	A	A	B	A	B

Since $V = 3$ in Figure 5.1.1.3.5.2 - 1, the sequence of number sets used to encode the value 86104 is B A A A B.

Figure 5.1.1.3.5.2 – 2 shows an example of an EAN-13 Bar Code Symbol with a five-digit Add-On Symbol.

Figure 5.1.1.3.5.2 - 2
EAN-13 Bar Code Symbol with Five-Digit Add-On Symbol



5.1.1.4 Dimensions and Tolerances

5.1.1.4.1 Nominal Dimensions of Characters

Bar code symbols can be printed at various densities to accommodate a variety of printing and scanning processes. The significant dimensional parameter is X, the ideal width of a single module element. The X-dimension must be constant throughout a given symbol.

The dimensions of EAN-13, UPC-A, EAN-8 and UPC-E Bar Code Symbols may be referenced to a defined set of dimensions referred to as the nominal size symbol. Refer to [Section 5.1.A.7](#) for dimensioned drawings of nominal size symbols.

The X-dimension at nominal size is 0.33 mm (0.013 in.).

The width of each bar (dark bar) and space (light bar) is determined by multiplying the X-dimension by the module width of each bar (dark bar) and space (light bar) (1, 2, 3, or 4). There is an exception for characters 1, 2, 7, and 8. For these characters, the bars (dark bars) and spaces (light bars) are reduced or enlarged by one-thirteenth of a module to provide a uniform distribution of bar width tolerances and thus improve scanning reliability.

The reduction or enlargement in millimetres at nominal size of the bars (dark bars) and spaces (light bars) for the characters 1, 2, 7, and 8 in the number sets A, B, and C is shown in Figure 5.1.1.4.1 – 1:

Figure 5.1.1.4.1 –1

Reduction/Enlargement for Characters 1, 2, 7, and 8

Character Value	Number Set A		Number Sets B and C	
	Bar (Dark Bar) mm	Space (Light Bar) mm	Bar (Dark Bar) mm	Space (Light Bar) mm
1	- 0.025	+0.025	+0.025	- 0.025
2	- 0.025	+0.025	+0.025	- 0.025
7	+0.025	- 0.025	- 0.025	+0.025
8	+0.025	- 0.025	- 0.025	+0.025

Note: The existing symbol generation equipment that uses a value of 0.030 mm for the reduction/enlargement factor at nominal size may continue to be used for the foreseeable future.

5.1.1.1-25.1.1.4.2 Symbol Height

For EAN-13, UPC-A, and UPC-E Bar Code Symbols, the height of the bars (dark bars) in the nominal size symbol is 22.85 mm (0.9 in.).

For EAN-8 Bar Code Symbols, the height of the bars (dark bars) in the nominal size symbol is 18.23 mm (0.718 in.).

For two-digit and five-digit Add-On Symbols, the height of the bars (dark bars) in the nominal size symbol is 21.9 mm (0.86 in.).

In EAN-13, EAN-8, UPC-A, and UPC-E Bar Code Symbols, the bars (dark bars) forming the left, centre, and right Guard Bar Patterns shall be extended downward by 5x (e.g., 1.65 mm (0.065 in.)). This shall also apply to the bars (dark bars) of the first and last symbol characters of the UPC-A Bar Code Symbol.

Symbol height is not modular.

5.1.1.1-35.1.1.4.3 Quiet Zone (Light Margin)

The minimum Quiet Zone width required by the main bar code symbol is 7x. However, other minimum Quiet Zone dimensions are specified for some symbol types due to the size and location of their Human Readable Interpretation. These dimensions are noted in Figure 5.1.1.4.3 – 1.

Formatted: Bullets and Numbering

Figure 5.1.1.4.3 – 1

Quiet Zone Lengths by Version

Symbol Version	Left Quiet Zone (Light Margin)		Right Quiet Zone (Light Margin)	
	Modules	mm*	Modules	mm
EAN-13	11	3.63	7	2.31
EAN-8	7	2.31	7	2.31
UPC-A	9	2.97	9	2.97
UPC-E	9	2.97	7	2.31
Add-Ons (EAN)	7-10	2.31-3.30	5	1.65
Add-Ons (U.P.C.)	9-12	2.97-3.96	5	1.65

*This is an example using an X-dimension of 0.33 mm.

Note: A useful device to help maintain the Quiet Zone in some production processes is to include a less than (<) and/or greater than (>) character in the Human Readable Interpretation field, with its apex aligned with the edge of the Quiet Zone. If this device is used, the character(s) shall be positioned in accordance with the appropriate drawings in [Section 5.1.A.6](#).

5.1.1.1.45.1.1.4.4 X-Dimension (Magnification Factor)

In the past the term "magnification factor" was extensively used to specify the size of a bar code symbol. This technique relied upon setting a nominal size (100%) that was directly related to a given X-dimension. Since January 2000, the more precise term "X-dimension" has been used to specify permissible symbol sizes (see [Section 5.4](#)).

The X-dimension of an Add-On Symbol shall be the same as the X-dimension of its associated main symbol.

Formatted: Bullets and Numbering

5.1.1.4.5 Symbol Length

The symbol length in modules, including the minimum Quiet Zones, shall be as indicated in Figure 5.1.1.4.5 – 1.

Figure 5.1.1.4.5 - 1

Symbol Length in Modules

Symbol Type	Length
EAN-13	113
UPC-A	113
EAN-8	81
UPC-E	67
Two-digit Add-On	25
Five-digit Add-On	52
EAN-13 or UPC-A and two-digit Add-On	138
UPC-E and two-digit Add-On	92
EAN-13 or UPC-A and five-digit Add-On	165
UPC-E and five-digit Add-On	119

5.1.1.4.6 Positioning of the Add-On Symbol

The Add-On Symbol shall not encroach on the right Quiet Zone of the main symbol. The maximum separation shall be 12x.

The bottom edge of the bars (dark bars) in the Add-On Symbol shall be horizontally aligned with the bottom edge of the guard bars of the main symbol.

5.1.2 Reference Decode Algorithm

Decode algorithms are used by scanning equipment to convert the bar and space patterns of the bar code into data characters. As a matter of policy, EAN International and the Uniform Code Council (UCC™) make no attempt to specify or standardise equipment beyond stating that it should be capable of reading symbols produced in accordance with the specifications laid out in this manual.

Bar code reader systems are designed to read imperfect symbols to the extent that practical algorithms permit. This section describes the reference decode algorithm

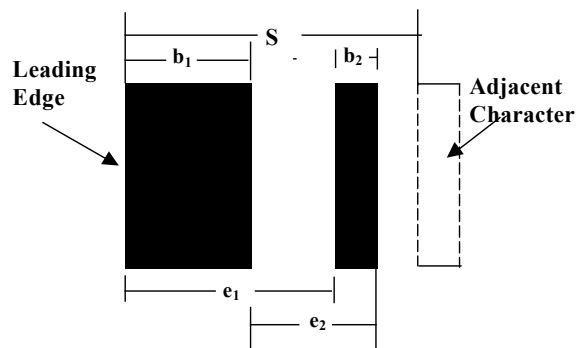
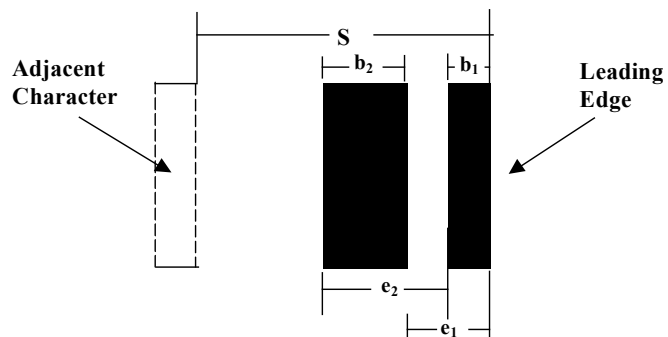
used to determine decode and decodability in symbol verification in accordance with *ISO 15416*.

For each symbol character, let S equal the total measured width of the character. The value S is used to determine reference threshold (RT) values. Individual edge to similar edge measurements (e) are then compared to the reference threshold to determine E values. Character values are determined from E values.

Value e_1 is defined as the measurement from the leading edge of a bar (dark bar) to the leading edge of the adjacent bar (dark bar). Value e_2 is defined as the measurement from the trailing edge of a bar (dark bar) to the trailing edge of the adjacent bar (dark bar). For number sets A and B, the right edge of each of the two bars (dark bars) is considered to be leading, while for number set C, the left edge of each bar (dark bar) is considered to be leading. These relationships are illustrated in Figure 5.1.2 – 1.

Figure 5.1.2 - 1

Symbol Character Decode Measurements

Number Set C**Number Sets A and B**

Reference thresholds RT1, RT2, RT3, RT4, and RT5 are given by:

- $RT1 = (1.5/7)S$
- $RT2 = (2.5/7)S$
- $RT3 = (3.5/7)S$
- $RT4 = (4.5/7)S$
- $RT5 = (5.5/7)S$

Within each character, the measurements $e1$ and $e2$ are compared with the reference thresholds. The corresponding integer values $E1$ and $E2$ are considered to be equal to 2, 3, 4, or 5 as follows:

- If $RT1 \leq e1 < RT2$, $E1 = 2$
- If $RT2 \leq e1 < RT3$, $E1 = 3$
- If $RT3 \leq e1 < RT4$, $E1 = 4$
- If $RT4 \leq e1 < RT5$, $E1 = 5$

Otherwise the character is in error.

In Figure 5.1.2 – 2, use the values of $E1$ and $E2$ as the primary determinant for the symbol character value.

Figure 5.1.2 – 2
Bar Code Symbol Decoding

Character	Number Set	Primary Determinant		Secondary Determinant $7(b_1 + b_2)/S$
		E1	E2	
0	A	2	3	
1	A	3	4	≤ 4
2	A	4	3	≤ 4
3	A	2	5	
4	A	5	4	
5	A	4	5	
6	A	5	2	
7	A	3	4	> 4
8	A	4	3	> 4
9	A	3	2	
0	B and C	5	3	
1	B and C	4	4	> 3
2	B and C	3	3	> 3
3	B and C	5	5	
4	B and C	2	4	
5	B and C	3	5	
6	B and C	2	2	
7	B and C	4	4	≤ 3
8	B and C	3	3	≤ 3
9	B and C	4	2	

Note: b_1 and b_2 are the widths of the two bar (dark bar) elements

The character is uniquely determined for all combinations of E1 and E2 except for the following four cases:

- E1 = 3 and E2 = 4 (characters 1 and 7 in number set A)

- E1 = 4 and E2 = 3 (characters 2 and 8 in number set A)
- E1 = 4 and E2 = 4 (characters 1 and 7 in number sets B and C)
- E1 = 3 and E2 = 3 (characters 2 and 8 in number sets B and C)

These cases require that the combined width of the two bars (dark bars) be tested as follows:

- For $E1 = 3$ and $E2 = 4$:
 - Character is 1 if $7 \times (b_1 + b_2) / S \leq 4$
 - Character is 7 if $7 \times (b_1 + b_2) / S > 4$
- For $E1 = 4$ and $E2 = 3$:
 - Character is 2 if $7 \times (b_1 + b_2) / S \leq 4$
 - Character is 8 if $7 \times (b_1 + b_2) / S > 4$
- For $E1 = 4$ and $E2 = 4$:
 - Character is 1 if $7 \times (b_1 + b_2) / S > 3$
 - Character is 7 if $7 \times (b_1 + b_2) / S \leq 3$
- For $E1 = 3$ and $E2 = 3$:
 - Character is 2 if $7 \times (b_1 + b_2) / S > 3$
 - Character is 8 if $7 \times (b_1 + b_2) / S \leq 3$

The requirements on $(b_1 + b_2)$ are shown in Figure 5.1.2 – 2.

The same procedures shall be used to decode the symbol characters in any Add-On Symbol.

Use Figure 5.1.2 – 3 to determine the appropriate S measurement for calculating the reference threshold values $RT1$ and $RT2$ applicable to the auxiliary patterns of the main symbol. For each symbol or half symbol the measurements of the appropriate auxiliary pattern e_i values are then compared to the reference thresholds to establish the integer E_i values. The determined values of $E1$, $E2$, $E3$, and $E4$ shall match those of valid auxiliary patterns as shown in Figure 5.1.2 – 4. Otherwise the symbol is in error.

Figure 5.1.2 – 3
Auxiliary Pattern Measurements

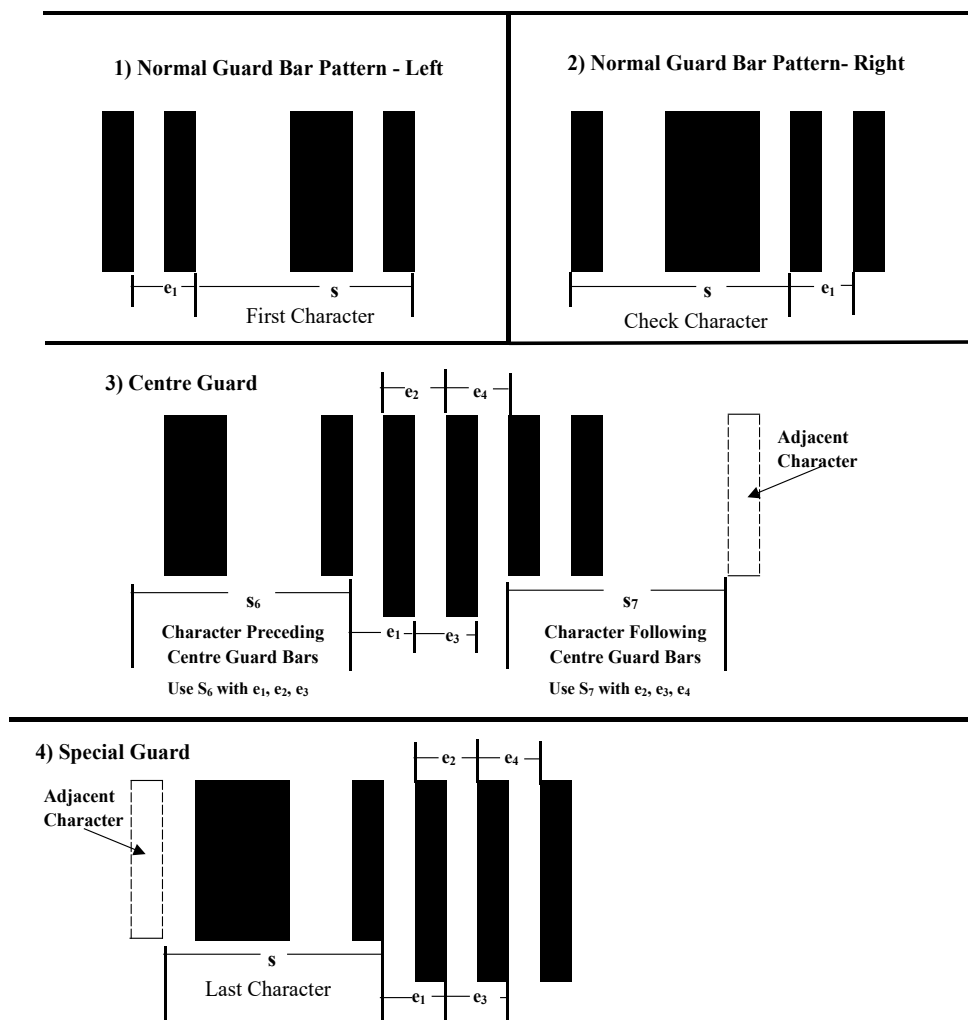


Figure 5.1.2 - 4

Main Symbol Auxiliary Pattern E Values

Auxiliary Guard Patterns	E1	E2	E3	E4
Normal Guard Bar Pattern	2			
Centre Guard Bar Pattern (left half)	2	2	2	
Centre Guard Bar Pattern (right half)		2	2	2
Special Guard Bar Pattern	2	2	2	2

5.1.3 Human Readable Interpretation

The human readable digits shall be printed underneath the main symbol and above the Add-On Symbol. A clearly legible font shall be used for the these digits, and OCR-B as defined in ISO 1073-2 is recommended. This font is referenced only as a convenient standard typeface, and it is not intended that these characters be machine read or verified. Reasonable alternative type fonts and character sizes are acceptable provided the Human Readable Interpretation is clearly legible.

All the encoded digits for EAN-13, UPC-A, and EAN-8 Bar Code Symbols, and the Add-On Symbols shall be shown in Human Readable Interpretation form. For UPC-E Bar Code Symbols, the six digits directly encoded together with the leading zero and the implicitly encoded Check Digit shall be shown in Human Readable Interpretation form. Figures [5.1.1.3.1 – 2](#), [5.1.1.3.2 – 1](#), [5.1.1.3.3 – 1](#), [5.1.1.3.4 – 1](#), [5.1.1.3.5.1 – 2](#), and [5.1.1.3.5.2 – 2](#) illustrate each type of symbol and its Human Readable Interpretation.

The height of the digits in the nominal size symbol is 2.75 mm. The minimum space between the top of the digits and the bottom of the bars (dark bars) shall be 0.5X. Normally the minimum is one module, which is close enough to keep the Human Readable Interpretation associated with the symbol.

In the EAN-13 Bar Code Symbol, the leftmost digit, which is encoded by variable parity, is printed to the left of the Start Character in line with the other digits.

For UPC-A and UPC-E Bar Code Symbols, the size of the first and last digits should be reduced to a maximum width equivalent to four modules. The height is reduced proportionally. The right-hand side of the first digit is positioned five module widths to

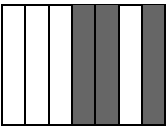
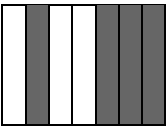
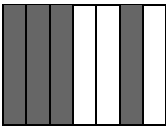
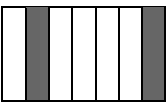
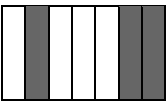
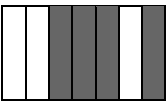
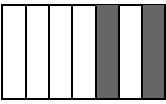
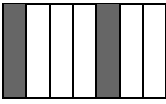
the left of the leftmost guard bar. The left-hand side of the last digit is positioned five module widths to the right of the rightmost guard bar for UPC-A Bar Code Symbols and three module widths for UPC-E Bar Code Symbols. The bottom edge of the first and last digit shall be aligned with the bottom edge of the remaining full size digits.

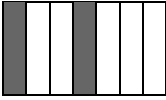
The Human Readable Interpretation of the Add-On Symbol shall be above it. The digits shall be the same height as those of the main symbol. The upper edges of the digits are aligned with the upper edges of the bars (dark bars) of the main symbol. The minimum space between the bottom of the digits and the top of the bars (dark bars) shall be 0.5X.

Some industries use specific variations of the recommended Human Readable Interpretation, such as inserted hyphens to segment the number field. An example of this is shown in [Section 5.1.A.6](#).

5.1.A.1 Appendix 1 Character Values in the EAN/UPC Symbology Family

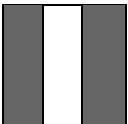
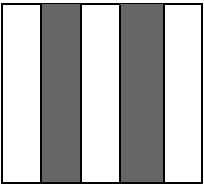
Figure 5.1.A.1 – 1

Value of Character	Number Set A (Odd)	Number Set B (Even)	Number Set C (Even)
0			
1			
2			
3			
4			
5			
6			
7			

8			
9			

5.1.A.2 Appendix 2: Auxiliary Characters in the EAN/UPC Symbology Family

Figure 5.1.A.2 – 1

Auxiliary Character	
Normal Guard Bar Pattern (right and left)	
Centre Guard Bar Pattern	
UPC-E Right Guard Bar Pattern	

5.1.A.3 Appendix 3: Logical Structure of an EAN-13 and UPC-A Bar Code Symbol Excluding Quiet Zones

Figure 5.1.A.3 – 1

Logical Structure of an EAN-13 or UPC-A Bar Code Symbol (Excluding Quiet Zones)				
Left Guard Bar Pattern	Characters 12 Through 7 (Left Half)	Centre Guard Bar Pattern	Characters 6 Through 1 (Right Half)	Right Guard Bar Pattern
3 modules	42 modules (6x7)	5 modules	42 modules (6x7)	3 modules
Total number of modules = 95				

Figure 5.1.A.3 – 2

Character Position												
Value of the Thirteenth Character	Number Set Used for Representing Characters 12 Through 7						Number Set Used for Representing Characters 6 Through 1					
	12	11	10	9	8	7	6	5	4	3	2	1
0	A	A	A	A	A	A	ALWAYS USE NUMBER SET C					
1	A	A	B	A	B	B						
2	A	A	B	B	A	B						
3	A	A	B	B	B	A						
4	A	B	A	A	B	B						
5	A	B	B	A	A	B						
6	A	B	B	B	A	A						
7	A	B	A	B	A	B						
8	A	B	A	B	B	A						

9	A	B	B	A	B	A	

5.1.A.4 Appendix 4: Logical Structure of an EAN-8 Bar Code Symbol Excluding Quiet Zones

Figure 5.1.A.4 – 1

Logical Structure of an EAN-8 Bar Code Symbol (Excluding Quiet Zones)				
Left Guard Bar Pattern	Characters 8 Through 5 (Left Half)	Centre Guard Bar Pattern	Characters 4 Through 1 (Right Half)	Right Guard Bar Pattern
3 modules	28 modules (4x7)	5 modules	28 modules (4x7)	3 modules
Total number of modules = 67				

Figure 5.1.A.4 – 2

Character Position							
Number Set Used for Representing Characters 8 Through 5				Number Set Used for Representing Characters 4 Through 1			
8	7	6	5	4	3	2	1
ALWAYS USE NUMBER SET A				ALWAYS USE NUMBER SET C			

5.1.A.5 Appendix 5: Logical Structure of a UPC-E Bar Code Symbol Excluding Quiet Zones

Figure 5.1.A.5 – 1

Logical Structure of a UPC-E Bar Code Symbol (Excluding Quiet Zones)		
Normal Guard Bar Pattern	Six Symbol Characters (Note the Use of Variable Parity)	Special Guard Bar Pattern (UPC-E)
3 modules	42 modules (6x7)	6 modules
Total number of modules = 51		

Figure 5.1.A.5 – 2

Value of Prefix Digit	Value of Check Digit	Number Sets Used for Numbering a UPC-E Bar Code Symbol					
		1	2	3	4	5	6
0	0	B	B	B	A	A	A
0	1	B	B	A	B	A	A
0	2	B	B	A	A	B	A
0	3	B	B	A	A	A	B
0	4	B	A	B	B	A	A
0	5	B	A	A	B	B	A
0	6	B	A	A	A	B	B
0	7	B	A	B	A	B	A
0	8	B	A	B	A	A	B
0	9	B	A	A	B	A	B

5.1.A.6 Appendix 6: Symbol Formats at Nominal Dimensions (Not to Scale)

Figure 5.1.A.6 - 1

EAN-13 Bar Code Symbol

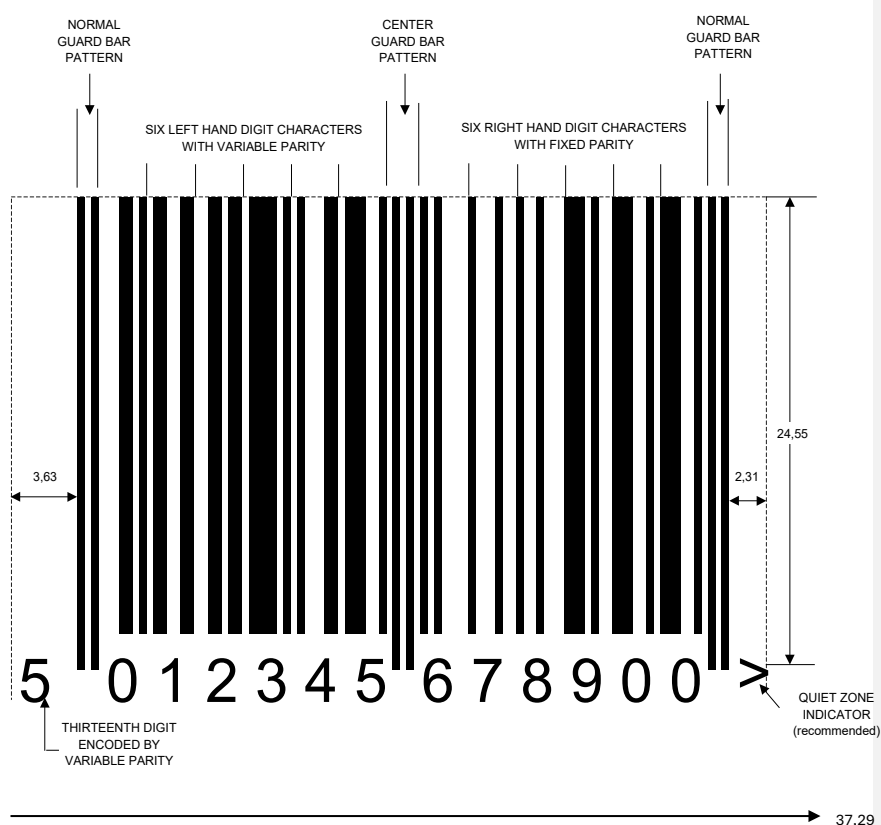


Figure 5.1.A.6 - 2
UPC-A Bar Code Symbol



Figure 5.1.A.6 – 3

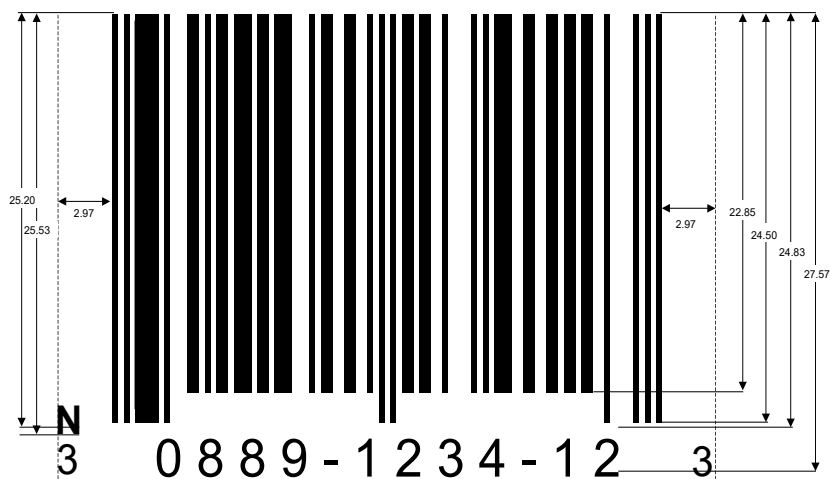


Figure 5.1.A.6 – 4

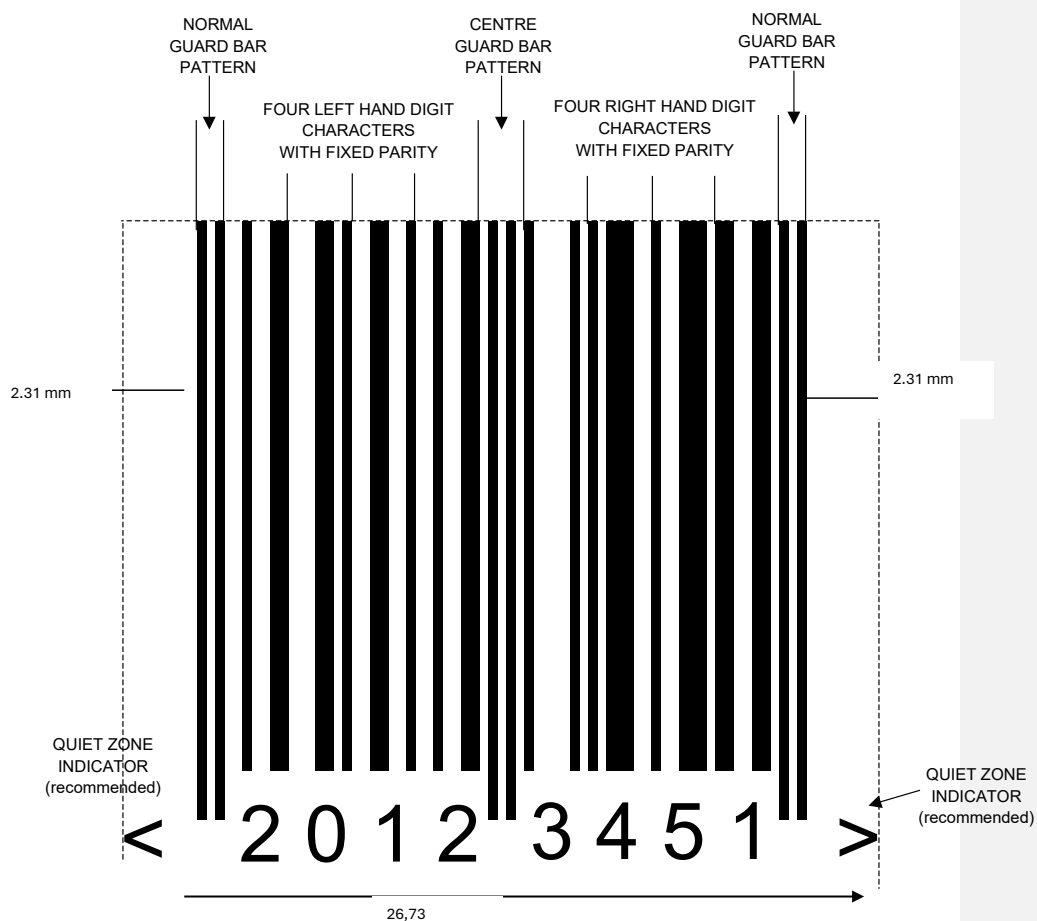


Figure 5.1.A.6 - 5
UPC-E Bar Code Symbol

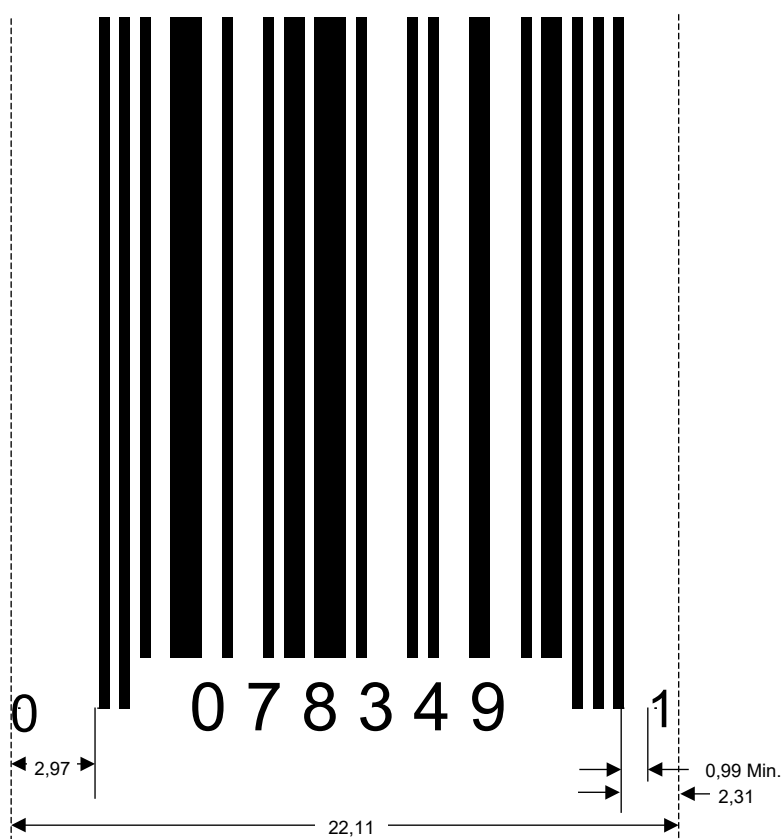


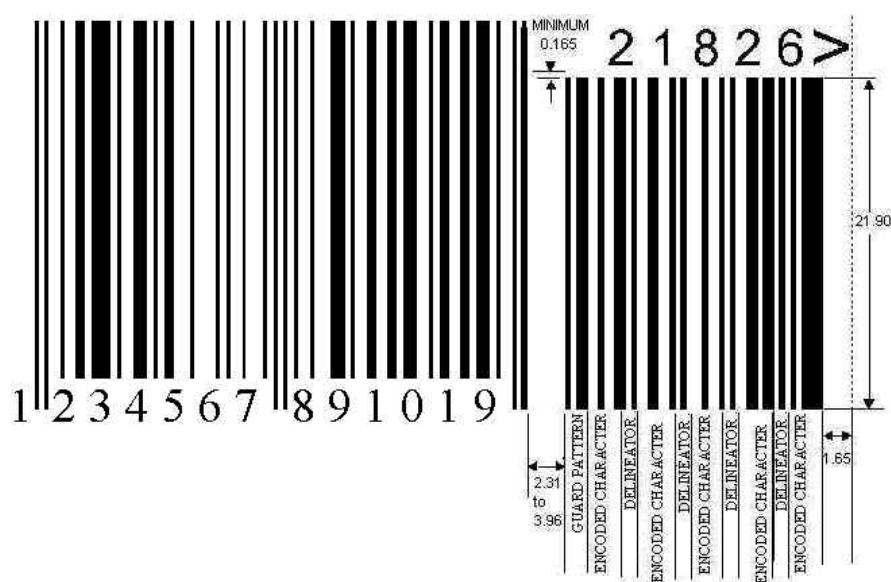
Figure 5.1.A.6 – 6

UPC-A Bar Code Symbol with Two-Digit Add-On Symbol



Figure 5.1.A.6 – 7

EAN-13 Bar Code Symbol with Five-Digit Add-On Symbol



5.1.A.7 Appendix 7: Dimensions of Modules and Symbols at Different Levels of Magnification

Figure 5.1.A.7 – 1

Magnification Factor	Ideal Module Width [mm]	EAN-13/UPC-A Dimensions [mm]		EAN-8 Dimensions [mm]	
		Width	Height	Width	Height
0.80	0.264	29.83	20.73	21.38	17.05
0.85	0.281	31.70	22.02	22.72	18.11
0.90	0.297	33.56	23.32	24.06	19.18
0.95	0.313	35.43	24.61	25.39	20.24
1.00	0.330	37.29	25.91	26.73	21.31
1.05	0.346	39.15	27.21	28.07	22.38
1.10	0.363	41.02	28.50	29.40	23.44
1.15	0.379	42.88	29.80	30.74	24.51
1.20	0.396	44.75	31.09	32.08	25.57
1.25	0.412	46.61	32.39	33.41	26.64
1.30	0.429	48.48	33.68	34.75	27.70
1.35	0.445	50.34	34.98	36.09	28.77
1.40	0.462	52.21	36.27	37.42	29.83
1.45	0.478	54.07	37.57	38.76	30.90
1.50	0.495	55.94	38.87	40.10	31.97
1.55	0.511	57.80	40.16	41.43	33.03
1.60	0.528	59.66	41.46	42.77	34.10
1.65	0.544	61.53	42.75	44.10	35.16
1.70	0.561	63.39	44.05	45.44	36.23
1.75	0.577	65.26	45.34	46.78	37.29
1.80	0.594	67.12	46.64	48.11	38.36

1.85	0.610	68.99	47.93	49.45	39.42
1.90	0.627	70.85	49.23	50.79	40.49
1.95	0.643	72.72	50.52	52.12	41.55
2.00	0.660	74.58	51.82	53.46	42.62

Note: Refer to [Section 5.4](#) for the minimum, nominal, and maximum X-dimensions, and symbol heights for bar code symbols.

Section 5.2:

ITF-14 Symbology Specifications

Table of Contents

5.2.1 Symbology Characteristics	2
5.2.1.1 Symbol Structure	2
5.2.1.2 Character Encodation.....	3
5.2.1.2.1 Data Character Encodation	3
5.2.1.2.2 Start and Stop Patterns.....	5
5.2.1.2.3 Check Digit	6
5.2.1.3 Dimensions and Tolerances	7
5.2.1.4 Reference Decode Algorithm	9
5.2.1.5 ITF-14 Symbols	11
5.2.1.5.1 Bearer Bar.....	11
5.2.1.6 Human Readable Interpretation.....	13
5.2.A.1 Appendix 1: (Informative) Additional Features	14
5.2.A.1.1 Protection Against Short Scans	14
5.2.A.1.2 Fixed Length Symbols	14
5.2.A.1.3 Bearer Bars	14
5.2.A.2 Appendix 2: (Informative) Guidelines for the Use of ITF-14	15
5.2.A.2.1 Autodiscrimination Compatibility.....	15
5.2.A.2.2 System Considerations.....	15
5.2.A.3 Appendix 3: (Informative) Symbology Identifier.....	16
5.2.A.4 Appendix 4: (Informative) Test Specifications	17

5.2.1 Symbology Characteristics

In the EAN.UCC System, the characteristics of ITF-14 Symbol are:

- Encodable character set: numeric 0 to 9 (ASCII characters 48 to 57 inclusive, in accordance with ISO 646)
- Code type: continuous
- Elements per symbol character: five (two wide and three narrow) encoded as either five bars (dark bars) or five spaces (light bars)
- Self-checking symbol character
- Data string length encodable: fixed length at 14 digits
- Bidirectionally decodable
- One Check Digit is required (see [Section 3.A.1](#))
- The symbol character density for ITF-14 is 16 to 18 modules per symbol character pair, depending on the wide-to-narrow ratio. The value is 16, based on the target ratio of 2.5 to 1.
- The non-data overhead is eight to nine modules, depending on the wide-to-narrow ratio. The value is 8.5, based on the target ratio of 2.5 to 1.

5.2.1.1 Symbol Structure

An ITF-14 Symbol includes:

- A leading Quiet Zone
- A start pattern
- Seven pairs of symbol characters representing data
- A stop pattern
- A trailing Quiet Zone

5.2.1.2 Character Encodation

5.2.1.2.1 Data Character Encodation

Figure 5.2.1.3.1 – 1 defines the ITF-14 Symbol's character encodation. In the binary representation column, the character 1 represents a wide element and 0 represents a narrow element.

Figure 5.2.1.3.1 – 1
Binary Representation of Character Encodation

Data Character	Binary Representation				
0	0	0	1	1	0
1	1	0	0	0	1
2	0	1	0	0	1
3	1	1	0	0	0
4	0	0	1	0	1
5	1	0	1	0	0
6	0	1	1	0	0
7	0	0	0	1	1
8	1	0	0	1	0
9	0	1	0	1	0

Figure 5.2.1.3.1 – 1 uses a modified binary coded decimal encoding scheme. The four leftmost bit positions for each character are assigned weights of 1, 2, 4, and 7, from left to right; the fifth position is used for an even parity bit. The sum of the positional weights of the 1 bits is equivalent to the data character value, except in the case of data character 0, where the weights 4 and 7 are applied. The parity bit ensures that there are always two 1 bits per character.

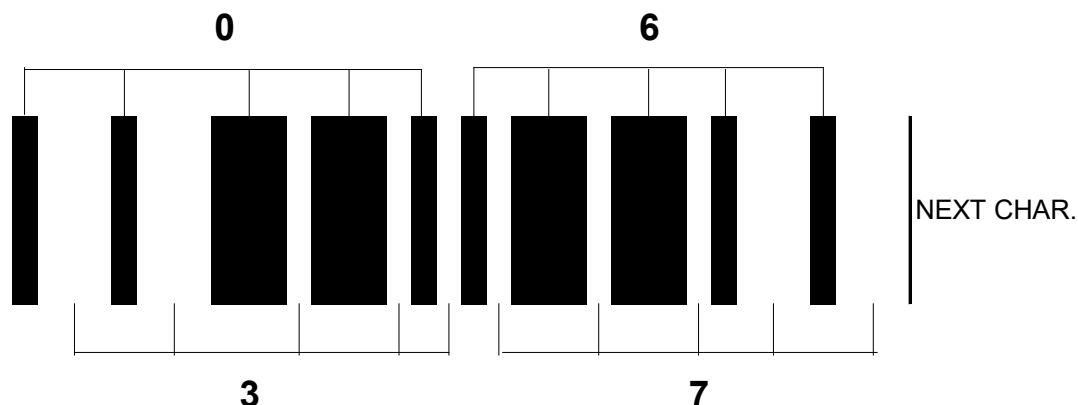
The algorithm shown in Figure 5.2.1.3.1 – 2 defines the rules for converting numeric data into the symbol characters of an ITF-14 Symbol (numeric data equals the Global Trade Item Number™ (GTIN™) and, therefore, already contains the Check Digit).

Figure 5.2.1.3.1 - 2

Step in Algorithm	Example
1. Calculate Check Digit for 0367123456789	367
2. With ITF-14 Symbols, the data string, including the Check Digit, will always be a 14-digit number. The leftmost four digits of this number are 0367.	0367
3. Subdivide the numeric string into digit pairs. The leftmost four digits of the number are 0367.	0367 03 and 67
4. Encode the digit pairs as follows:	
-- Encode the leading digit of each pair into bar patterns, as shown in Figure 5.2.1.3.1 – 1.	0 and 6
-- Encode the second digit of each pair into space patterns, as shown in Figure 5.2.1.3.1 – 1.	3 and 7
5. Form each symbol character pair by taking the bar (dark bar) and space (light bar) elements alternately from the patterns derived from the two steps in 4, commencing with the first bar (dark bar) of the pattern for the first digit, followed by the first space (light bar) of the pattern for the second digit.	

Figure 5.2.1.3.1 – 3 illustrates the sequence of bar (dark bar) and space (light bar) elements corresponding to the data character pairs 03 and 67.

Figure 5.2.1.3.1 – 3
ITF-14 Symbol Character Pairs Encoding 03 and 67



5.2.1.2.2 Start and Stop Patterns

The start pattern shall consist of four narrow elements in the sequence “bar (dark bar) - space (light bar) - bar (dark bar) - space (light bar).” The stop pattern shall consist of a “wide bar (dark bar) - narrow space (light bar) - narrow bar (dark bar)” sequence.

The start pattern shall be positioned at the normal left end of the symbol characters adjacent to the first bar (dark bar) of the most significant digit. The stop pattern shall be positioned at the normal right end of the symbol characters adjacent to the final space (light bar) of the least significant digit.

There is no assigned Human Readable Interpretation of the start and stop patterns, and they shall not be transmitted by the decoder.

Figure 5.2.1.3.2 – 1 illustrates the start and stop patterns and their relationship to the symbol characters.

Figure 5.2.1.3.2 – 1

Start and Stop Patterns

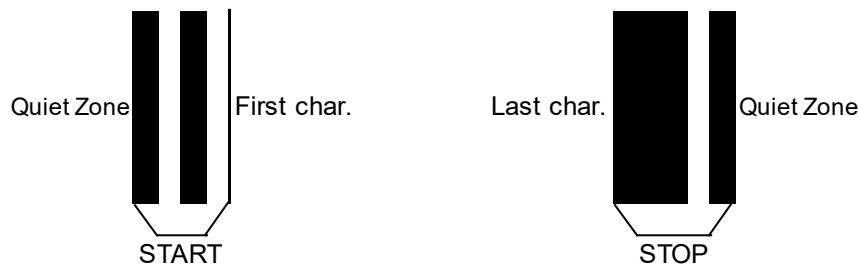
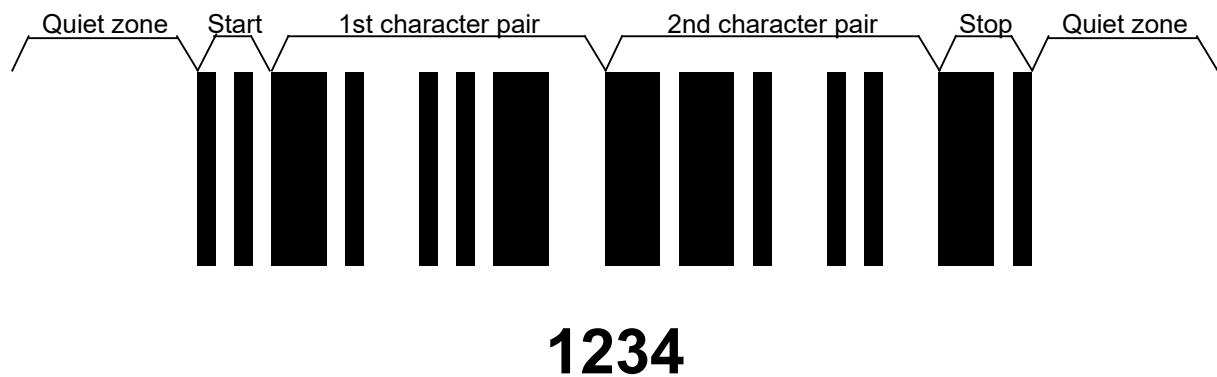


Figure 5.2.1.3.2 – 2 illustrates a complete bar code for the number 1234, showing the necessary Quiet Zones.

Figure 5.2.1.3.2 – 2
ITF-14 Symbol Inclusive of Quiet Zones



5.2.1.2.3 Check Digit

A Check Digit is required in the ITF-14 Symbology. [Section 3.A.1](#) defines the Check Digit position and calculation.

5.2.1.3 Dimensions and Tolerances

ITF-14 Symbols shall use the following target dimensions:

The X-dimension of ITF-14 Symbols is defined by the application specification based on the needs of the application. Refer to Section 5.4.1.2 for specifications by application area.

In the ITF-14 Symbol target size, the theoretical widths of the bars (light or dark) are:

Narrow bar = 1.016 mm (0.04 in.)

Wide bar = 2.540 mm (0.10 in.). The target width of the wide bars (dark bars) is 2.5 times the width of the narrow bars (dark bars).

The target width of an ITF-14 Symbol ten element character pair is 16.256 mm (0.64 in.), and the corresponding widths of auxiliary characters are:

Start Character = 4.064 mm (0.16 in.)

Stop Character = 4.572 mm (0.18 in.)

The Quiet Zones to the right and left of the symbol are compulsory. The minimum width of the Quiet Zone is 10X. Both Quiet Zones in an ITF-14 Symbol have target widths of 10.2 mm (0.40 in.).

A minimum Quiet Zone of 1 mm (0.04 in.) between the bottom line of the Bearer Bar and the top of the human readable characters is required.

For ITF-14 Symbols, the height of the bars (dark bars) in the target size symbol is 32 mm (1.25 in.).

Note: All dimensions given are ideal, theoretical values corresponding to the target size of symbols as used in the general distribution operating environment. These dimensions are not intended to be used directly in the preparation of bar codes.

The length of an ITF-14 Symbol, including Quiet Zones, can be calculated from the following expression:

$$W = (P(4N+6)+N+6)X+2Q$$

Where:

W is the length in millimetres

P is the number of character pairs

N is the wide-to-narrow ratio

X is the width of a narrow element in millimetres

Q is the width of the Quiet Zone in millimetres

An ITF-14 Symbol has seven character pairs, a target wide-to-narrow ratio of 2.5:1, a target X width of 1.016 mm (0.04 in.), and Quiet Zone widths of 10.2 mm (0.40 in.). This corresponds to a total symbol width of 142.748 mm (5.8 in.).

5.2.1.4 Reference Decode Algorithm

Bar code reading systems are designed to read imperfect symbols to the extent that practical algorithms permit. This section describes the reference decode algorithm used in the computation of the Decodability value described in *ISO/IEC 15416*.

Decodability shall be determined as follows:

- Within each ITF-14 Symbol character (representing two digits), sort the bars (b_i) and spaces (s_i) such that:

$$b_1 < b_2 < b_3 < b_4 < b_5$$

$$s_1 < s_2 < s_3 < s_4 < s_5$$

- The determined X-dimension (Z) is given by:

$$Z = b_1 + b_2 + b_3 + s_1 + s_2 + s_3 / 6$$

- Separation value (V_1) is:

$$V_1 = (d/Z) - 0.5$$

where d = the smaller of $(b_4 - b_3)$ or $(s_4 - s_3)$

- Uniformity value (V_2) is:

$$V_2 = 1 - u/Z$$

where u = the largest of:

$$b_5 - b_4$$

$$b_3 - b_1$$

$$s_5 - s_4$$

$$s_3 - s_1$$

- Narrowest element value (V_3) is:

$$V_3 = [(n/Z) - 0.25] / 0.75$$

where n = the smaller of s_1 or b_1

- For each symbol character, determine the Decodability value V . V is the smallest of V_1 , V_2 , or V_3 .
- The scan profile Decodability value is the smallest value of V measured in a Scan Reflectance Profile (SRP). The reference decode algorithm fails when V exhibits a negative value.
- The Decodability grade for each profile is determined from the Decodability value according to [ANSI X3.182, Table 3](#).

5.2.1.5 ITF-14 Symbols

5.2.1.5.1 Bearer Bar

The purpose of a Bearer Bar is to equalise the pressure exerted by the printing plate over the entire surface of the symbol, and to enhance reading reliability by helping to reduce the probability of misreads or short scans that may occur when a skewed scanning beam enters or exits the bar code symbol through its top or bottom edge.

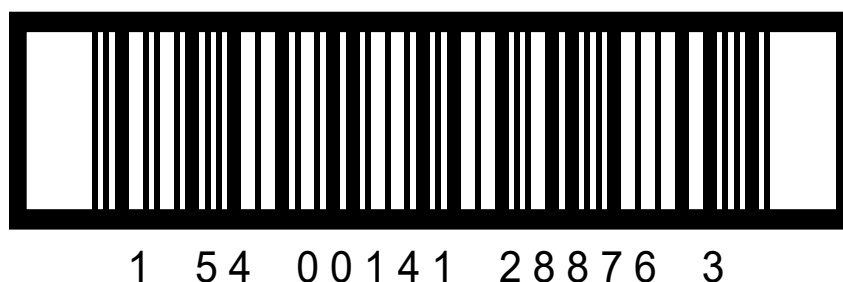
The Bearer Bar is mandatory unless it is not technically feasible to apply it (in which case reading reliability will be reduced).

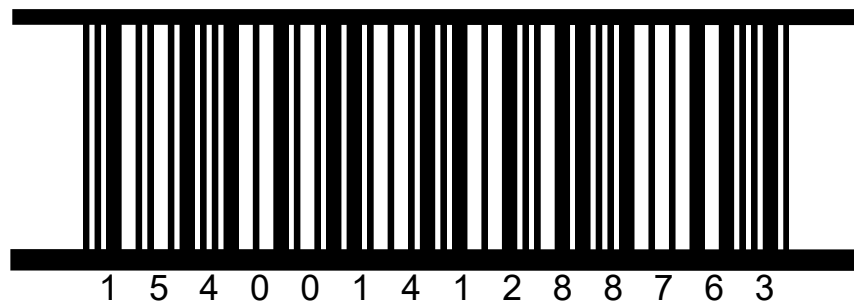
For printing methods requiring printing plates, the nominal Bearer Bar has a constant thickness of 4.8 mm (0.19 in.) and must completely surround the symbol, including its Quiet Zones, and butt directly against the top and bottom of the bars (dark bars) of the symbol.

For printing methods that do not require printing plates, the Bearer Bar should be a minimum of twice the width of a narrow bar (dark bar) and need only appear at the top and bottom of the symbol, butting directly against the top and bottom of the symbol bars (dark bars). The Bearer Bar may extend above and below the Quiet Zones. However, it is not mandatory to print the vertical sections of the Bearer Bar. See Figure 5.2.1.6.1 – 1.

To determine the optimum X-dimension and Bar Width Reduction (BWR) for a given print environment, please refer to [Section 5.4.A.5](#).

Figure 5.2.1.6.1 – 1





5.2.1.6 Human Readable Interpretation

A clearly legible Human Readable Interpretation of the data characters (proportional to the size of the symbol) including a Check Digit should normally be printed with the symbol encoding the data characters. Start and stop patterns do not have Human Readable Interpretation. Character size and font are not specified, and the Human Readable Interpretation may be printed anywhere in the area surrounding the symbol as long as the Quiet Zones are not encroached upon.

5.2.A.1 Appendix 1: (Informative) Additional Features

5.2.A.1.1 Protection Against Short Scans

In ITF-14 Symbols, the bar (dark bar) patterns of the start and stop patterns may be found at the respective end and beginning of certain encoded symbol characters within the code. There is, therefore, no guarantee that a partial scan of the symbol will not produce a valid read for an embedded symbol having fewer characters.

In the EAN.UCC System, short scans are very unlikely to happen, as the symbol must always contain 14 digits. However, a symbol containing more than 14 digits may cause a short scan of 14 digits. In this instance, the Check Digit offers a certain security to detect this error.

These are the measures that should be taken to minimise the risk of partial read.

5.2.A.1.2 Fixed Length Symbols

In any application standard, the number of characters encoded in an ITF-14 Symbol should be fixed for that application, and reading or data processing equipment should be programmed to only accept messages of that defined length. An ITF-14 Symbol must always carry a 14-digit number.

5.2.A.1.3 Bearer Bars

For information regarding Bearer Bars, refer to Section 5.2.1.6.1.

5.2.A.2 Appendix 2: (Informative) Guidelines for the Use of ITF-14

5.2.A.2.1 Autodiscrimination Compatibility

ITF-14 Symbols may be read by suitably programmed bar code readers that are designed to autodiscriminate the ITF Symbology from other symbologies. The ITF Symbology is, in particular, fully distinguishable from, and thus compatible with, many symbologies including the ISO standard symbologies.

When an ITF-14 Symbol is used in an autodiscrimination environment with Code 39 Symbols, the following guidelines shall be followed:

- The nominal inter-character gaps in the Code 39 Symbols shall be no wider than the narrow elements.
- The reading system shall be constrained and the decoder programmed to ensure that the number of characters (including Start and Stop Characters) in all Code 39 Symbols is greater than one-half of the number of data characters in the ITF-14 Symbol.
- ITF-14 Symbols shall have a minimum length of six characters.

Use of the recommendations in [Section 5.2.A.1](#) will provide additional protection in an autodiscrimination environment.

The decoder's valid set of symbologies should be limited to those needed by a given application to maximize reading security.

5.2.A.2.2 System Considerations

It is important that the various components making up a bar code installation system (e.g., printers, labels, readers) operate in concert. A failure in any component, or a mismatch between components, can compromise the performance of the overall system.

When both readers and printers are specified by a single user or by cooperative agreement (closed system), certain specified values, such as X-dimensions, inter-character gap width, and spectral band, may deviate from standard values. However, the characteristics of the printer, symbol, and reader should be matched to achieve desired performance.

5.2.A.3 Appendix 3: (Informative) Symbology Identifier

The symbology identifier allocated to the ITF-14 Symbol in *ISO/IEC 15424*, which may be added as a preamble to the decoded data by a suitably programmed bar code reader, is

]Im

where:

] is ASCII character 93

I (upper case I) is the code character for the ITF-14 Symbology

m is a modifier character

Note: The symbology identifier]I1 is the only symbology identifier used by the Uniform Code Council (UCC™) and EAN International with the ITF-14 Symbol. This information shall not be encoded in the bar code symbol, but should be generated by the decoder after decoding and transmitting as a preamble to the data message. The value of “m” in the symbology identifier is equal to 1, which indicates the Check Digit has been validated and transmitted by the scanner.

5.2.A.4 Appendix 4: (Informative) Test Specifications

To verify whether a symbol meets the specifications in the EAN.UCC System, it shall be tested using the specification defined in ISO/IEC 15416, which details the conditions under which measurements should be made. The specification defines methods of determining an overall quality grade based on the attributes of the bar code symbol and determining its conformity with the system. For ITF-14 Symbols, the reference decode algorithm shall be the algorithm specified in [Section 5.2.A.3](#).

Full details on bar code production and quality assessment can be found in [Section 5.4](#).

The verifier shall determine the average wide-to-narrow ratio (N) for each profile. The value N should be computed character by character, then averaged over all characters in the symbol. The range indicated below is passing:

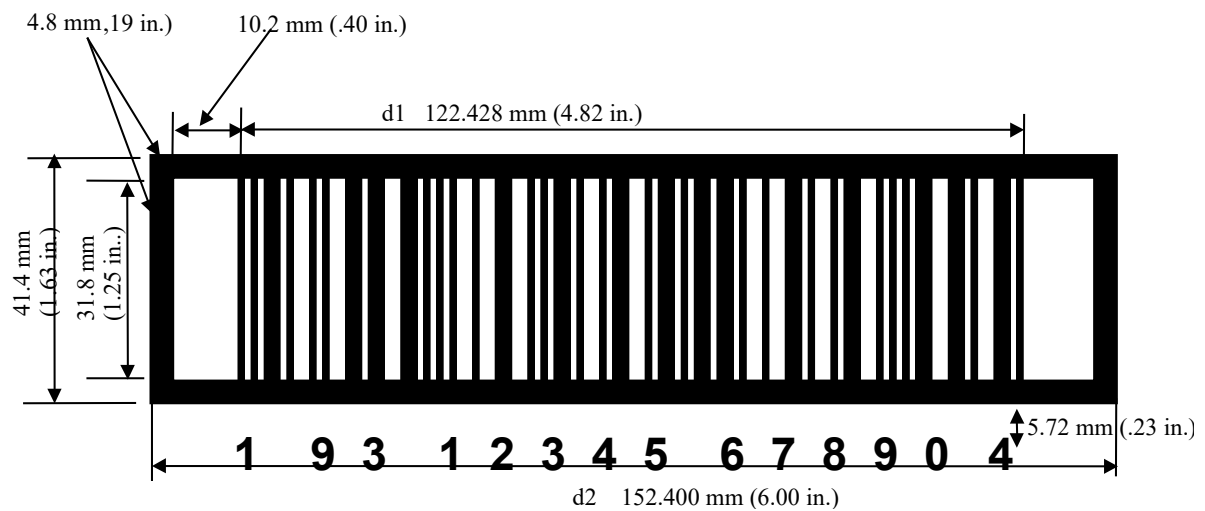
$$2.25 < N < 3.00$$

N is calculated for each symbol character (pair of data digits) according to the following rule:

$$N_i = 1.5 * [(b_4 + b_5 + s_4 + s_5) / (b_1 + b_2 + b_3 + s_1 + s_2 + s_3)]$$

The value N for the profile is then obtained by averaging the N_i for all characters in the symbol.

Figure 5.2.A.4 – 1

ITF-14 Symbol: Main Dimensions at X-Dimension 1.016 mm (0.040 in.)

This diagram is not intended to be used as a basis for measurement.

Section 5.3:

UCC/EAN-128 Symbology Specifications

Table of Contents

5.3.1 Symbology Characteristics	3
5.3.1.1 UCC/EAN-128 Symbology Characteristics.....	3
5.3.2 UCC/EAN-128 Bar Code Symbol Structure	5
5.3.3 UCC/EAN-128 Symbology Character Assignments.....	6
5.3.3.1 Symbol Character Structure.....	7
5.3.3.2 Data Character Encodation	9
5.3.3.3 Code Sets	16
5.3.3.3.1 Code Set A.....	16
5.3.3.3.2 Code Set B.....	16
5.3.3.3.3 Code Set C.....	16
5.3.3.4 Special Characters	16
5.3.3.4.1 Code Set and Shift Characters.....	17
5.3.3.4.2 Function Characters	17
5.3.3.5 Start and Stop Characters	19
5.3.3.6 Symbol Check Character	19
5.3.3.7 UCC/EAN-128 Symbology Start Pattern.....	19
5.3.4 Dimensional Requirements	20
5.3.4.1 Minimum Width of a Module (X-Dimension)	20
5.3.4.2 Quiet Zone (Light Margin)	20
5.3.5 Reference Decode Algorithm	20

5.3.6 Symbol Quality	26
5.3.6.1 General	26
5.3.6.2 Decodability	26
5.3.6.3 Quiet Zones (Light Margins)	28
5.3.6.4 Transmitted Data	28
5.3.7 UCC/EAN-128 Symbology Application Parameters	28
5.3.7.1 Symbol Height	28
5.3.7.2 Symbol Length	28
5.3.7.3 Maximum Symbol Length	30
5.3.7.4 Human Readable Interpretation	30
5.3.7.5 Transmitted Data (FNC1)	32
5.3.8 Rules for Encoding/Decoding Element Strings in UCC/EAN-128 Symbology	32
5.3.8.1 The Basic Structure of UCC/EAN-128 Bar Code Symbols	32
5.3.8.2 The Basic Structure of Each UCC/EAN-128 Bar Code Symbol	33
5.3.8.2.1 Pre-Defined Length Application Identifiers	35
5.3.8.2.2 Application Identifier (23n)	35
5.3.8.3 Concatenation	35
5.3.8.3.1 Concatenation of the Pre-Defined Length Element Strings	37
5.3.8.3.2 Variable Length Data Strings	38
5.3.8.3.3 Pre-Defined and Variable Length Element Strings	39
5.3.8.4 The Separator Character (FNC1)	40
5.3.8.5 Mixing UCC/EAN-128 Symbology with Other Symbologies	40
5.3.8.6 Symbol Placement	40
5.3.8.7 Processing UCC/EAN-128 Bar Code Symbols - Basic Required Logic	40

5.3.1 Symbology Characteristics

The UCC/EAN-128 Bar Code Symbol has been carefully designed through joint co-operation among EAN International, the Uniform Code Council (UCC™) and Automatic Identification Manufacturers, Inc. (AIM). Use of UCC/EAN-128 Bar Code Symbols provides a high degree of security and distinguishes EAN.UCC System Element Strings from extraneous non-standard bar code symbols.

The UCC/EAN-128 Symbology is a subset of the more general Code 128 Symbology. By agreement among AIM, Inc., EAN International and the UCC, use of the Function 1 Character (FNC1) in Code 128 Symbols in the first symbol character position following the Start Character has been reserved exclusively for the EAN.UCC System.

Code 128 is fully described in *“ISO/IEC 15417, Information Technology - Automatic Identification and Data Capture Techniques - Bar code Symbology Specification - Code 128.”*

The information covered in Section 5.3 includes:

- Sections [5.3.1](#) – [5.3.6](#): UCC/EAN-128 Symbology subset (using *“ISO/IEC 15417”* for reference)
- [Section 5.3.7](#): EAN.UCC System application-defined parameters
- [Section 5.3.8](#): EAN.UCC System rules for encoding/decoding Element Strings in UCC/EAN-128 Bar Code Symbols

5.3.1.1 UCC/EAN-128 Symbology Characteristics

The characteristics of the UCC/EAN-128 Symbology are:

- Encodable character set:
 - The Code 128 ASCII characters are in accordance with *ISO 646*. Refer to [Figure 3.A.3 – 1](#) for more details. Spaces are not encoded in UCC/EAN-128 Bar Code Symbols).
 - Characters with ASCII values 128 to 255 may also be encoded in Code 128 Symbols. Characters with ASCII values 128 -to 255 accessed by Function 4 Character (FNC4) are reserved for future use and are not used in UCC/EAN-128 Bar Code Symbols.

- Four non-data function characters. FNC2 and FNC4 are not used in UCC/EAN-128 Bar Code Symbols.
- Four code set selection characters (including single character code set shift)
- Three Start Characters
- One Stop Character
- Continuous code type
- Six elements per symbol character comprising three bars (dark bars) and three spaces (light bars), each one, two, three, or four modules in width. The Stop Character is made up of seven elements comprising four bars (dark bars) and three spaces (light bars).
- Character self-checking
- Variable symbol length
- Bi-directionally decodable
- One mandatory Symbol Check Character (see [Section 5.3.A.1](#)).
- Data character density is 11 modules per symbol character (5.5 modules per numeric character in code set C, 13 modules per Stop Character)
- Non-data overhead:
 - UCC/EAN-128 Bar Code Symbols have a special double character start pattern consisting of the appropriate Start Character and immediately followed by a Function 1 Character (FNC1). The FNC1 adds to the symbol's non-data overhead. The total symbol overhead is 46 modules.- The FNC1 character may also be used as a separator character between Element Strings not contained in the pre-defined table shown in [Figure 5.3.8.2.1 – 1](#).
- UCC/EAN-128 Bar Code Symbol size characteristics:
 - The maximum physical length is 165 mm (6.5 in.) including Quiet Zones.
 - The maximum number of data characters in a single symbol is 48.
 - For a given length of data, the symbol size is variable between limits in X-dimension to accommodate the ranges in quality achievable by the various printing processes.

5.3.2 UCC/EAN-128 Bar Code Symbol Structure

The UCC/EAN-128 Bar Code Symbol is made up as follows, reading from left to right:

- * Leading Quiet Zone

* A Start Character (A, B, or C)	The double character Start pattern
* The Function 1 Character (FNC1)	

- * Data (including the Application Identifier represented in character set A, B, or C)
- * A Symbol Check Character
- * The Stop Character
- * Trailing Quiet Zone

The data characters represented in the symbol are shown in Human Readable Interpretation underneath or above the symbol.

Figure 5.3.2 – 1

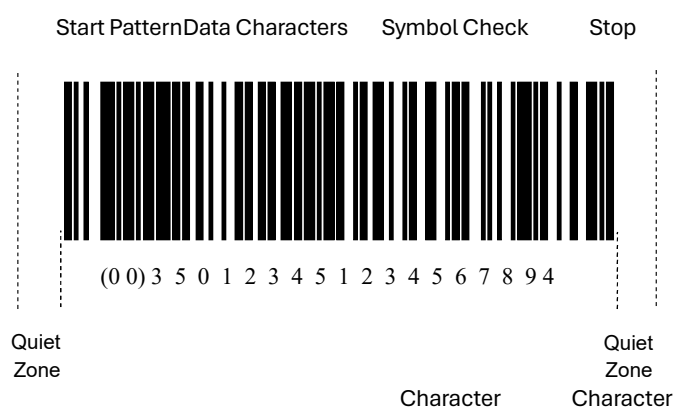
General Format of a UCC/EAN-128 Bar Code Symbol**5.3.3 UCC/EAN-128 Symbology Character Assignments**

Figure 5.3.3.2 – 1 defines all the Code 128 character assignments. In the element width column, the numeric values represent the widths of the elements in modules or multiples of the X-dimension.

UCC/EAN-128 Bar Code Symbol character assignments are identical to Code 128 Symbol character assignments.

5.3.1.15.3.1 Symbol Character Structure

The sum of the bar modules in any symbol character is always even (even parity) and the sum of the space modules is, therefore, always odd. This parity feature enables character self-checking.

Figure 5.3.3.1 – 1

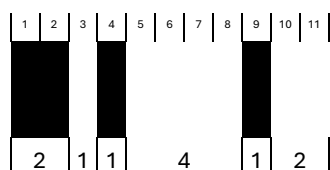
UCC/EAN-128 Bar Code Symbol Start Character A

Figure 5.3.3.1 – 2 illustrates the encodation of the symbol character value 35, which represents data character C in code sets A or B or the digits 35 in code set C.

Figure 5.3.3.1 – 2

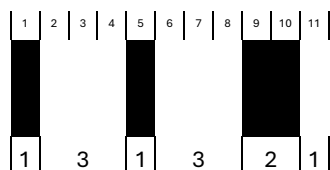
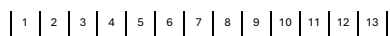
Symbol Character Value 35

Figure 5.3.3.1 – 3

UCC/EAN-128 Bar Code Symbol Stop Character



5.3.1-25.3.3.2 Data Character Encodation

Code 128 has three character sets, which are shown in Figure 5.3.3.2 – 1 as code sets A, B, and C.

UCC/EAN-128 Symbology specifies the identical character set, as defined by the International *ISO/IEC 646* Standard, to ensure international compatibility. For more information see [Figure 3.A.3 – 1](#).

The symbol character bar (dark bar) and space (light bar) patterns shown in Figure 5.3.3.2 – 1 represent the data characters listed under the columns for code set A, B, or C. The choice of code set depends on the Start Character, the use of code A, code B, or code C characters, or the shift character. If the symbol begins with Start Character A, then code set A is defined initially. Code set B and code set C are similarly defined by beginning the symbol with Start Character B or C, respectively. The code set can be redefined within the symbol by using code A, code B, and code C characters or the shift character (see [Section 5.3.3](#) for the use of special characters).

The same data may be represented by different Code 128 Symbols through the use of different combinations of Start, code set, and shift characters. The individual applications do not specify code sets A, B, or C. [Section 5.3.A.3](#) contains rules to minimise the length of the symbol for any given data.

Each symbol character is assigned a numeric value listed in Figure 5.3.3.2 – 1. This value is used in calculating the Symbol Check Character value. It may also be used to provide a conversion to and from ASCII values (see [Section 5.3.A.2](#)).

Figure 5.3.3.2 – 1

Code 128 Character Encodation

Symbol Character Value	Code Set A	ASCII Value for Code Set A	Code Set B	ASCII Value for Code Set B	Code Set C	Element Widths (Modules)						Element Pattern										
						B	S	B	S	B	S	1	2	3	4	5	6	7	8	9	10	11
0	space	32	space	32	00	2	1	2	2	2	2	■	■	■	■	■	■	■	■	■	■	■
1	!	33	!	33	01	2	2	2	1	2	2	■	■	■	■	■	■	■	■	■	■	■
2	"	34	"	34	02	2	2	2	2	2	1	■	■	■	■	■	■	■	■	■	■	■
3	#	35	#	35	03	1	2	1	2	2	3	■	■	■	■	■	■	■	■	■	■	■
4	\$	36	\$	36	04	1	2	1	3	2	2	■	■	■	■	■	■	■	■	■	■	■
5	%	37	%	37	05	1	3	1	2	2	2	■	■	■	■	■	■	■	■	■	■	■
6	&	38	&	38	06	1	2	2	2	1	3	■	■	■	■	■	■	■	■	■	■	■
7	apos- trophe	39	apos- trophe	39	07	1	2	2	3	1	2	■	■	■	■	■	■	■	■	■	■	■
8	(	40	(	40	08	1	3	2	2	1	2	■	■	■	■	■	■	■	■	■	■	■
9	)	41	)	41	09	2	2	1	2	1	3	■	■	■	■	■	■	■	■	■	■	■
10	*	42	*	42	10	2	2	1	3	1	2	■	■	■	■	■	■	■	■	■	■	■
11	+	43	+	43	11	2	3	1	2	1	2	■	■	■	■	■	■	■	■	■	■	■
12	comma	44	comma	44	12	1	1	2	2	3	2	■	■	■	■	■	■	■	■	■	■	■
13	-	45	-	45	13	1	2	2	1	3	2	■	■	■	■	■	■	■	■	■	■	■
14	full stop	46	full stop	46	14	1	2	2	2	3	1	■	■	■	■	■	■	■	■	■	■	■
15	/	47	/	47	15	1	1	3	2	2	2	■	■	■	■	■	■	■	■	■	■	■
16	0	48	0	48	16	1	2	3	1	2	2	■	■	■	■	■	■	■	■	■	■	■
17	1	49	1	49	17	1	2	3	2	2	1	■	■	■	■	■	■	■	■	■	■	■

Symbol Character Value	Code Set A	ASCII Value for Code Set A	Code Set B	ASCII Value for Code Set B	Code Set C	Element Widths (Modules)						Element Pattern										
						B	S	B	S	B	S	1	2	3	4	5	6	7	8	9	10	11
18	2	50	2	50	18	2	2	3	2	1	1											
19	3	51	3	51	19	2	2	1	1	3	2											
20	4	52	4	52	20	2	2	1	2	3	1											
21	5	53	5	53	21	2	1	3	2	1	2											
22	6	54	6	54	22	2	2	3	1	1	2											
23	7	55	7	55	23	3	1	2	1	3	1											
24	8	56	8	56	24	3	1	1	2	2	2											
25	9	57	9	57	25	3	2	1	1	2	2											
26	colon	58	colon	58	26	3	2	1	2	2	1											
27	semi- colon	59	semi- colon	59	27	3	1	2	2	1	2											
28	<	60	<	60	28	3	2	2	1	1	2											
29	=	61	=	61	29	3	2	2	2	1	1											
30	>	62	>	62	30	2	1	2	1	2	3											
31	?	63	?	63	31	2	1	2	3	2	1											
32	@	64	@	64	32	2	3	2	1	2	1											
33	A	65	A	65	33	1	1	1	3	2	3											
34	B	66	B	66	34	1	3	1	1	2	3											
35	C	67	C	67	35	1	3	1	3	2	1											
36	D	68	D	68	36	1	1	2	3	1	3											
37	E	69	E	69	37	1	3	2	1	1	3											

Symbol Character Value	Cod e Set A	ASCII Value for Code Set A	Code Set B	ASCII Value for Code Set B	Code Set C	Element Widths (Modules)						Element Pattern										
						B	S	B	S	B	S	1	2	3	4	5	6	7	8	9	10	11
38	F	70	F	70	38	1	3	2	3	1	1											
39	G	71	G	71	39	2	1	1	3	1	3											
40	H	72	H	72	40	2	3	1	1	1	3											
41	I	73	I	73	41	2	3	1	3	1	1											
43	J	74	J	74	42	1	1	2	1	3	3											
43	K	75	K	75	43	1	1	2	3	3	1											
44	L	76	L	76	44	1	3	2	1	3	1											
45	M	77	M	77	45	1	1	3	1	2	3											
46	N	78	N	78	46	1	1	3	3	2	1											
47	O	79	O	79	47	1	3	3	1	2	1											
48	P	80	P	80	48	3	1	3	1	2	1											
49	Q	81	Q	81	49	2	1	1	3	3	1											
50	R	82	R	82	50	2	3	1	1	3	1											
51	S	83	S	83	51	2	1	3	1	1	3											
52	T	84	T	84	52	2	1	3	3	1	1											
53	U	85	U	85	53	2	1	3	1	3	1											
54	V	86	V	86	54	3	1	1	1	2	3											
55	W	87	W	87	55	3	1	1	3	2	1											
56	X	88	X	88	56	3	3	1	1	2	1											
57	Y	89	Y	89	57	3	1	2	1	1	3											
58	Z	90	Z	90	58	3	1	2	3	1	1											
59	[	91	[	91	59	3	3	2	1	1	1											

Symbol Character Value	Code Set A	ASCII Value for Code Set A	Code Set B	ASCII Value for Code Set B	Code Set C	Element Widths (Modules)						Element Pattern										
						B	S	B	S	B	S	1	2	3	4	5	6	7	8	9	10	11
60	\	92	\	92	60	3	1	4	1	1	1											
61	]]	93	]]	93	61	2	2	1	4	1	1											
62	^	94	^	94	62	4	3	1	1	1	1											
63	_	95	_	95	63	1	1	1	2	2	4											
64	NUL	00	grave accent	96	64	1	1	1	4	2	2											
65	SOH	01	a	97	65	1	2	1	1	2	4											
66	STX	02	b	98	66	1	2	1	4	2	1											
67	ETX	03	c	99	67	1	4	1	1	2	2											
68	EOT	04	d	100	68	1	4	1	2	2	1											
69	ENQ	05	e	101	69	1	1	2	2	1	4											
70	ACK	06	f	102	70	1	1	2	4	1	2											
71	BEL	07	g	103	71	1	2	2	1	1	4											
72	BS	08	h	104	72	1	2	2	4	1	1											
73	HT	09	i	105	73	1	4	2	1	1	2											
74	LF	10	j	106	74	1	4	2	2	1	1											
75	VT	11	k	107	75	2	4	1	2	1	1											
76	FF	12	l	108	76	2	2	1	1	1	4											
77	CR	13	m	109	77	4	1	3	1	1	1											
78	SO	14	n	110	78	2	4	1	1	1	2											
79	SI	15	o	111	79	1	3	4	1	1	1											
80	DLE	16	p	112	80	1	1	1	2	4	2											
81	DC1	17	q	113	81	1	2	1	1	4	2											

Symbol Character Value	Code Set A	ASCII Value for Code Set A	Code Set B	ASCII Value for Code Set B	Code Set C	Element Widths (Modules)						Element Pattern										
						B	S	B	S	B	S	1	2	3	4	5	6	7	8	9	10	11
82	DC2	18	r	114	82	1	2	1	2	4	1											
83	DC3	19	s	115	83	1	1	4	2	1	2											
84	DC4	20	t	116	84	1	2	4	1	1	2											
85	NAK	21	u	117	85	1	2	4	2	1	1											
86	SYN	22	v	118	86	4	1	1	2	1	2											
87	ETB	23	w	119	87	4	2	1	1	1	2											
88	CAN	24	x	120	88	4	2	1	2	1	1											
89	EM	25	y	121	89	2	1	2	1	4	1											
90	SUB	26	z	122	90	2	1	4	1	2	1											
91	ESC	27	{	123	91	4	1	2	1	2	1											
92	FS	28		124	92	1	1	1	1	4	3											
93	GS	29	}	125	93	1	1	1	3	4	1											
94	RS	30	~	126	94	1	3	1	1	4	1											
95	US	31	DEL	127	95	1	1	4	1	1	3											
96	FNC 3		FNC3		96	1	1	4	3	1	1											
97	FNC 2		FNC2		97	4	1	1	1	1	3											
98	SHIFT		SHIF T		98	4	1	1	3	1	1											
99	CODE C		CODE C		99	1	1	3	1	4	1											
100	CODE B		FNC4		CODE B	1	1	4	1	3	1											
101	FNC		CODE		CODE	3	1	1	1	4	1											

Symbol Character Value	Code Set A	ASCII Value for Code Set A	Code Set B	ASCII Value for Code Set B	Code Set C	Element Widths (Modules)						Element Pattern										
						B	S	B	S	B	S	1	2	3	4	5	6	7	8	9	10	11
	4		A		A																	
102	FNC 1		FNC1		FNC1	4	1	1	1	3	1											
103	Start A					2	1	1	4	1	2											
104	Start B					2	1	1	2	1	4											
105	Start C					2	1	1	2	3	2											

Symbol Character Values	Code Set A	Code Set B	Code Set C	Element Widths (Modules)						Element Pattern													
	Stop			B	S	B	S	B	S	B	1	2	3	4	5	6	7	8	9	10	11	12	13
				2	3	3	1	1	1	2													

Note: The Stop Character comprises 13 modules in four bars (dark bars) and three spaces (light bars). Every other character comprises 11 modules, starts with a bar (dark bar), ends with a space (light bar), and comprises six elements, each of which varies from one to four modules in width. The numeric values in the B and S columns represent the number of modules in each bar (dark bar) or space (light bar) element respectively in the symbol characters.

5.3.1.35.3.3.3 Code Sets

5.3.3.3.1 Code Set A

Code set A includes all of the standard upper case alphanumeric characters and punctuation characters together with the symbology elements (e.g., characters with ASCII values from 00 to 95) and seven special characters.

5.3.1.1.25.3.3.3.2 Code Set B

Code set B includes all of the standard upper case alphanumeric characters and punctuation characters together with the lowercase alphabetic characters (e.g., ASCII characters 32 to 127 inclusive) and seven special characters.

5.3.1.1.35.3.3.3.3 Code Set C

Code set C includes the set of 100 digit pairs from 00 to 99 inclusive, as well as three special characters. This allows numeric data to be encoded as two data digits per symbol character.

5.3.1.45.3.3.4 Special Characters

The last seven characters of code sets A and B (character values 96 to 102) and the last three characters of code set C (character values 100 to 102) are special non-data characters that, though they have particular significance to the bar code reader, have no ASCII character equivalents.

Formatted: Bullets and Numbering

Formatted: Bullets and Numbering

Formatted: Bullets and Numbering

5.3.1.1-15.3.3.4.1 Code Set and Shift Characters

Code set and shift characters shall be used to change from one code set to another within a symbol. The decoder shall not transmit them.

- Code set characters: Code A, B, or C characters change the symbol code set from the code set previously defined to the new code set, which is defined by the code character. This change applies to all characters following the code set character until either the end of the symbol, another code set character, or the shift character is encountered.
- Shift character: The shift character changes the code set from A to B or B to A for the single character following the shift character. Characters following the affected character shall revert to the code set A or B defined prior to the shift character.

5.3.3.4.2 Function Characters

Function Characters (FNC) provide special operations and application instructions to the bar code reading device.

- The Function 1 Character (FNC1) shall be subject to the special considerations defined in [Section 5.3.A.2](#). An FNC1 in the first position following the Start Character of a Code-128 Symbol is at all times a reserved use, which identifies the EAN.UCC System.
- The Function 2 Character (FNC2) (Message Append) is not used in the EAN.UCC System. It instructs the bar code reader to temporarily store the data from the symbol containing the FNC2 and transmit it as a prefix to the data of the next symbol. This may be used to concatenate several symbols before transmission. This character may occur anywhere in the symbol. Where the sequence of data is significant, provision should be made to ensure reading of the symbols in the correct sequence.
- The Function 3 Character (FNC3) (Initialise) instructs the bar code reader to interpret the data from the symbol containing the FNC3 as instructions for initialisation or reprogramming of the bar code reader. The data from the symbol shall not be transmitted by the bar code reader. This character may occur anywhere in the symbol.
- The Function 4 Character (FNC4) is not used in the EAN.UCC System. In Code 128 Symbols, FNC4 is used to represent an extended ASCII character set (byte values 128 to 255) as specified in ISO 8859-1 or otherwise in an application specification. If a single FNC4 is used, the value 128 is added to the ASCII value

of the following data character in the symbol. A shift character may follow the FNC4 if it is necessary to change the code set for the following data character. Subsequent data characters revert to the standard ASCII set. If two consecutive FNC4s are used, the value 128 is added to the ASCII value of the following data characters until two further consecutive FNC4s are encountered or the end of the symbol is reached. If, during this sequence of extended ASCII encodation, a single FNC4 is encountered, it is used to revert to standard ASCII encodation for the next data character only. Shift and code set characters shall have their normal effect during such a sequence. The default reference character set for extended ASCII values 128 to 255 is the corresponding half of ISO 8859-1, Latin alphabet 1, but application specifications may define or reference alternative sets corresponding to byte values 128 to 255.

5.3.3.5 Start and Stop Characters

- Start Characters A, B, and C define the corresponding code set to be used initially in the symbol.
- The Stop Character is common to all code sets.
- The decoder shall not transmit Start and Stop Characters.

5.3.1-65.3.3.6 Symbol Check Character

The Symbol Check Character shall be included as the last symbol character before the Stop Character. [Section 5.3.A.1](#) defines the algorithm for its calculation. The Symbol Check Character shall not be represented in the Human Readable Interpretation, nor shall it be transmitted by the decoder.

Formatted: Bullets and Numbering

5.3.1-75.3.3.7 UCC/EAN-128 Symbology Start Pattern

The UCC/EAN-128 Symbology has special double character start patterns consisting of Start (A, B, or C) FNC1. These special Start Characters differentiate UCC/EAN-128 Bar Code Symbols from the more generalised Code 128 Symbols.

In other words, a Code 128 Symbol, which begins with one of the UCC/EAN-128 Symbology double character start patterns, is always a UCC/EAN-128 Bar Code Symbol; a Code 128 Symbol, which does not begin with this start pattern, is never a UCC/EAN-128 Bar Code Symbol.

A Function 1 Character (FNC1) may be the Symbol Check Character (in less than 1 percent of cases). It is also used as a Separator Character, when appropriate, if Application Identifiers (AIs) and their data fields are concatenated into a single bar code.

- Start A begins the UCC/EAN-128 Symbol data encodation according to character set A.
- Start B begins the UCC/EAN-128 Symbol data encodation according to character set B.
- Start C begins the UCC/EAN-128 Symbol data encodation according to character set C. Start Character C should always be used when the data inclusive of the AI begins with four or more numeric characters.

Formatted: Bullets and Numbering

5.3.4 Dimensional Requirements

UCC/EAN-128 Bar Code Symbols shall conform to the dimensions in the subsections that follow.

5.3.4.1 Minimum Width of a Module (X-Dimension)

The minimum X-dimension is defined by the application specification and requirements (see [Section 5.4](#)), while considering the equipment available for symbol production and scanning. For UCC/EAN-128 Bar Code Symbols, the absolute minimum X-dimension is 0.250 mm (0.00984 in.). The maximum X-dimension is 1.016 mm (0.040 in.). Application specifications stipulate a target and range of the X-dimension.

The X-dimension shall be constant throughout a given symbol.

5.3.4.2 Quiet Zone (Light Margin)

The minimum width of the Quiet Zone to the left and right of the UCC/EAN-128 Bar Code Symbol is 10x.

5.3.5 Reference Decode Algorithm

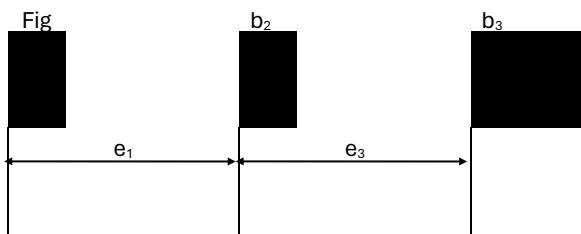
Bar code reading systems are designed to read imperfect symbols to the extent that practical algorithms permit. This section describes the reference decode algorithm used in the computation of the Decodability value described in *ISO/IEC 15416*.

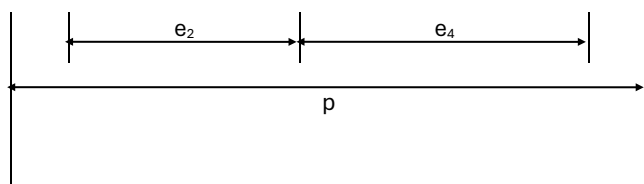
The algorithm contains the following steps to decode each character:

1. Calculate eight width measurements p, e1, e2, e3, e4, b1, b2, and b3 (see Figure 5.3.5 – 1).

Figure 5.3.5 – 1

Decode Measurements





2. Convert measurements e_1 , e_2 , e_3 , and e_4 to normalised values e_1 , e_2 , e_3 , and e_4 , which will represent the integral module width (e_i) of these measurements. The following method is used for the i -th value:

If $1,5p/11 \leq e_i < 2,5p/11$, then $E_i = 2$

If $2,5p/11 \leq e_i < 3,5p/11$, then $E_i = 3$

If $3,5p/11 \leq e_i < 4,5p/11$, then $E_i = 4$

If $4,5p/11 \leq e_i < 5,5p/11$, then $E_i = 5$

If $5,5p/11 \leq e_i < 6,5p/11$, then $E_i = 6$

If $6,5p/11 \leq e_i < 7,5p/11$, then $E_i = 7$

Otherwise the character is in error.

3. Look up the character in the decode table using the four values E_1 , E_2 , E_3 , and E_4 as the key (see Figure 5.3.5 – 2).
4. Retrieve the self-checking symbol character value V , which is stored in the table with the character. The value V is equal to the sum of the modules for the bars (dark bars) as defined for that character.
5. Verify that:

$$(V-1, 75)p / 11 < (b_1 + b_2 + b_3) < (V + 1, 75)p / 11$$

Otherwise the character is in error.

The calculation indirectly uses character parity to detect all decode errors caused by single non-systematic one-module edge errors.

Using these five steps, decode the first character. If it is a Start Character, continue decoding the symbol in the normal forward direction. If it is not a Start Character but decodes as a Stop Character, attempt to decode all subsequent characters in the reverse direction.

After all characters have been decoded, make sure there was a valid Start Character, a valid Stop Character, and that the Symbol Check Character is correct.

Translate the symbol characters into the appropriate data characters from code set A, B, or C according to the Start Character, code characters, and shift characters used in the symbol.

In addition, perform other secondary checks on Quiet Zones, beam acceleration, absolute timing, and dimensions that are appropriate considering the specific reading device and intended application environment.

Note: In this algorithm the symbol is decoded using edge to similar edge measurements (e) and an additional measurement of the sum of the three bar (dark bar) widths.

Figure 5.3.5 – 2

Edge Differences for Decoding Code 128 Symbols

Char. Value	E1	E2	E3	E4	V	Char. Value	E1	E2	E3	E4	V
00	3	3	4	4	6	54	4	2	2	3	6
01	4	4	3	3	6	55	4	2	4	5	6
02	4	4	4	4	6	56	6	4	2	3	6
03	3	3	3	4	4	57	4	3	3	2	6
04	3	3	4	5	4	58	4	3	5	4	6
05	4	4	3	4	4	59	6	5	3	2	6
06	3	4	4	3	4	60	4	5	5	2	8
07	3	4	5	4	4	61	4	3	5	5	4
08	4	5	4	3	4	62	7	4	2	2	6
09	4	3	3	3	4	63	2	2	3	4	4
10	4	3	4	4	4	64	2	2	5	6	4
11	5	4	3	3	4	65	3	3	2	3	4
12	2	3	4	5	6	66	3	3	5	6	4
13	3	4	3	4	6	67	5	5	2	3	4
14	3	4	4	5	6	68	5	5	3	4	4
15	2	4	5	4	6	69	2	3	4	3	4
16	3	5	4	3	6	70	2	3	6	5	4
17	3	5	5	4	6	71	3	4	3	2	4
18	4	5	5	3	6	72	3	4	6	5	4
19	4	3	2	4	6	73	5	6	3	2	4
20	4	3	3	5	6	74	5	6	4	3	4
21	3	4	5	3	6	75	6	5	3	3	4
22	4	5	4	2	6	76	4	3	2	2	4
23	4	3	3	4	8	77	5	4	4	2	8
24	4	2	3	4	6	78	6	5	2	2	4
25	5	3	2	3	6	79	4	7	5	2	6
26	5	3	3	4	6	80	2	2	3	6	6
27	4	3	4	3	6	81	3	3	2	5	6
28	5	4	3	2	6	82	3	3	3	6	6
29	5	4	4	3	6	83	2	5	6	3	6
30	3	3	3	3	6	84	3	6	5	2	6
31	3	3	5	5	6	85	3	6	6	3	6
32	5	5	3	3	6	86	5	2	3	3	6
33	2	2	4	5	4	87	6	3	2	2	6
34	4	4	2	3	4	88	6	3	3	3	6
35	4	4	4	5	4	89	3	3	3	5	8
36	2	3	5	4	4	90	3	5	5	3	8
37	4	5	3	2	4	91	5	3	3	3	8
38	4	5	5	4	4	92	2	2	2	5	6
39	3	2	4	4	4	93	2	2	4	7	6
40	5	4	2	2	4	94	4	4	2	5	6
41	5	4	4	4	4	95	2	5	5	2	6
42	2	3	3	4	6	96	2	5	7	4	6
43	2	3	5	6	6	97	5	2	2	2	6
44	4	5	3	4	6	98	5	2	4	4	6
45	2	4	4	3	6	99	2	4	4	5	8
46	2	4	6	5	6	100	2	5	5	4	8
47	4	6	4	3	6	101	4	2	2	5	8
48	4	4	4	3	8	102	5	2	2	4	8
49	3	2	4	6	6	103	3	2	5	5	4
50	5	4	2	4	6	104	3	2	3	3	4
51	3	4	4	2	6	105	3	2	3	5	6
52	3	4	6	4	6	Stop _A	5	6	4	2	6
53	3	4	4	4	8	Stop _B	3	2	2	4	6

Note: Stop_A values are for decoding in a forward direction. Stop_B values apply to the first six elements of the Stop Character starting at the rightmost side when scanned in a reverse direction.

5.3.6 Symbol Quality

5.3.6.1 General

ISO/IEC 15416 defines a standardised methodology for measuring and grading bar code symbols. Code 128 Symbols shall be evaluated according to that standard. The reference decode algorithm defined in [Section 5.3.5](#) shall be used for the assessment of the decode and Decodability parameters under ISO/IEC 15416.

For UCC/EAN-128 Bar Code Symbol minimum quality levels, refer to [Section 5.3.7](#).

5.3.6.2 Decodability

Decodability is a measure of how closely the decode algorithm measurement values approach those in a theoretically perfect symbol. Thus, Decodability is a parameter that measures how closely the Scan Reflectance Profile is to approaching decode failure for a given printed symbol.

For the calculation of the Decodability value V, the following provisions apply, which supplement those described in ISO/IEC 15416 for edge to similar edge decodable symbologies:

Substitute V1 for V_c in the formula $V_c = K / (S / 2n)$.

Where: K = the smallest difference between a measurement and a reference threshold

N = 11 (number of modules in a symbol character)

S = total width of the character

Calculate V2:

$$V2 = \frac{1,75 - (ABS((W_b \times 11/S) - M))}{1,75}$$

Where: M = number of dark modules in the character

S = total width of the character

W_b = sum of the bar (dark bar) widths in the character

ABS = mathematical term for taking the absolute of the calculation that follows it

V_c is the lesser of V1 and V2.

The Stop Character includes an additional terminating bar (dark bar). For the purpose of measuring Decodability, the Stop Character should be checked twice: first using the six leftmost elements and then using the six rightmost elements from right to left. Both sets of six elements are equivalent in width to a standard character.

5.3.6.3 Quiet Zones (Light Margins)

The Quiet Zones to the right and left of the UCC/EAN-128 Bar Code Symbol are compulsory. Both Quiet Zones have a minimum width of 10x.

ISO/IEC 15416 allows for additional pass/fail criteria to be stipulated by a symbology specification. In the case of a UCC/EAN-128 Bar Code Symbol, a minimum Quiet Zone of 10Z is specified. Both left and right Quiet Zones on each Scan Reflectance Profile (SRP) under ISO/IEC 15416 shall be measured and graded as follows:

Quiet Zone $\geq 10Z$: Grade 4 (A)

Quiet Zone $< 10Z$: Grade 0 (F)

Where Z = the average measured width of the narrow bars (dark bars) and spaces (light bars) (one module) in the symbol

5.3.6.4 Transmitted Data

Transmitted data from a decoded UCC/EAN-128 Bar Code Symbol shall comprise the byte values of the data characters. It is prefixed by the symbology identifier]C1, if used. The Start and Stop Characters, function characters, code set and shift characters, and Symbol Check Character shall not be included in the transmitted data.

For UCC/EAN-128 Symbology implementation, see [Section 5.3.7](#).

5.3.7 UCC/EAN-128 Symbology Application Parameters

5.3.7.1 Symbol Height

For UCC/EAN-128 Bar Code Symbols used in general distribution, the minimum height of the bars (dark bars) in the symbol is 32 mm (1.25 in.). The actual symbol height used depends on the specific application requirements.

5.3.7.2 Symbol Length

The dimensions of the UCC/EAN-128 Bar Code Symbol depend on the number of characters encoded:

1 Start Character x 11 modules = 11

Function 1 Character (FNC1) x 11 modules = 11

1 Symbol Check Character x 11 modules = 11

1 Stop Character	x 13 modules =	13
N symbol characters	x 11 modules =	11N

(11N + 46) modules

Where N is the number of symbol characters, any auxiliary characters (shift and code characters) embedded in the data are included.

A module is equal to the X-dimension of the symbol.

Character set C allows two digits to be encoded in one symbol character. Thus, numeric data can be encoded with twice the density of other data when using character set C.

In addition, Quiet Zones to the right and left of the bar code are compulsory and both have widths of 10 modules.

Thus total symbol length, including Quiet Zones, is:

$$(11N + 66) \text{ modules} = (11N + 66) \times$$

5.3.7.3 Maximum Symbol Length

Two parameters have to be taken into consideration for defining the maximum length of a UCC/EAN-128 Bar Code Symbol: the physical length, which depends on the number of characters encoded and the module width (or X-dimension) used, and the number of data characters encoded excluding the auxiliary characters.

The maximum length of any UCC/EAN-128 Bar Code Symbol must be within the following limits:

- The physical length, including Quiet Zones, cannot exceed 165 mm (6.5 in.).
- The maximum number of encoded data characters is 48, including the Application Identifier(s) and Function 1 Character (FNC1) when used as a Separator, but excluding the auxiliary characters and the Symbol Check Character.

5.3.7.4 Human Readable Interpretation

The Human Readable Interpretation of the data in the bar code symbol must be shown below the symbol. Start, Stop, shift, and function characters, as well as the Symbol Check Character, are not shown in the human readable format.

The precise location of the Human Readable Interpretation and the font used to represent the characters are not specified for UCC/EAN-128 Bar Code Symbols. However, the characters should be clearly legible (such as OCR-B) and must be obviously associated with the symbol. The Quiet Zones must not be violated.

Application Identifiers should be clearly recognisable to facilitate key entry. This is achieved by putting parentheses around Application Identifiers in the Human Readable Interpretation.

Note: The parentheses are not part of the data and are not encoded in the bar code symbol.

5.3.7.5 Transmitted Data (FNC1)

The following UCC/EAN-128 Symbology implementation specifications are in accordance with *ISO/IEC 15417 Appendix 2* for transmitted data:

- The Function 1 Character (FNC1) may validly occur as the Symbol Check Character.
- FNC1 in the third or subsequent character position is transmitted as the ASCII character 29 (GS).
- Symbols using FNC1 in the first data position should have symbology identifiers enabled.
- When FNC1 is used in the first position it shall not be represented in the transmitted message, although its presence is indicated by the use of modifier value 1 in the symbology identifier.

5.3.8 Rules for Encoding/Decoding Element Strings in UCC/EAN-128 Symbology

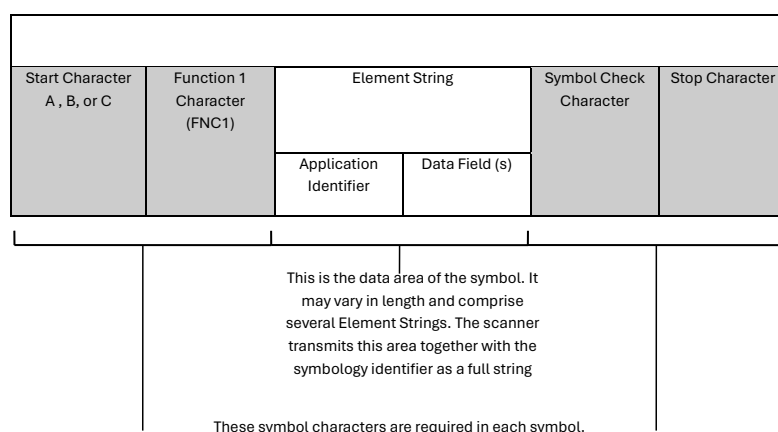
5.3.8.1 The Basic Structure of UCC/EAN-128 Bar Code Symbols

All bar code symbologies use particular symbol characters to mark the beginning and the end of the bar code symbol. A UCC/EAN-128 Bar Code Symbol may begin with the Start Character A, B, or C, which determines the interpretation of the subsequent symbol characters. UCC/EAN-128 Symbology uses the Function 1 Character (FNC1) in the position following the Start Character. This double start pattern is reserved for EAN.UCC System applications worldwide. This makes it possible to distinguish UCC/EAN-128 Bar Code Symbols from extraneous non-standard bar code symbols.

5.3.8.2 The Basic Structure of Each UCC/EAN-128 Bar Code Symbol

Figure 5.3.8.2 – 1

UCC/EAN-128 Bar Code Symbol Structure



Since UCC/EAN-128 Bar Code Symbols vary in length, it is important to ensure that:

- Not more than 48 data characters are encoded (see the data area of Figure 5.3.8.2 – 1)
- The physical length does not exceed 165 mm (6.5 in.) including Quiet Zones

The maximum length allows several Element Strings to be encoded in one bar code symbol, a process called concatenation. Concatenation is advantageous because it means that the symbology elements are only needed once, and the space required for the symbol is smaller than when separate bar code symbols are used to encode each Element String. It also improves scanning accuracy, allowing for single scanning rather than multiple scanning. The various Element Strings can be transmitted from the bar code reader as a single full string.

The various Element Strings, which are transmitted from concatenated bar code symbols, have to be analysed and processed. To simplify this procedure and reduce the symbol size, the lengths of some Element Strings are pre-defined (see [Figure 5.3.8.2.1 – 1](#)). Element Strings that are not contained in [Figure 5.3.8.2.1 – 1](#) and that do not appear

at the end of the symbol (encoded immediately before the Symbol Check Character) must immediately be followed by an FNC1 to separate it from the Element String that follows.

5.3.8.2.1 Pre-Defined Length Application Identifiers

Figure 5.3.8.2.1 – 1 contains all Application Identifiers that have a predefined length and, therefore, do not require a Function 1 Character (FNC1) separator.

Figure 5.3.8.2.1 – 1

Element Strings with Pre-Defined Length Using Application Identifiers			
First Two Digits of the Application Identifier	Number of Characters (Application Identifier and Data Field)	First Two Digits of the Application Identifier	Number of Characters (Application Identifier and Data Field)
00	20	17	8
01	16	(18)	8
02	16	(19)	8
(03)	16	20	4
(04)	18	31	10
11	8	32	10
12	8	33	10
13	8	34	10
(14)	8	35	10
15	8	36	10
(16)	8	41	16

Figure 5.3.8.2.1 – 1 is limited to the listed numbers and will remain unchanged. Those numbers in parentheses are not yet assigned.

5.3.8.2.2 Application Identifier (23n)

The first two digits of the Application Identifier (23n) present a special case. The first digit following AI (23n) indicates the length of the Element String. No Separator Character is required when AI (23n) is used in a concatenated Element String.

5.3.8.3 Concatenation

Using the UCC/EAN-128 Bar Code Symbol, it is possible to concatenate (chain together) discrete Element Strings. [Figure 5.3.8.2.1 – 1](#) specifies the total Element String length (including the Application Identifier) associated with the first two digits of an Application Identifier. Application Identifiers starting with two digits that are not included in [Figure 5.3.8.2.1 – 1](#) have a variable length even if the definition of the Application Identifier specifies a fixed length data field.

5.3.8.3.1 Concatenation of the Pre-Defined Length Element Strings

Concatenated Element Strings constructed from Application Identifiers with a pre-defined length do not require a Separator Character. Each Element String is immediately followed by either the next Application Identifier or the Symbol Check Character and Stop Character.

For example, concatenation of net weight (4 kg) with the associated Global Trade Item Number™ (GTIN™) 95012345678903 does not require the use of a Separator Character. From Figure 5.3.8.2.1 – 1, Element Strings with Pre-Defined Length Using Application Identifiers:

- 01 has a pre-defined Element String length of 16 digits.
- 31 has a pre-defined Element String length of 10 digits.

Figure 5.3.8.3.1 – 1

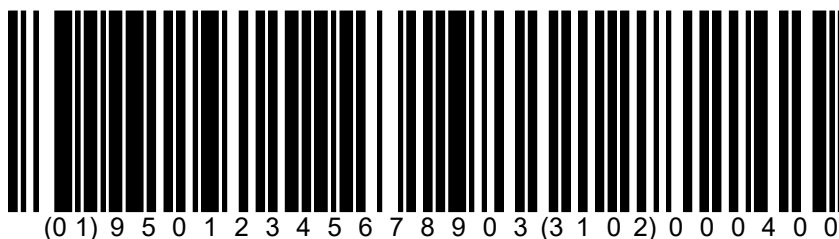
GTIN 95012345678903

Net weight 4.00 kg



Figure 5.3.8.3.1 – 2

GTIN 95012345678903 + Net weight 4.00 kg



5.3.8.3.2 Variable Length Data Strings

Concatenating Element Strings of variable length, which includes all Application Identifiers that do not start with two characters contained in [Figure 5.3.8.2.1 – 1](#), involves the use of a Separator Character. The Separator Character used is the Function 1 Character (FNC1). It is placed immediately after the last symbol character of a variable length data string and is followed by the Application Identifier of the next Element String. If the Element String is the last to be encoded, it is followed by the Symbol Check and Stop Characters and not the FNC1 Separator Character.

For example, concatenation of price per unit of measure (365 currency units) and batch number (123456) requires the use of a Separator Character immediately after the price per unit of measure.



Figure 5.3.8.3.2 – 1

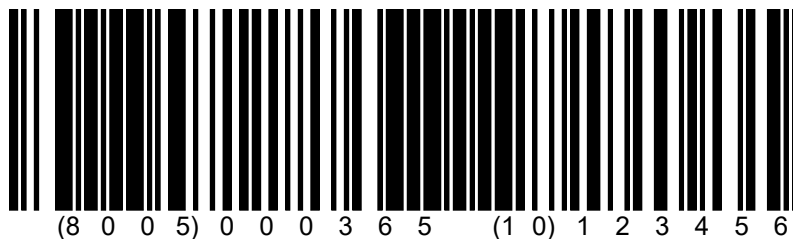
Price per unit of measure 365

Batch number 123456

Figure 5.3.8.3.2 – 2

Price per unit of measure 365

Batch number 123456



Note: The FNC1 is not shown in Human Readable Interpretation.

5.3.8.3.3 Pre-Defined and Variable Length Element Strings

When concatenating a mixture of pre-defined and other Element Strings, place the pre-defined Element Strings before the variable length Element Strings. The Separator Character is not used to terminate pre-defined Element Strings, and hence, fewer symbol characters are required in the concatenated bar code.

5.3.8.4 The Separator Character (FNC1)

The Separator Character appears in the decoded data string as <GS> (ASCII character 29, 7-bit character set ISO 646). All Element Strings not of pre-defined length must be followed by a Function 1 Character (FNC1) separator when followed by another Element String in a single bar code symbol. An FNC1 is not required at the end of the last Element String represented in a UCC/EAN-128 Bar Code Symbol. The processing routine shown on the next page allows for a FNC1 entered by error after an Element String contained in [Figure 5.3.8.3.2 – 1](#).

Refer to [Section 5.3.7](#) for additional information on encoding/decoding FNC1.

5.3.8.5 Mixing UCC/EAN-128 Symbology with Other Symbologies

Global Trade Item Numbers™ (GTINs™) may be carried in any of the EAN.UCC System endorsed symbologies. When additional data is required beyond the GTIN, UCC/EAN-128 Bar Code Symbols are used. The UCC/EAN-128 Symbology specification does not eliminate other EAN.UCC Symbologies. In these cases, the GTIN is printed using an ITF-14 Symbol or other EAN.UCC System symbologies and additional data using a UCC/EAN-128 Bar Code Symbol.

5.3.8.6 Symbol Placement

The preferred placement for a supplementary UCC/EAN-128 Symbol is on the same horizontal plane as the bar code symbol containing the Global Trade Item Number™ (GTIN™), SSCC, or other stand-alone EAN.UCC System identification number. The supplementary symbol(s) should be as close as possible to the main symbol and must not interfere with the Quiet Zones.

- Orient the supplementary symbols in the same direction as the main symbol. Main symbol placement guidelines are given in [Section 6.0](#).
-
- Concatenated symbols must follow the symbol placement guidelines given in [Section 6.0](#), based upon the EAN.UCC System ID number they encode (GTIN, SSCC).

5.3.8.7 Processing UCC/EAN-128 Bar Code Symbols - Basic Required Logic

See [Figure 7.9–1](#) for a flow chart of the logic required to accurately parse UCC/EAN-128 Bar Code Symbols from the full data strings output from a scanner.

5.3.A.1 Appendix 1: (Normative) Additional Features of Code 128

5.3.A.1.1 Symbol Check Character

The Code 128 Symbol Check Character shall be calculated according to the following rules.

1. Retrieve the symbol character value from [Figure 5.3.3.2 – 1](#).
2. Each symbol character position is given a weight. The Start Character is weighted 1. Then, beginning on the left with the first symbol character following the Start Character, the weights are 1, 2, 3, and 4 to...n for all following symbol characters up to, but not including, the Symbol Check Character itself; n denotes the number of symbol characters representing data or special information in the symbol, exclusive of the Start and Stop Characters and Symbol Check Character.

Note: Both the Start Character and the first symbol character following the Start Character (the Function 1 Character (FNC1) for all UCC/EAN-128 Bar Code Symbols) are weighted by one.
3. Each symbol character value is multiplied by its weight.
4. The products of the calculations in step 3 are totalled.
5. The sum of the products is divided by 103.
6. The remainder derived from the calculation in step 5 is the symbol character value of the Symbol Check Character.

Figure 5.3.A.1 – 1 shows how to calculate the Symbol Check Character value for the batch number 2503X using the UCC/EAN-128 Bar Code Symbol.

Figure 5.3.A.1 – 1

Start C FNC1 10 [†] 25 03 Code B X [Symbol Check Character] Stop							
Characters	Start C	FNC1	10	25	03	Code B	X
Character values (Step 1)	105	102	10	25	3	100	56
Weights (Step 2)	1	1	2	3	4	5	6
Products (Step 3)	105	102	20	75	12	500	336
Sum of products (Step	115						

[†] Application Identifier (10) is defined as batch or lot number.

4)	0
Divide by 103 (Step 5)	$1150 / 103 = 11$
Remainder = Symbol	17
Check Character value	

The Symbol Check Character shall be positioned immediately following the final data or special character and before the Stop Character.

Note: The Symbol Check Character shall not be shown in the Human Readable Interpretation.

5.3.A.2 Appendix 2: (Informative) Relationship of Symbol Character Value to ASCII Value

In order to convert symbol character value (S) to ASCII decimal value or vice versa, the following relationships are applicable for code set A and code set B.

- Code set A

If $S \leq 63$,

ASCII value = $S + 32$

If $64 \leq S \leq 95$,

ASCII value = $S - 64$

- Code set B

If $S \leq 95$,

ASCII value = $S + 32$

The resulting values are shown in [Figure 5.3.3.2 – 1](#).

Note: As described in [Section 5.3.3](#), the Function 4 Character (FNC4) is not used in the EAN.UCC System. However, the presence of FNC4 in Code 128 Symbols has the effect of adding 128 to the ASCII value of the following data character or characters derived from the rules given above.

5.3.A.3 Appendix 3: (Informative) Use of Start, Code Set, and Shift Characters to Minimise Symbol Length

The same data may be represented by different UCC/EAN-128 Bar Code Symbols through the use of different combinations of Start, code set, and shift characters.

The following rules should normally be implemented in printer control software to minimise the number of symbol characters needed to represent a given data string (and, therefore, reduce the overall symbol length).

1. Determine the Start Character:

- a. If the data consists of two digits, use Start Character C.
- b. If the data begins with four or more numeric data characters, use Start Character C.
- c. If an ASCII symbology element (e.g., NUL) occurs in the data before any lowercase character, use Start Character A.
- d. Otherwise, use Start Character B

2. If Start Character C is used and the data begins with an odd number of numeric data characters, insert a code set A or code set B character before the last digit, following rules 1c and 1d above to determine between code sets A and B.

3. If four or more numeric data characters occur together when in code sets A or B and:

- a. If there is an even number of numeric data characters, then insert a code set C character before the first numeric digit to change to code set C.
- b. If there is an odd number of numeric data characters, then insert a code set C character immediately after the first numeric digit to change to code set C.

4. When in code set B and an ASCII symbology element occurs in the data:

- a. If following that character, a lowercase character occurs in the data before the occurrence of another symbology element, then insert a shift character before the symbology element.
- b. Otherwise, insert a code set A character before the symbology element to change to code set A

5. When in code set A and a lowercase character occurs in the data:

- a. If following that character, a symbology element occurs in the data before the occurrence of another lowercase character, then insert a shift character before the lowercase character.
 - b. Otherwise, insert a code set B character before the lowercase character to change to code set B
6. When in code set C and a non-numeric character occurs in the data, insert a code set A or code set B character before that character, and follow rules 1c and 1d to determine between code sets A and B.

Note 1: In these rules, the term “lowercase” is used for convenience to mean any code set B character with Code 128 Symbol character values 64 to 95 (ASCII values 96 to 127) (e.g., all lowercase alphanumeric characters plus `{ } ~ DEL). The term “symbology element” means any code set A character with Code 128 Symbol character values 64 to 95 (ASCII values 00 to 31).

Note 2: If the Function 1 Character (FNC1) occurs in the first position following the Start Character, or in an odd-numbered position in a numeric field, it should be treated as two digits for the purpose of determining the appropriate code set.

5.3.A.4 Appendix 4: (Informative) Guidelines for the Use of Code 128

5.3.A.4.1 Autodiscrimination Compatibility

Code 128 Symbols may be read by suitably programmed bar code readers that have been designed to autodiscriminate these symbols from other symbologies. Code 128 Symbology is fully distinguishable from, and thus compatible with, the following linear symbologies:

- ITF (Interleaved 2-of-5)
- Codabar
- Code 39
- Code 93
- EAN/UPC
- Telepen
- Reduced Space

Section 5.4:

Bar Code Production and Quality Assessment

Table of Contents

5.4.1. INTRODUCTION	4
5.4.1.1 EAN.UCC System Developments	4
5.4.1.2 Preliminary Symbol Design and Production Questions	4
5.4.1.3 Analog Versus Digital Design and Production	4
5.4.1.3.1 Film Masters	4
5.4.1.3.2 Digital Bar Code Files	5
5.4.1.4 Bar Code Symbol Print Quality Assessment	5
5.4.1.5 Types of EAN.UCC System Bar Code Symbols	5
5.4.1.6 Symbol Specification Tables	7
5.4.1.6.1 Dimensional Specifications	8
5.4.1.6.2 Magnification	8
5.4.1.6.3 Printing Considerations	8
5.4.1.6.4 Packaging Considerations	8
5.4.1.6.5 Application Areas	9
5.4.1.6.6 Operative Scanning Environments	11
5.4.1.6.6.1 EAN.UCC System Scanner Functional Bands	11
5.4.1.6.6.2 Symbology Operational Bands	12
5.4.1.6.7 EAN.UCC System Symbol Specification Tables	14
5.4.2. EAN.UCC SYSTEM BAR CODE PRINTING METHODS AND MATERIALS	20
5.4.3. PRINTING EAN.UCC SYSTEM BAR CODES BY APPLICATION GROUP ..	20
5.4.3.1 Product Packages	20
5.4.3.2 Standardised, Corrugated Product Handling Containers	21
5.4.3.3 Logistic Units	22
5.4.3.4 Coupons	22

5.4.4. DEVELOPING A BAR CODE PRODUCTION PLAN	23
5.4.5. WHEN MEMBERS CHOOSE TO PRINT THEIR OWN BAR CODES	26
5.4.6. WHEN MEMBERS USE A PRINTING COMPANY TO PRINT SYMBOLS	27
5.4.7. COMMON PROBLEMS TO AVOID	28
5.4.7.1 Poor Print Quality	28
5.4.7.1.1 Symbol Contrast	28
5.4.7.1.2 Print Defects	28
5.4.7.1.3 Quiet Zones (Light Margins).....	29
5.4.7.2 Packaging Problems	29
5.4.7.2.1 Obscured symbols	29
5.4.7.2.2 Label Application	29
5.4.7.2.3 Show Through	29
5.4.7.2.4 Specular Reflectance.....	29
5.4.8. QUICK CHECKLIST.....	30
5.4.9. BAR CODE PRODUCTION AND QUALITY ASSESSMENT RESOURCES.	31
5.4.9.1 Bar Code Design and Production	31
5.4.9.2 Bar Code Quality Assessment	31
5.4.A.1 APPENDIX 1: CALIBRATED CONFORMANCE STANDARD	33
5.4.A.2 APPENDIX 2: QUALITY LEVELS TO ENSURE THE SYMBOL WILL EASILY SCAN	35
5.4.A.3 APPENDIX 3: USING A THERMAL BAR CODE LABEL PRINTER	36
5.4.A.3.1 Symbol Design Considerations for Direct Thermal and Thermal Transfer Printers	36
5.4.A.3.2 General Considerations for Direct Thermal Printing	36
5.4.A.3.3 General Considerations for Thermal Transfer Consumable Supplies	36
5.4.A.3.4 Initial Direct Thermal and Thermal Transfer Printer Set Up	37
5.4.A.3.5 Maintaining Acceptable Quality	37
5.4.A.4 APPENDIX 4: USING A GENERAL OFFICE PRINTER	39
5.4.A.4.1 Symbol Design Considerations for General Purpose Printers	39
5.4.A.4.2 Initial General Purpose Printer Set Up	40
5.4.A.4.3 Maintaining Acceptable Quality	41
5.4.A.5 APPENDIX 5: PRINT PROCESS CHARACTERISATION TECHNIQUES	43

5.4.A.5.1 Introduction	43
5.4.A.5.2 General Information	43
5.4.A.5.3 Digital Production Methods of Characterisation: Symbol Matrix Characterisation Method	44
5.4.A.5.4 Characterisation Approach for Film Master Based Processes	45
5.4.A.5.4.1 Bar Gain and Variation	45
5.4.A.5.4.2 Assessment of Printing Conditions	46
5.4.A.5.4.3 Print Gain Gauge Method	46
5.4.A.5.4.4 Evaluation of Print Gain Gauge Results	49
5.4.A.5.4.5 Bar Gain/Loss Checks	50
5.4.A.6 APPENDIX 6: DIRECT CONTACT PRINTING OF BAR CODE SYMBOLS ON CORRUGATED	56

5.4.1. INTRODUCTION

5.4.1.1 EAN.UCC System Developments

- In response to users needs and changes in the global marketplace, the EAN.UCC System has experienced several important developments in its history: The system has expanded globally into numerous application areas beyond product identification. In addition to the EAN/UPC Symbology, two new symbologies have evolved: the ITF-14 Symbology and the UCC/EAN-128 Symbology.
- The system has shifted away from creating analog Film Master bar code symbols to focus on symbols that are digitally rendered.
- The system has adopted a standard methodology for analysing and communicating information about bar code symbol print quality, using the ISO verification methodology based on the *ISO/IEC 15416* standard (previously known as ANSI X3.182 and EN 1635, standards).

5.4.1.2 Preliminary Symbol Design and Production Questions

Four key symbol specification questions should be addressed before symbol design and production begin:

1. What symbol(s) can be used?
2. How large or small can the symbol be?
3. What minimum quality level is specified for the symbol based on its intended scanning environment?
4. Where should the symbol be placed on the package or container?

Questions 1 through 3 are addressed in [Section 5.4.1.6](#), which provides a series of symbol specification tables that are organised according to the applications defined in [Section 2.0](#). Question 4 can be answered by referring to [Section 6.0](#).

5.4.1.3 Analog Versus Digital Design and Production

5.4.1.3.1 Film Masters

A Film Master is a bar code that exists within a positive or negative film and conforms to the strict tolerances set by the Uniform Code Council (UCC™) in the *U.P.C. Film Master Verification Manual* (for U.P.C. Symbols) and *ANSI/UCC6: Application Standard for Shipping Container Codes* (for ITF Symbols and UCC/EAN-128 Symbols used for Logistic Unit Identifiers). Film Masters have been used by printing companies since the 1970s for bar code production and duplication. Printers follow EAN.UCC System specifications and employ measurable quality indicators during the symbol production process. For more information on Film Masters, refer to the following documents:

- *ISO/IEC 15421- Information Technology – Automatic Identification and Data Capture Techniques - Bar Code Master Test Specifications*
- [U.P.C. Film Master Verification Manual](#)

5.4.1.3.2 Digital Bar Code Files

Today, the printing industry is moving away from manual design, paste-up, stripping, contacting, and stepping, which are a part of Film Master production. These production steps are now accomplished digitally using computers, creating a host of new options for symbol creation. For example, digital bar code files can be purchased from a supplier or can be created by an organisation using bar code design software. To produce symbols that meet the strict tolerances of the EAN.UCC System, the people who create them must be highly knowledgeable of EAN.UCC System symbol specifications. In addition, the production systems and procedures used must be appropriate for the application and environment involved. For information about symbol design, see *Guidelines for Symbol Design Software Providers*. For information on creating bar codes with direct thermal, thermal transfer, and desktop printers, see Sections 5.4.A.3 and 5.4.A.4.

5.4.1.4 Bar Code Symbol Print Quality Assessment

To help ensure bar code symbols scan correctly throughout the supply chain, symbol verification should be added to quality control procedures. The *ISO 15416* procedures, when used in combination with a verifier, should be used to analyse the quality of printed symbols at all stages of production, ranging from initial printing through final package configuration. For problem symbols, an ISO-based verifier can be helping in diagnosing the problem and can provide a standard means of reporting between printing companies and their trading partners.

ISO-based verification requires that the *Calibrated Conformance Standard, Test Card for EAN/UPC Symbol Verifiers* be used to check verifier calibration and operator scanning methods (see [Section 5.4.A.1](#)).

Although a number of devices exist that automate the process of bar width measurement and print contrast, most are not recommended for use. Using ISO-based verification ensures that the printed symbol can be scanned using a wide variety scanning equipment, both old and new.

5.4.1.5 Types of EAN.UCC System Bar Code Symbols

The following figures illustrate the different EAN.UCC System bar code symbols.

Figure 5.4.1.5 – 1 EAN-13 Bar Code Symbol Figure 5.4.1.5 - 2 UPC-A Bar Code Symbol



Figure 5.4.1.5 – 3 EAN-8 Bar Code Symbol Figure 5.4.1.5 – 4 UPC-E Bar Code Symbol



Figure 5.4.1.5 – 5 EAN-13 Bar Code Symbol with Five-Digit Add-On Symbol



Figure 5.4.1.5 – 6 UPC-A Bar Code Symbol with Two-Digit Add-On Symbol



Figure 5.4.1.5 – 7 ITF-14 Bar Code Symbol (carrying an EAN.UCC-14 ID Number)

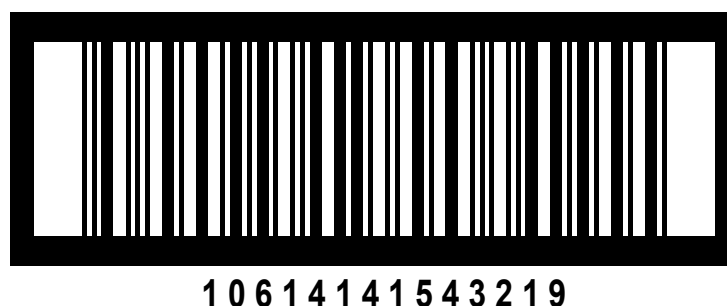


Figure 5.4.1.5 – 8 UCC/EAN-128 Bar Code Symbol (carrying an EAN.UCC-14 ID Number)



5.4.1.6 Symbol Specification Tables

The Symbol Specification Tables in [Section 5.4.1.6.7](#) provide the following bar code specification details:

- The bar code symbol(s) specified by the EAN.UCC System for each application area (including country or regional exceptions)
- The minimum, target, and maximum X-dimension (narrow element width) for the symbol, based on the scanning environment
- The minimum, target, and maximum bar code symbol height, based on the scanning environment

Note: For symbols in the EAN/UPC Symbology family, this measurement includes the Human Readable Interpretation, but for ITF-14 and UCC/EAN-128 Bar Code Symbols, the measurement pertains only to the bars.

- The left Quiet Zone width, the right Quiet Zone width, and for primary/supplementary symbols, the minimum and maximum separation between the two symbols

Note: These measurements are expressed as multiples of the X-dimension in the form nX.

- The minimum ISO quality specification

Note: Expressed as g.g/aa/www, where g.g is the minimum overall symbol grade to one decimal place (on a 4.0 scale), aa is the effective measuring aperture in thousandths of an inch, and www is the wavelength of the light source in nanometres.

See [the following subsections](#) for information on obtaining the correct specification for a specific bar code symbol.

5.4.1.6.1 Dimensional Specifications

User operational requirements continually influence the dimensional specifications of EAN.UCC System bar code symbols; likewise these evolving specifications influenced the development of scanning system optics and printing processes. The three major dimensional specifications are a bar code's nominal (target) X-dimension, the allowable X-dimension range, and the minimum bar height. These characteristics are always specified based on the operating environment. The X-dimension target and range determine the scanner's operating range (field of view). A bar code's height along with its X-dimension target and range help determine the ergonomic aspects of product handling when using a scanner. These dimensional specifications are critical for successful bar code scanning.

5.4.1.6.2 Magnification

In the past, the term symbol magnification was extensively used to specify the size of a bar code symbol. This technique relied upon setting a nominal size (100%) that was directly related to a given X-dimension. Since January 2000, the more precise X-dimension has been used to specify permissible symbol sizes. The Symbol Specification Tables in [Section 5.4.1.6.7](#) specify the target, minimum, and maximum values for a symbol's X-dimension and height. The height of symbols in the EAN/UPC Symbology family is defined by the X-dimension (see [Section 5.1](#)).

5.4.1.6.3 Printing Considerations

The operational bands provide printers and labellers with the flexibility needed to produce quality symbols over a wide range of processes. Once a scanning operational environment is determined and the allowable specification range is known, the printer should be consulted (or the software instructions reviewed) for guidance on:

- The minimum recommended symbol size based on printing press or print characterisation tests
- Colour/substrate considerations (e.g., separate print station for symbol or double ink layer)
- The optimum orientation of the symbol on the printed web

5.4.1.6.4 Packaging Considerations

Once a scanning operational environment is determined and the allowable specification range is known, the packaging engineer should be consulted to:

- Ensure the symbol will not be obstructed by other graphics or package design parameters (e.g., folds, creases, corner wraps, flaps, laminates, embossed logos/patterns, text)
- Ensure that only the symbol intended for scanning will be scanned (e.g., all symbols on the individual units packed within a larger trade item are obscured so that only the primary unit's symbol is scanned)

[Section 6.0](#) contains complete information on symbol placement criteria to meet quality and ergonomic needs.

5.4.1.6.5 Application Areas

Before using the Symbol Specification Tables in Section 5.4.1.6.7, users should identify the application where the bar code symbol will be used. Figure 5.4.1.6.5 – 1 provides a cross-reference for the system applications defined in Section 2.0. The column “See SST(s) #” lists the appropriate Symbol Specification Table(s) for the specific application area. If two tables are referenced, use the decision tree in Figure 5.4.1.6.6.2 - 2 to find the correct table for the application.

Figure 5.4.1.6.5 – 1

Areas of EAN.UCC System Application

Application Areas	See Section	See SST(s) #	Read Before Reviewing Symbol Specification Table
Fixed Measure Trade Item - packages/containers scanned at POS	<u>2.1.2.1.2</u>	1 or 3	EAN-13, UPC-A, EAN-8, and UPC-E Symbols only
Fixed Measure Trade Item – books and serials	<u>2.1.2.1.5</u>	1 or 3	EAN-13, UPC-A, EAN-8, and UPC-E Symbols only
Fixed Measure Trade Item - packages/containers not scanned at POS	<u>2.1.2.1</u>	2 or 4	
Fixed Measure Trade Items - trade item packed in several physical units not scanned at POS	<u>2.1.2.1.7</u>	2 or 4	UCC/EAN-128 Symbol only
Fixed Measure Trade Items - restricted distribution	<u>2.1.2.3</u>	1 or 3	
Variable Measure Trade Item - restricted circulation	<u>2.1.2.4</u>	1	EAN-13 and UPC-A Symbols only
Variable Measure Trade Items - packages/containers not scanned at POS	<u>2.1.2.2</u>	2 or 4	UCC/EAN-128 Symbol only
POS trade item attributes - using secondary Two-or five-digit Add-On Symbols	<u>2.1.3.4.1</u> and <u>2.1.3.4.2</u>	1	Use the X-dimension specified for the primary symbol
Trade item attributes - using secondary UCC/EAN-128 Bar Code Symbols	<u>2.1.3.</u>	2 or 4	Use the X-dimension specified for the primary symbol
Logistics - mandatory SSCC	<u>2.2.2</u>	5	UCC/EAN-128 Symbol only
Logistics – logistic unit Element Strings	<u>2.2.2.1</u>	5	UCC/EAN-128 Symbol only
Assets – EAN.UCC Global Returnable Asset Identifier	<u>2.3.3.1.1</u>	2 or 4	UCC/EAN-128 Symbol only
Assets – EAN.UCC Global Individual Asset Identifier	<u>2.3.3.1.2</u>	2 or 4	UCC/EAN-128 Symbol only
Location or postal codes	<u>2.4.3.2</u>	2 or 4	UCC/EAN-128 Symbol only
EAN.UCC Global Service Relation Numbers	<u>2.5.3</u>	4	UCC/EAN-128 Symbol only
Coupons - restricted geographic distribution outside United States or common currency area identification	<u>2.6.1.3</u>	1	EAN-13 Symbol only
Coupons - restricted geographic distribution Inside United States - UPC-A Bar Code Symbols plus UCC/EAN-128 Bar Code Symbols	<u>2.6.1.3.3</u>	4	(See <i>Guidelines for Supply Chain Identification</i>)
Refund Receipts - restricted geographic distribution	<u>2.6.2</u>	1	EAN-13 Symbols only
Electronic Serial Identifier for Cellular Mobile Telephones	<u>2.6.3</u>	4	UCC/EAN-128 Symbol only
Company internal application using symbols from the EAN/UPC Symbolology	<u>2.6.4.4</u>	1	EAN-13, UPC-A, and UPC-E Symbols only
Internal application using UCC/EAN-128 Bar Code Symbols	<u>2.6.4.5</u>	2 or 4	UCC/EAN-128 Symbol only
Payment slips	<u>2.6.5</u>	4	UCC/EAN-128 Symbol only
Customer Specific Articles	<u>2.6.6</u>	4	

5.4.1.6.6 Operative Scanning Environments

5.4.1.6.6.1 EAN.UCC System Scanner Functional Bands

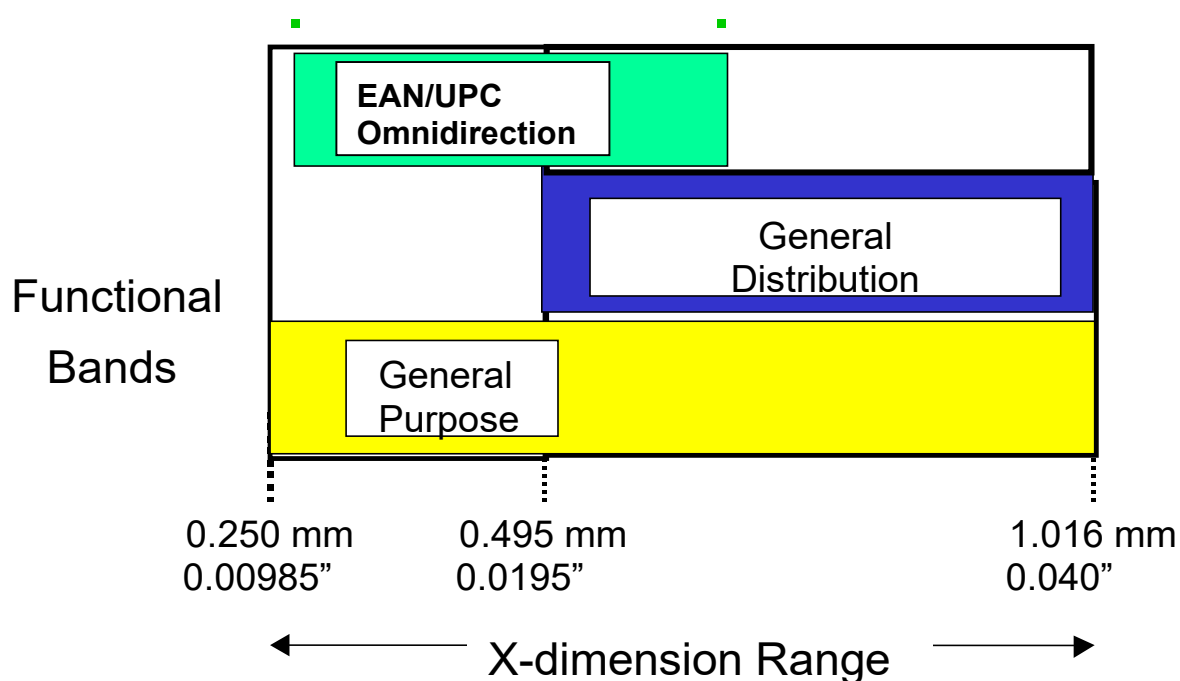
EAN.UCC System symbol specifications are based on three scanner functional bands (see Figure 5.4.1.6.6.1 – 1):

1. The omnidirectional band is intended primarily for retail operations to provide orientation free scanning. Scanners are designed to read oversquare symbols an average of 100 mm (4 in.) from their surface.
2. The fixed scanner band is intended to facilitate automated, fixed mount scanning of trade items packaged for transport and logistic units.
3. The general purpose scanner band

The three functional bands serve as the basis of four operative scanning environments covered in Section 5.4.1.6.6.2.

Figure 5.4.1.6.6.1 – 1

EAN.UCC System Scanner Functional Bands



5.4.1.6.6.2 Symbology Operational Bands

The final consideration for selecting the correct symbol specification is based on where the symbol will be scanned, or the symbol's operative scanning environment. The four operative scanning environments are:

1. Retail: Symbols on all trade items processed for the retail market must conform with EAN/UPC Symbology requirements. These requirements are based on an omnidirectional scanning environment and associated ergonomic factors.
2. General Distribution Scanning: The general distribution environment includes trade items packaged for transport, logistic units, assets, and location tags, as well as their related attributes.
3. Both retail and General Distribution Scanning: These are trade items packaged for transport in general distribution that also are scanned at the Point-of-Sale.
4. All others: This category includes trade items used in industries on both the supply and demand sides of the supply chain (e.g., healthcare, paper, packaging, electrical, communications, information technology) as well as assets and location tags.

Figure 5.4.1.6.6.2 – 1

Operative Scanning Environment

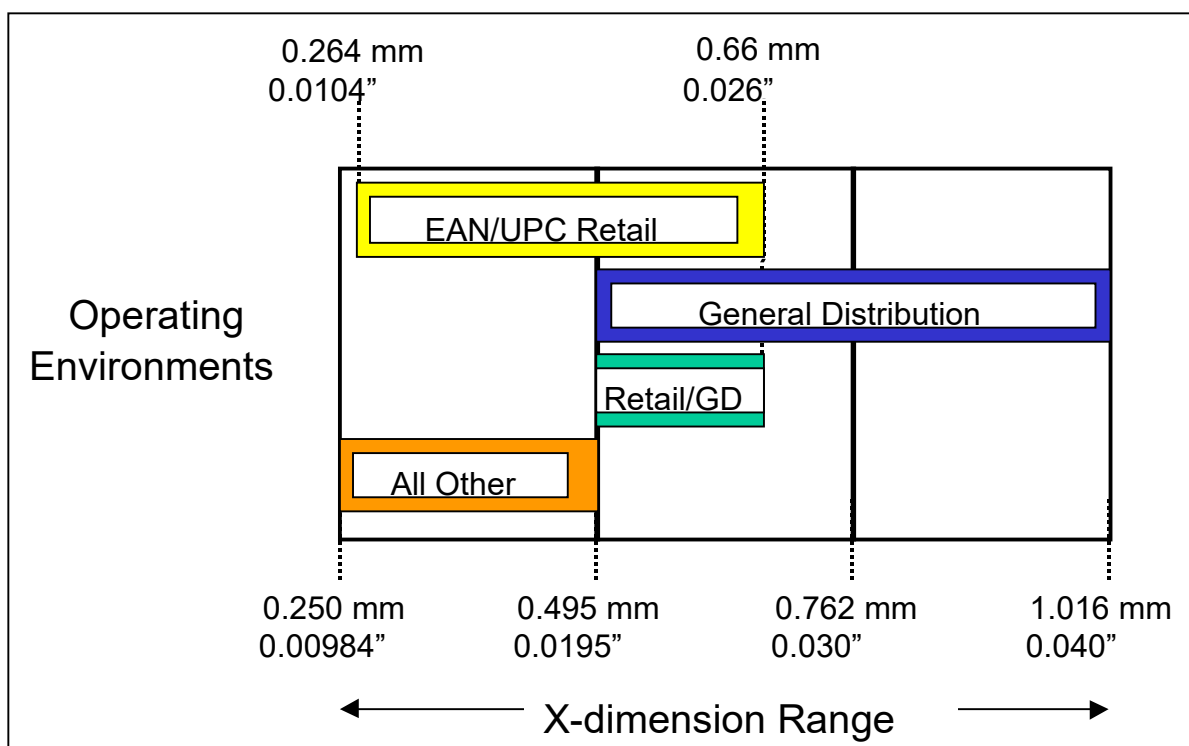
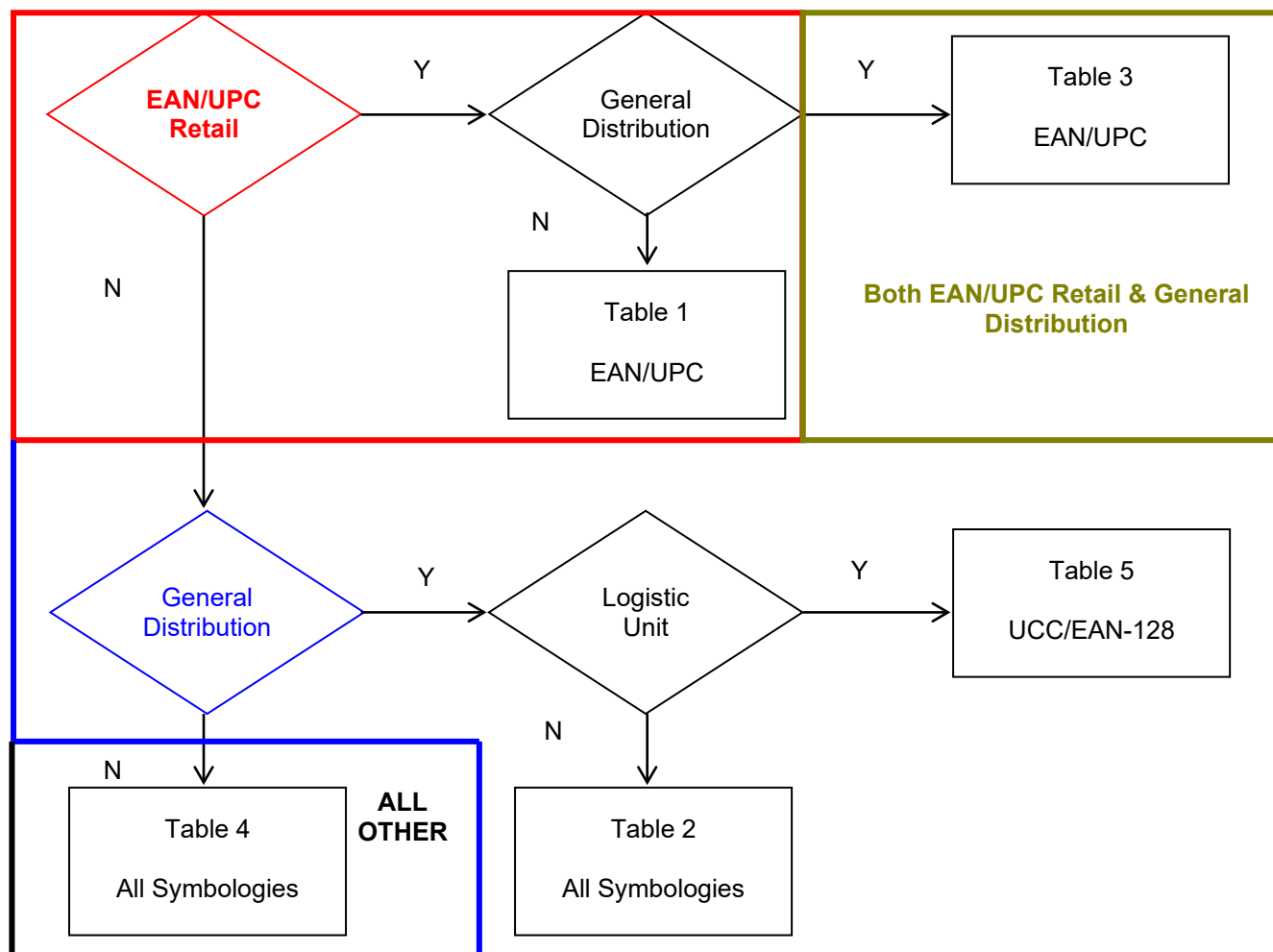


Figure 5.4.1.6.6.2 – 2

EAN.UCC Symbology Operational Environment Decision Tree

5.4.1.6.7 EAN.UCC System Symbol Specification Tables

To find the correct bar code specification, locate the appropriate application area using [Figure 5.4.1.6.5 – 1](#). If the application area references two Symbol Specification Tables, use the decision tree in [Figure 5.4.1.6.6.2 – 2](#) to determine which one is appropriate to use. The Symbol Specification Tables provide a basic snapshot of information required to begin producing a quality bar code symbol.

Figure 5.4.1.6.7 – 1

EAN.UCC System Symbol Specification Table 1

* Primary Symbol(s) Specified	X-Dimension mm (inches)			*** Minimum Symbol Height for Given X mm (inches)			Quiet Zone			Minimum Quality Specification
	**Minimum	Target	Maximum	For Minimum X- dimension	For Target X-dimension	For Maximum X-dimension	Left	Right		
EAN-13	0.264 (0.0104")	0.33 (0.013")	0.66 (0.026")	20.73 (0.82")	25.91 (1.02")	51.82 (2.04")	11X	7X	1.5/06/670	
EAN-8	0.264 (0.0104")	0.33 (0.013")	0.66 (0.026")	17.03 (0.67")	21.29 (0.84")	42.58 (1.68")	7X	7X	1.5/06/670	
UPC-A	0.264 (0.0104")	0.33 (0.013")	0.66 (0.026")	20.73 (0.82")	25.91 (1.02")	51.82 (2.04")	9X	9X	1.5/06/670	
UPC-E	0.264 (0.0104")	0.33 (0.013")	0.66 (0.026")	20.73 (0.82")	25.91 (1.02")	51.82 (2.04")	9X	7X	1.5/06/670	
* Primary Symbol(s) Specified Plus Add-on 2 or 5	X-Dimension mm (inches)			** Minimum Symbol Height for Given X mm (inches)			Quiet Zone			Minimum Quality Specification
	**Minimum	Target	Maximum	For Minimum X- dimension	For Target X- dimension	For Maximum X-dimension	Left	Minimum Separation Between Symbols	Maximum Separation Between Symbols	
EAN-13 + 2	0.264 (0.0104")	0.33 (0.013")	0.66 (0.026")	20.73 (0.82")	25.91 (1.02")	51.82 (2.04")	11X	7X	12X	1.5/06/670
EAN-13 + 5	0.264 (0.0104")	0.33 (0.013")	0.66 (0.026")	20.73 (0.82")	25.91 (1.02")	51.82 (2.04")	11X	7X	12X	1.5/06/670
UPC-A + 2	0.264 (0.0104")	0.33 (0.013")	0.66 (0.026")	20.73 (0.82")	25.91 (1.02")	51.82 (2.04")	9X	9X	12X	1.5/06/670
UPC-A + 5	0.264 (0.0104")	0.33 (0.013")	0.66 (0.026")	20.73 (0.82")	25.91 (1.02")	51.82 (2.04")	9X	9X	12X	1.5/06/670
UPC-E + 2	0.264 (0.0104")	0.33 (0.013")	0.66 (0.026")	20.73 (0.82")	25.91 (1.02")	51.82 (2.04")	9X	7X	12X	1.5/06/670
UPC-E + 5	0.264 (0.0104")	0.33 (0.013")	0.66 (0.026")	20.73 (0.82")	25.91 (1.02")	51.82 (2.04")	9X	7X	12X	1.5/06/670

*Special considerations exist for North American Point-of-Sale (POS) until a migration to International Standards is completed. Until January 1, 2005, only UPC-A or UPC-E Bar Code Symbols are acceptable in North America. After that date, EAN-8 and EAN-13 Bar Code Symbols will also be accepted using the size specifications in this figure.

***UCC Technical Bulletin 2* gives full details on when bar code symbols can be printed at less than the minimum X-dimension. In general, bar code symbols may only be printed using an X-dimension below 0.264 mm (0.0104 in.) or 80 percent magnification under the following conditions:

- The allowance for X-dimensions between 0.2475 mm (0.00975 in.) or 75 percent magnification and 0.264 (0.014 in.) or 80 percent magnification is only applicable to on demand (e.g., thermal, laser) print processes. For all other printing processes, an X-dimension of 0.264 mm (0.0104 in.) is attainable and is the minimum allowable size.
- When printing a minimum symbol with any method of printing, the area provided for printing the symbol and the required Quiet Zone should never be less than the area required for an X-dimension of 0.264 mm (0.0104 in.).
- When printing a minimum symbol with any method of printing, the symbol height should never be truncated below the minimum 20.73 mm (0.82 in.).

***The symbol height dimensions listed for EAN-13, EAN-8, UPC-A and UPC-E bar code symbols include the Human Readable Interpretation. Because of the operative scanning environment for bar

code symbols, there is a direct relationship between the symbol's height and length. This means the minimum, target, and maximum symbol heights listed are tied to the minimum, target, and maximum X-dimension listed.

There is no maximum for the height, but if the maximum X-dimension is used, the symbol height must be equal to or greater than those listed in the Maximum Symbol Height column.

Figure 5.4.1.6.7 – 2

EAN.UCC System Symbol Specification Table 2

Symbol(s) Specified	*X-Dimension mm (inches)			** Minimum Symbol Height for Given X mm (inches)			Quiet Zone		***Minimum Quality Specification
	Minimum	Target	Maximum	For Minimum X- dimension	For Target dimension	X For Maximum X-dimension	Left	Right	
EAN-13	0.495 (0.0195")	0.66 (0.026")	0.66 (0.026")	38.87 (1.53")	51.82 (2.04")	51.82 (2.04")	11X	7X	1.5/06/670
EAN-8	0.495 (0.0195")	0.66 (0.026")	0.66 (0.026")	31.94 (1.26")	42.58 (1.68")	42.58 (1.68")	7X	7X	1.5/06/670
UPC-A	0.495 (0.0195")	0.66 (0.026")	0.66 (0.026")	38.87 (1.53")	51.82 (2.04")	51.82 (2.04")	9X	9X	1.5/06/670
UPC-E	0.495 (0.0195")	0.66 (0.026")	0.66 (0.026")	38.87 (1.53")	51.82 (2.04")	51.82 (2.04")	9X	7X	1.5/06/670
ITF-14	0.495 (0.0195")	0.495 (0.0195")	1.016 (0.040")	32.00 (1.25")	32.00 (1.25")	32.00 (1.25")	10X	10X	1.5/10/670
UCC/EAN-128	0.495 (0.0195")	0.495 (0.0195")	1.016 (0.040")	32.00 (1.25")	32.00 (1.25")	32.00 (1.25")	10X	10X	1.5/10/670

*UPC-E and EAN-8 Bar Code Symbols are designed for use on small packages. Whenever space permits, UPC-A, EAN-13, ITF-14, or UCC/EAN-128 Bar Code Symbols should be used in the General Distribution Scanning environment.

ITF-14 Symbols with X-dimensions below 0.635 mm (0.025 in.) should not be printed directly on corrugate with conventional (plate based) processes. Packages and/or containers marked with ITF-14 Symbols with X-dimensions between 1.016 mm (0.040 in.) and 1.219 mm (0.048 in.) are acceptable based on historical specifications, but a migration to the 1.016 mm (0.040 in.) maximum X-dimension should be made on new artwork. The ITF-14 Symbol's bar length ratio target is 2.5:1, and the acceptable range is 2.25:1 to 3:1.

The minimum X-dimension for variable measure products not scanned at the POS is 0.376 mm (0.0148 in.).

**The minimum symbol height for General Distribution Scanning is always 32 mm (1.25 in.).

The height dimensions listed for EAN-13, EAN-8, UPC-A and UPC-E Bar Code Symbols include the Human Readable Interpretation. Because of the operative scanning environment for bar code symbols, there is a direct relationship between the symbol's height and length. This means the minimum, target, and maximum symbol heights listed are tied to the minimum, target, and maximum X-dimension listed.

The symbol height dimensions for ITF-14 and UCC/EAN-128 Bar Code Symbols relate to the bar heights only (do not include Human Readable Interpretation or ITF-14 Symbol Bearer Bars). There is really no maximum for the height, but if the maximum X-dimension is used, the symbol height must be equal to or greater than those listed in the Maximum Symbol Height column.

***For ITF-14 Symbols with an X-dimension less than 0.635 mm (0.025 in.), the minimum quality specification is 1.5/10/670. For ITF-14 Symbols with an X-dimension greater than 0.635 mm (0.025 in.), the minimum quality specification is 0.5/20/670.

Figure 5.4.1.6.7 – 3

EAN.UCC System Symbol Specification Table 3

Symbol(s) Specified	*X-Dimension mm (inches)			** Minimum Symbol Height for Given X mm (inches)			Quiet Zone		Minimum Quality Specification
	Minimum	Target	Maximum	For Minimum X- dimension	For Target dimension	X- For Maximum X-dimension	Left	Right	
EAN-13	0.495 (0.0195")	0.66 (0.026")	0.66 (0.026")	38.87 (1.53")	51.82 (2.04")	51.82 (2.04")	11X	7X	1.5/06/670
EAN-8	0.495 (0.0195")	0.66 (0.026")	0.66 (0.026")	31.94 (1.26")	42.58 (1.68")	42.58 (1.68")	7X	7X	1.5/06/670
UPC-A	0.495 (0.0195")	0.66 (0.026")	0.66 (0.026")	38.87 (1.53")	51.82 (2.04")	51.82 (2.04")	9X	9X	1.5/06/670
UPC-E	0.495 (0.0195")	0.66 (0.026")	0.66 (0.026")	38.87 (1.53")	51.82 (2.04")	51.82 (2.04")	9X	7X	1.5/06/670

*Special considerations exist for North American Point-of-Sale (POS) until a migration to international standards is completed. Until January 1, 2005, only UPC-A or UPC-E Bar Code Symbols are acceptable in North America. After that date, EAN-8 and EAN-13 Bar Code Symbols will also be accepted using the size specifications in this figure.

UPC-E and EAN-8 Bar Code Symbols are designed for use on small packages. Whenever space permits, UPC-A and EAN-13 Bar Code Symbols should be used.

**The height dimensions listed for EAN-13, EAN-8, UPC-A and UPC-E bar code symbols include the Human Readable Interpretation. Because of the operative scanning environment for bar code symbols, there is a direct relationship between the symbol's height and length. This means the minimum, target, and maximum symbol heights listed are tied to the minimum, target, and maximum X-dimension listed.

There is no maximum for the height, but if the maximum X-dimension is used, the symbol height must be equal to or greater than those listed in the Maximum Symbol Height column.

Figure 5.4.1.6.7 – 4

EAN.UCC System Symbol Specification Table 4

Symbol(s) Specified	*X-Dimension mm (inches)			** Minimum Symbol Height for Given X mm (inches)			Quiet Zone		Minimum Quality Specification
	Minimum	Target	Maximum	For Minimum X- dimension	For Target X-dimension	For Maximum X-dimension	Left	Right	
EAN-13	0.264 (0.0104")	0.33 (0.013")	0.66 (0.026")	20.73 (0.82")	25.91 (1.02")	51.82 (2.04")	11X	7X	1.5/06/670
EAN-8	0.264 (0.0104")	0.33 (0.013")	0.66 (0.026")	17.03 (0.67")	21.29 (0.84")	42.58 (1.68")	7X	7X	1.5/06/670
UPC-A	0.264 (0.0104")	0.33 (0.013")	0.66 (0.026")	20.73 (0.82")	25.91 (1.02")	51.82 (2.04")	9X	9X	1.5/06/670
UPC-E	0.264 (0.0104")	0.33 (0.013")	0.66 (0.026")	20.73 (0.82")	25.91 (1.02")	51.82 (2.04")	9X	7X	1.5/06/670
ITF-14	0.250 (0.00984")	0.495 (0.0195")	0.495 (0.0195")	12.70 (0.50")	12.70 (0.50")	12.70 (0.50")	10X	10X	1.5/10/670
UCC/EAN-128	0.250 (0.00984")	0.495 (0.0195")	0.495 (0.0195")	12.70 (0.50")	12.70 (0.50")	12.70 (0.50")	10X	10X	1.5/10/670

*ITF-14 Symbols with X-dimensions below 0.635 mm (0.025 in.) should not be printed directly on corrugate with conventional (plate based) processes. Packages and/or containers marked with ITF-14 Symbols with X-dimensions between 1.016 mm (0.040 in.) and 1.219 mm (0.048 in.) are acceptable based on historical specifications, but a migration to the 1.016 mm (0.040 in.) maximum X-dimension should be made on new artwork. The ITF-14 Symbol's bar width ratio target is 2.5:1, and the acceptable range is 2.25:1 to 3:1.

**The height dimensions listed for EAN-13, EAN-8, UPC-A and UPC-E Bar Code Symbols include the Human Readable Interpretation, but the symbol height dimensions for ITF-14 and UCC/EAN-128 Bar Code Symbols relate to the bar heights only (do not include Human Readable Interpretation or ITF-14 Symbol Bearer Bars).

Because of the operative scanning environment for bar code symbols, there is a direct relationship between the symbol's height and length. This means the minimum, target, and maximum symbol heights listed are tied to the minimum, target, and maximum X-dimension listed.

The minimum bar height for ITF-14 and UCC/EAN-128 Bar Code Symbols in this operative scanning environment is 13 mm (0.50 in.), but if the package is physically too small to accommodate this rule, further truncation is permitted. In no case shall the bar height be less than 5 mm (0.20 in.).

There is no maximum for the symbol height, but if the maximum X-dimension is used, the symbol height must be equal to or greater than those listed in the Maximum Symbol Height column.

Figure 5.4.1.6.7 – 5

EAN.UCC System Symbol Specification Table 5

Symbol(s) Specified	*X-Dimensions mm (inches)			** Minimum Symbol Height for Given X mm (inches)			Quiet Zone		Minimum Quality Specification
	Minimum	Target	Maximum	For Minimum X: dimension	For Target dimension	X For Maximum X-dimension	Left	Right	
UCC/EAN-128	0.495 (0.0195")	0.495 (0.0195")	0.940 (0.037")	32.00 (1.25")	32.00 (1.25")	32.00 (1.25")	10X	10X	1.5/10/670

*If the item is too small to accommodate the minimum X-dimension then a lower X-dimension may be used. In no circumstances shall the X-dimension used be less than 0.250 mm (0.00984 in.).

**The minimum UCC/EAN-128 Bar Code Symbol height indicated is for bar height only and does not include the Human Readable Interpretation. This minimum bar code symbol height is preferred for the UCC/EAN-128 Bar Code Symbol encoding the SSCC. If the item is also bar coded with other logistic unit Element Strings, which will not be scanned in a General Distribution Scanning environment, the minimum bar height is the greater of 15 percent of the symbol length including Quiet Zones or 13 mm (0.50 in.). If the package is physically too small to accommodate this rule, further truncation is permitted, but in no case shall the bar height be less than 5 mm (0.20 in.). There is no maximum for the height, but if the maximum X-dimension is used, the symbol height must be equal to or greater than those listed in the Maximum Symbol Height column.

5.4.2. EAN.UCC SYSTEM BAR CODE PRINTING METHODS AND MATERIALS

Most EAN.UCC System bar code symbols are printed by:

- Printing companies that use:
 - Traditional printing methods (e.g., offset, flexographic, gravure, or screen)
 - Digital printing methods (e.g., digital offset, in-line ink-jet, or in-line ion deposition)
- Digital bar code printing equipment (e.g., direct thermal, thermal transfer, continuous feed laser, or industrial ink-jet)
- General purpose printing devices (e.g., sheet-fed laser or ink-jet)

EAN.UCC System bar code symbols are usually printed directly on:

- Blank labels used for imprinting
- Labels with complex graphics
- Apparel tags
- Hang-tags for coils of steel or paper
- Consumer packaging (e.g., bread bags, aspirin bottle cartons, magazines, and surgical devices)
- Standardised, corrugated containers (e.g., standard cases with a fixed quantity or assortment of consumer packages)

5.4.3. PRINTING EAN.UCC SYSTEM BAR CODES BY APPLICATION GROUP

Bar code printing methods vary depending on the item for which the bar code is being printed. For this reason, Section 5.4.3.1 separates the discussion about bar code production into four groups, which are based product type.

5.4.3.1 Product Packages

Product packages come in all sizes, shapes, and substrates. EAN.UCC System bar code symbols are used on product packages in a variety of industries, such as grocery, retail, foodservice, apparel, healthcare, construction, electronics, packaging furniture, and textiles. This section provides basic information about product packages (specific package types are too numerous to cover individually).

When EAN.UCC System members make decisions about how to print and package their products, they often look first at the way similar products are printed and packaged. This helps members and their printing companies make decisions about what size bar code they need given the type, colour, shape, size, and substrate of the package. They may also talk to companies that provide bar code Film Masters or digital bar code files.

The next decision for EAN.UCC System members is whether to print their own bar codes or have someone else print them. Members should consider choosing traditional printing press methods if they:

- Print a specific bar code in large quantities (fixed data content)
- Print a bar code with other complex graphics (e.g., multi-colour or process printing)
- Print directly on difficult packaging substrates (e.g., aluminium or translucent plastic)

They should consider choosing a digital printing method if they:

- Print small batches of bar codes
- Print bar codes that frequently vary in data content (variable data content)

No matter what printing method fits their requirements, EAN.UCC System members can find someone else to produce their bar codes, but if their bar codes' data content frequently varies (e.g., requires a lot, batch, or date code), they may want to print their own. If they decide to print their own, members should take the time to learn how to use the correct printer/software/label combination. To find out more about printing bar codes with digital printers, see [Section 5.4.5](#).

5.4.3.2 Standardised, Corrugated Product Handling Containers

Standardised, corrugated containers are used for packaging, storing, handling, and shipping consumer packages. Because they are standard inventory units, they may be produced in large quantities.

If the container is not designed for scanning at the retail Point-of-Service (POS) (e.g., a case of 36 paper towel rolls or a case of 144 bandage boxes), the container may often be used in its natural state (e.g., a brown corrugated box).

There are generally three approaches to printing a bar code on a corrugated box:

1. Printing directly on the box using a flexographic printing process
2. Printing directly on the box using an industrial ink-jet printing device
3. Printing on a label and then applying the label to the box

Several types of bar codes may be used on these containers based on the following conditions:

- If the bar code is printed directly on the box, the ITF-14 Symbol is typically used because the specified bar code quality grade (ISO methodology) is relaxed to a minimum of 0.5/20/670.
- If information is required that cannot be carried by the ITF-14 Symbol (e.g., lot numbers, serial numbers, or dates), then a UCC/EAN-128 Symbol is used.
- If the container will be scanned at the retail POS, then the EAN/UPC Symbology is required.

It should be noted that printing EAN-13, UPC-A or UCC/EAN-128 Symbols is difficult here because:

- Corrugate's brown colour does not provide much contrast with the colour of the dark bars.
- Special care is required for printing EAN-13, UPC-A or UCC/EAN-128 Symbols because defects and unevenness in the surface have a more severe effect on them.

Whenever EAN-13, UPC-A or UCC/EAN-128 Symbols are printed, a minimum print quality grade of 1.5 (C) is specified. If an EAN-13, UPC-A or UCC/EAN-128 Symbol is required for use on a corrugate box and the minimum print quality requirements of 1.5 (C) cannot be met by printing directly on the corrugate, then printing and applying a label may be the best choice.

If the container will be scanned at the POS as well as in the distribution or shipping process, the EAN/UPC Symbology must be used and the symbol should have a minimum X-dimension of 0.495 mm (0.0195 in.), and the symbol placement guidelines for shipping containers should be followed.

5.4.3.3 Logistic Units

The identification numbers in bar codes used to identify logistic units vary for each unit. This is because the bar codes must uniquely identify logistic units that vary by date, purchase order, customer, and/or content. The most practical method for printing bar codes used in logistic processes is a digital method. In smaller EAN.UCC System member companies, this may mean printing a transport label from a printer in the office. In larger companies, an industrial bar code printer (typically a thermal transfer printer) may be used to generate bar code transport labels on-demand for each shipment. In other large companies, transport labels may be printed in batches on a continuous bar code printer (typically thermal transfer or laser) in a centralised location and then applied during order processing.

5.4.3.4 Coupons

Manufacturers' redeemable coupons are generally printed:

- On a traditional printing press for newspaper or product inserts or for postal distribution
- On a pressure-sensitive label attached to a product for instant redemption
- As a part of the product packaging itself for redemption after the product is consumed

Retailers may also use traditional printing methods for in-store coupons, or they may have electronic printers that produce coupons for the customer as a part of the Point-of-Sale (POS) process.

5.4.4. DEVELOPING A BAR CODE PRODUCTION PLAN

Whether EAN.UCC System members print their own bar codes or have someone else print them, it is important to begin the process by developing a plan (specification) for their bar codes. A good bar code plan addresses the following questions:

1. How do I create the identification number for the bar code?

To create a correct identification number, see [Section 2.0](#) for detailed rules about implementing the EAN.UCC System in the application area required. Then move to the appropriate subsection of [Section 3.0](#) to find the unambiguous definition of the data content for the bar code.

2. What bar code type will be used?

To find what bar code(s) to use, see [Section 5.4.1.6](#) to find a Symbol Specification Table for the application area based on the scanning environment. A general tutorial on this subject can also be found in the [Guidelines for Producing Quality Symbols](#).

3. What size is the bar code graphic?

After the correct bar code symbol is specified together with the information to be carried by the symbol, the design stage begins. The size of the symbol within the design depends on the symbol specified, where the symbol will be used, and how the symbol will be printed. A major consideration about symbol size is the capability of the selected printing process. The minimum size and correct Bar Width Reduction (BWR) for an EAN.UCC Symbol varies by printing process and even from press to press. Printing companies should establish a minimum symbol size and BWR to achieve acceptable and repeatable quality results. Print Gain Gauges (see [Section 5.4.A.5.4.3](#)) provide a means of press calibration.

To find the minimum, nominal, and maximum X-dimension (narrow bar width) and bar height required for a bar code symbol, see [Section 5.4.1.6](#) to find a Symbol Specification Table for the application area based on the particular scanning environment.

4. What colour is the bar code symbol?

The optimum colour combination for an EAN.UCC System bar code is black bars with a white background (spaces and Quiet Zones). If other colours are preferable, consider the following:

- EAN.UCC System bar code symbols require dark colours for bars (e.g., black, dark blue, dark brown, or dark green).
- The bars should always consist of a single line colour and should never be printed by multiple imaging tools (plate, screen, or cylinder).
- EAN.UCC System bar code symbols require light backgrounds of adequate opacity for the Quiet Zones and spaces (light bars) (e.g., white or pale yellow). In addition to light backgrounds, “reddish” colours may also be used as well as yellow, orange, pink, peach, light browns, and light purples. Given the fact that most bar code scanners use a red light source, these colours may be suitable for backgrounds, but should be avoided for bars.

- In many cases the symbol background is not printed. If the symbol background is printed beneath the bars, the background should be printed as solid line colours. If multiple layers of ink are used to increase the background opacity, each layer should be printed as a solid. If a fine screen is used to deliver more ink to the substrate, there should be no voids in the print caused by the screen not adequately filling in.

These specifications do not offer a list of acceptable colours for bars (dark bars) and spaces (light bars) because of the wide variety of inks and dyes, properties, and ink transfer processes employed. The Symbol Contrast Gauge for EAN.UCC Symbols provides an easy and effective way to evaluate the Symbol Contrast of a design if package being evaluated approximates the final, filled package.

In many cases, a package designer is involved in the specification of the printing material characteristics, such as matte, gloss, colour, and texture. A printer may submit sample materials for evaluation and/or approval. When these decisions are made, the bar code symbol quality should be considered. The following questions should be considered:

- Will a fluorescent, metallic, translucent, or transparent material be overprinted to create the symbol background? If so, will the ink opacity be sufficient for Symbol Contrast?
 - Will an overprint varnish or laminate be used? If so, will it interfere with symbol scanning?
 - Will the material be pitted or textured to a degree that could create voids in the bars (dark bars) or spots in the background spaces (light bars)?
- Where should the bar code symbol be placed on the product?

Symbol placement refers to the symbol location on the design and the symbol orientation (rotation) relative to the printed web or sheet flow. When assigning the placement for the symbol, begin by consulting the specifications in [Section 6.0](#), then consider the packaging and printing processes. The packaging engineer should make sure the symbol will not be obscured or damaged (e.g., appear over a carton edge, beneath a carton fold, beneath a package flap, or covered by another packaging layer). After determining the proper placement, the printing company should be consulted before assigning the symbol rotation. This is because many printing processes require bar codes to be printed in a specific orientation to the feed direction of the web or sheet. Consider the following when deciding upon symbol placement:

- If possible, when using flexographic printing, the bars should run parallel to the press web direction. If the bars are required to run perpendicular to the press direction, avoid distorting the symbol for the plate roll circumference. The lack of distortion will alter the overall length of the symbol but will provide dimensional integrity.
- When using either silk screen or rotogravure printing processes, the symbol should be aligned parallel to the cell structure on the screen or gravure plate cylinder to provide the smoothest bar edge possible.

To find specifications for symbol placement, see [Section 6.0](#).

- How should the text associated with the bar code be printed?

To help explain issues about the Human Readable Interpretation text, consider the following frequently asked questions:

- Does the Human Readable Interpretation text need to be a certain size? The OCR-B font was originally specified for use with EAN/UPC Symbolology, and its size varies in proportion to the symbol size. The text for ITF-14 Symbols and UCC/EAN-128 Symbols must be clearly legible and in a size proportional to the symbol size (see Sections [5.2](#) and [5.3](#)).
- Can spaces be placed in between text characters? Yes. In fact the EAN/UPC Symbolology specifies the spacing of characters (See [Section 5.1](#)). Many companies specify spacing in between the text in ITF-14 Symbols and UCC/EAN-128 Symbols. This makes the text easier to read and key enter. While including spaces is appropriate for the Human Readable Interpretation text, spaces must not be encoded into the symbols.
- I see parentheses around the Application Identifiers (AIs) in the UCC/EAN-128 Symbol. Are they supposed to be there and are they encoded in the bars (dark bars) and spaces (light bars) of the symbol? All AIs must be enclosed in parentheses in Human Readable Interpretation text, but the parentheses must not be encoded in the symbol.
- How many digits do I print in the Human Readable Interpretation text? Twelve digits must be printed below a UPC-A Symbol. Thirteen digits must be printed below an EAN-13 Symbol. Eight digits must be printed below a UPC-E Symbol and an EAN-8 Symbol.

- What quality level is required to ensure the symbol will easily scan?

Today, bar code symbol quality can be graded using an instrument called a verifier that uses the ISO grading method. The minimum ISO symbol grade/verifier aperture/verifier wavelength to be specified is found in the Symbol Specification Tables in [Section 5.4.1.6](#).

ISO describes a method for looking at the quality of bar code symbols using an ISO-based verifier as a tool.

- The verifier is programmed to look at certain characteristics of a symbol the way a scanner would, provide scan grades, and, after ten scans, provide an ISO symbol grade. The Uniform Code Council (UCC™) and EAN Member Organisations utilise the ISO method, but specify the minimum grade necessary for every EAN.UCC System symbol depending on which symbol is used, where it is used, and what identification code it is carrying. In addition to the minimum grade, the UCC and EAN Member Organisations also specify the verifier aperture width and wavelength. This is similar to a university using a standardised test to determine whether applicants qualify for admission. Several universities may utilise the same standardised test, but each sets the minimum score necessary for its applicants to be admitted.
- Verification, as a method for use by the entire global supply chain, requires a calibrated conformance standard. The Global Symbolology Committee (GSC) has developed a Calibrated Conformance Standard for the EAN/UPC Symbolology, which is described in [Section 5.4.A.1](#). The standard promotes regular testing of verification equipment to determine if it is operating within the ISO tolerance levels as published by the verifier manufacturer. This is especially important in heavy use applications, where various operators may be involved or when someone is learning to use the

verifier properly. The operator should routinely scan each of the symbols on the standard to determine if the verifier device provides the values listed on the test card.

The *ANSI X3.182* and *EN 1635* print quality standards have been replaced by *ISO/IEC 15416: Automatic Identification and Data Capture Techniques – Bar Code Print Quality Specifications – Linear Symbols*, which is technically consistent with its two predecessors but, as an International Standard, can be applied all round the world.

Section 5.4.A.2 contains a quick reference to the symbol quality parameters according to their type and application. For more detailed information on this quality assessment methodology, see *Guidelines for Producing Quality Symbols* or *UCC Technical Bulletin 1: Methods for Assessing Symbol Quality*.

5.4.5. WHEN MEMBERS CHOOSE TO PRINT THEIR OWN BAR CODES

If EAN.UCC System members decide to print their own bar codes, they need a production plan (see Section 5.4.4), a software package for designing bar codes, a printing device to print them, and a device to check print quality. Many companies can help with bar code design software, bar code printers, bar code quality control instruments, quality assessment services, and general bar code information.

EAN.UCC System members who decide to use a direct thermal or thermal transfer bar code label printer, should see Section 5.4.A.3. These printers and their associated software are typically designed with EAN.UCC System bar codes built into the firmware. Direct thermal and thermal transfer printers are capable of generating high quality bar code symbols (typically ISO grade 4 or 3). The printers may be stand-alone, or they may be integrated into an application such as a weighing and labelling system. In many cases, the user has no control over the size or placement of the bar code symbol.

EAN.UCC System members may also decide to use an office printer (e.g., laser, desktop, ink-jet, ion deposition, and mechanical matrix office printers). Section 5.4.A.4 provides advice on using a general office printer. These printing devices are capable of printing high quality bar codes when operated by experienced people equipped with a high quality bar code design software product. Office printers are designed primarily for printing full size pages of text and graphics. However, they can be used to print retail tags using pre-cut labels on page size backing paper. Some are also equipped with a continuous feed mechanism that can be used when producing symbols in large quantities.

5.4.6. WHEN MEMBERS USE A PRINTING COMPANY TO PRINT SYMBOLS

If EAN.UCC System members have a printing company print their bar codes, they should start by providing the company with a bar code specification that answers the questions in [Section 5.4.4](#). The printing company may also want the member to provide either a bar code Film Master, digital bar code file, or For Position Only Bar Code (FPO).

If a printing company asks for a Film Master, the member should see if the printing company is already working with a Film Master manufacturer who understands the special requirements of Film Masters. In addition to providing printing companies with Film Masters, these companies are traditionally an excellent resource for advice on bar code production.

Printing companies who print bar codes in a pressroom (and prepare artwork electronically) or print bar codes electronically, typically use digital bar code files. They may create the files themselves with internal bar code design software or rely on a Film Master manufacturer or customer to supply a digital bar code file.

The printing company may also ask EAN.UCC System members to provide artwork that includes an FPO. If so, the printing company will create the actual production-ready symbol or have it created by a third party.

EAN.UCC System members should also ask the printing company about specific requirements when printing EAN.UCC System bar codes, such as:

- What are the minimum size requirements for the bar code given the selected printing process?
- Should the bar code be oriented in a specific direction for the best quality result?
- Will an additional print station be required for the bar code?

EAN.UCC System members should also consider how the printed bar code will appear in the final filled package:

- Make sure the bar code is not underneath a fold or flap after the product is packaged.
- Do not let the bar code wrap around the corner of a box or container after it is packaged.
- Make sure the bar code's placement on the package meets EAN.UCC System recommendations in [Section 6.0](#).
- Make sure the product inside a plastic package will not show through the bar code printed on the plastic package to the degree that the bar code does not meet minimum quality grades.

5.4.7. COMMON PROBLEMS TO AVOID

5.4.7.1 Poor Print Quality

The following are the most common problems associated with print quality for traditional wet ink processes and digital printer applications.

5.4.7.1.1 Symbol Contrast

It is essential that bars (dark bars) and spaces (light bars) of adequate opacity be printed in solid colours without any voids or missing sections.

- For traditional printing, this may mean more ink and/or pressure must be applied to the printing plate, or a darker colour should be used.
- For label printing it may mean the intensity of the thermal print head must be increased and/or the label substrate and/or foil (ribbon) materials must be replaced for a compatible match.

5.4.7.1.2 Print Defects

When using recycled substrate material, particularly fibreboard, the “bits” (defects) in the board can affect the quality of the print contrast and Quiet Zones. Proper care should also be used when printing on the flutes of fibreboard. Some plastic and/or paper substrates may also contain voids in their surface treatment or coating that can cause defects to appear in the print.

On-demand printers can also introduce printing defects, including those described in the following examples:

- For thermal printers, faulty print heads or creases in the thermal transfer ribbons will produce bar code symbols that have missing bars or horizontal lines through the bars. Thermal print heads must be cleaned and maintained regularly, and replaced when necessary, to avoid printing incomplete bar code symbols.
- Thermal printer consumable supplies are an important quality consideration. For best results, the correct combination of label and ribbon materials should be chosen for the printer type and application environment. When a different brand, batch of labels, or ribbon is loaded on the printer, initial set-up procedures for analysing print quality should be followed.
- For general-purpose printers or printing companies, bar code design software may introduce rounding errors if the symbol's target size is not scaled to match the resolution of the output device.

General-purpose printers require periodic maintenance. Laser printers, for example, not only consume toner, but also require periodic replacement of components such as drums, developers, fusers, and brushes. All of the consumable parts may be contained in a single replacement cartridge or they may be separately installed, depending on the make and model of printer. Because bar code labels contain a higher percentage of black printing than occurs in ordinary text, fewer pages can be printed between maintenance intervals.

5.4.7.1.3 Quiet Zones (Light Margins)

The left and right Quiet Zones must not be infringed.

- Avoid printing the bar code too close to the edge of the label.
- Avoid printing additional text or lines too close to the bar code symbol.
- Quiet Zone Indicators are a useful tool to protect Quiet Zones.

5.4.7.2 Packaging Problems

5.4.7.2.1 Obscured symbols

If any part of the symbol is obscured it may not scan. Ensure the bar code symbol is not obscured by sealing tape, straps, labels, pre-printed film, creases in shrink wrap, or embossed areas (e.g., recycle logo on plastic package).

5.4.7.2.2 Label Application

- Replace bar code labels that have been poorly applied (e.g., creased or peeled up on an edge).
- Take extra care when using wrap-around labels, ensuring the Quiet Zone is not too close to the corner of a case.

5.4.7.2.3 Show Through

The exterior packaging materials of the package must obscure bar code symbols on individual items contained within the package. This eliminates the possibility of scanning an individual item's bar code symbol instead of the bar code symbol on the larger unit.

5.4.7.2.4 Specular Reflectance

In many cases, bar code symbols on the final, filled package (e.g., positioned under film wrap or at obscure angles under blister packs) will not scan.

- Account for the total package construction (e.g., colours and packaging materials) and the contents inside the package (e.g., soil or black candy behind a white translucent plastic) when assessing the final position of the bar code symbol during the design phase.

5.4.8. QUICK CHECKLIST

- **Wrong bar code symbol**
It is vital that identification numbers and supplementary data be carried by the correct bar code symbol. To create a correct identification number, see [Section 2.0](#) for detailed rules about implementing the EAN.UCC System in the application area required. Then see the appropriate subsection of [Section 3.0](#) to find the unambiguous definition of the data content for the bar code.
- **Bar height and truncation**
If the bar code symbol height is too small, scanning performance will drop or scanning failure will occur. Check height requirements for the bar code symbol for your application based on the Symbol Specification Tables in [Section 5.4.1.6](#).
- **Bars (dark bars) and spaces (light bars)**
If the width of the bars (dark bars) and the spaces (light bars) is not printed in accordance with EAN.UCC System standards, the bar code symbol will not scan successfully. If the width of the bars (dark bars) and spaces (light bars) is not adjusted for the addressable resolution of the output device, degradation in Decodability grades will occur. For more detailed information on designing symbols for addressable resolution, see [Guidelines for Producing Quality Symbols](#) or [Guidelines for Symbol Design Software Providers](#).
- **X-dimension**
Print EAN/UPC Bar Code Symbols within the specified X-dimension range after correcting for the addressable resolution of the output device. Wherever possible, symbols should be printed at the higher end of the specified X-dimension range. An X-dimension below 0.33 mm (0.013 in.) should only be used after consulting with the printing company.
- **Incorrect colour**
A colour and substrate combination that provides adequate ISO Symbol Contrast for the symbol is important. For a general tutorial on the subject, see [Guidelines for Producing Quality Symbols](#).
- **Data Input Inconsistencies**
Three common inconsistencies will result in scanning errors and must be avoided.
 - The Human Readable Interpretation text does not correspond to the data encoded in bar code symbols.
 - The user has not been informed of the Global Trade Item Number™ (GTIN™) in sufficient time to include it or revise it in the product data file.
 - Two bar code symbols used on the same product package encode different GTINs™.

5.4.9. BAR CODE PRODUCTION AND QUALITY ASSESSMENT RESOURCES

5.4.9.1 Bar Code Design and Production

- *Guidelines for Producing Quality Symbols* (available in print and on the Uniform Code Council's (UCC™) CD-ROM Tool Kit called *The Art of Producing Bar Codes*)
- *Guidelines for Symbol Design Software Providers* (available online at <http://www.uc-council.org>, in print, and on the UCC's CD-ROM Tool Kit called *The Art of Producing Bar Codes*)
- *ISO/IEC 15419 – Information Technology – Automatic Identification and Data Capture Techniques – Bar Code Digital Imaging and Printing Test Specification*
- *U.P.C. Film Master Verification Manual* (available online at <http://www.uc-council.org>, in print, and on the UCC's CD-ROM Tool Kit called *The Art of Producing Bar Codes*)
- *ISO/IEC 15421- Information Technology – Automatic Identification and Data Capture Techniques - Bar Code Master Test Specifications*
- *UCC Technical Bulletin 2*

5.4.9.2 Bar Code Quality Assessment

- *Guidelines for Producing Quality Symbols* (available in print and on the Uniform Code Council's (UCC™) CD-ROM Tool Kit called *The Art of Producing Bar Codes*)
- *ISO/IEC 15416 – Information Technology – Automatic Identification and Data Capture Techniques – Bar Code Print Quality Test Specification – Linear Symbols*
- *UCC Quality Specification for the U.P.C. Printed Symbol* (available online at <http://www.uc-council.org>, in print, and on the UCC's CD-ROM Tool Kit called *The Art of Producing Bar Codes*)
- *UCC Technical Bulletin 1: Methods for Assessing Symbol Quality* (available online at <http://www.uc-council.org>, in print, and on the UCC's CD-ROM Tool Kit called *The Art of Producing Bar Codes*)
- *Calibrated Conformance Standard, Test Card for EAN/UPC Symbol Verifiers* (traceable standard for checking verifier calibration and training verifier operators; available from the UCC)

- Symbol Templates and Gauges (available from the UCC as a set)
 - *Layout Template for EAN Symbols* (EAN-13 and EAN-8)
 - *Layout Template for U.P.C. Symbols* (UPC-A and UPC-E)
 - *EAN.UCC Symbol Size Gauge* (EAN-13, EAN-8, UPC-A, UPC-E, ITF-14, and UCC/EAN-128)
 - *Symbol Contrast Gauge for EAN.UCC Symbols* (for use with opaque substrates)
- *ANSI X3.182 Bar Code Print Quality Guideline* (being replaced by *ISO/IEC 15416*)
- *EN 1635 Bar coding - Test specifications - Bar code symbols* (being replaced by *ISO/IEC 15416*)
- Flexographic Technical Association: *Flexographic Image Reproduction Specifications and Tolerance*, Second Edition
- Fibre Box Association: *Guideline for Direct Contact Printing of Bar Code Symbols on Corrugate*

5.4.A.1 APPENDIX 1: CALIBRATED CONFORMANCE STANDARD

The *Calibrated Conformance Standard, Test Card for EAN/UPC Symbol Verifiers* is a physical set of Symbols from the EAN/UPC Symbology family designed to test particular characteristics of *ISO/IEC 15416*-based verification equipment. The standards are manufactured on special materials and are made traceable to the National Institute of Standards and Technology (NIST). This traceability is facilitated through a custom-designed piece of hardware (nicknamed “the Judge”) that has been engineered to measure the various attributes outlined in *ISO/IEC 15416 Bar Code Print Quality Guideline* and the *UCC Quality Specification for the U.P.C. Printed Symbol*.

The idea behind the standard is to regularly test if the verification equipment is operating within ISO tolerance levels as published by the verifier manufacturer. This is especially important in heavy use applications, where various operators may be involved or where someone is learning to use the verifier properly. The operator should routinely scan each of the symbols on the standard to determine if the verifier device provides the values listed on the test card. A small picture of the Test Card's layout is shown in Figure 5.4.A.1 – 1 (note that the image is not to scale).

A 6-mil aperture and 670 nm +/-10 nm wavelength must be used for EAN/UPC Symbols, and the exact scanning method should be determined by following all of the verifier manufacturer's recommendations. This may require some practice to obtain the right touch, but it will inform the operator when the correct method has been used. If the verifier reports values that agree with the values listed on the Test Card (within the verifier manufacturer's stated accuracy and repeatability limits), then the operator can assume the verifier is calibrated. If, after repeated attempts, the device does not provide the value as printed on the standard (within the verifier manufacturer's stated accuracy and repeatability limits), then the device or the operator's scanning technique must be considered suspect. In this event, the operator should refer to the operator's manual as to the proper remedies specified by the verifier manufacturer.

The Test Card, as any standard, is sensitive and should be handled with care. If the symbols show dirty areas, they can be safely cleaned using a soft cotton pad and photographic grade film cleaner. If visible scratches develop on a symbol, that area of the symbol should not be used. If sufficient visible scratches develop so that a clean scan path is not available, then the Test Card is no longer certified and should not be used as a standard.

Figure 5.4.A.1 – 1

**Calibrated Conformance Standard, Test Card for EAN/UPC Symbol Verifiers
(Sample Layout Only – Not to Scale)**

CALIBRATED CONFORMANCE STANDARD © TEST CARD FOR EAN/UPC SYMBOL VERIFIERS	
EAN-13 MASTER GRADE	UPC-A MASTER GRADE
	
DECODABILITY _____ CONTRAST _____ MODULATION _____	DECODABILITY _____ CONTRAST _____ MODULATION _____
 DEFECTS (VOID) _____	 DECODABILITY (BAR) _____
CALIBRATION # _____ WAVE LENGTH 670 nm EFF. APERT. 0.006 in.	CONTRAST 
EAN UCC S Y S T E M	PART NO. CC001 REV P
DATE ISSUED _____ THIS STANDARD IS CERTIFIED FOR 3 YEARS FROM YOUR DATE WHEN ORDERED TO A CALIBRATED VERIFIER OF CALIBRATED CONFORMANCE OF ANCESTRAL DOCUMENTATION © 1999-2002 EAN.UCC COUNCIL. All Rights Reserved.	

5.4.A.2 APPENDIX 2: QUALITY LEVELS TO ENSURE THE SYMBOL WILL EASILY SCAN

The minimum ISO symbol grade/verifier aperture/verifier wavelength to be specified is found in the Symbol Specification Table for the business application/scanning environment in [Section 5.4.1.6](#) (e.g., 1.5/06/670).

ISO/IEC 15416 describes a method for assessing the quality of printed bar code symbols using an ISO-based verifier as a tool. The verifier is programmed to look at certain characteristics of the symbol the way a scanner would, provide scan grades, and after ten scans, provide an ISO symbol grade.

The EAN.UCC System utilises the ISO method and specifies the minimum grade necessary for every EAN.UCC Symbol depending on which symbol is used and where it is used. In addition to the minimum grade, the EAN.UCC System also specifies the verifier aperture and wavelength. This is similar to a university using a standardised test to determine whether applicants qualify for admission. Several universities may utilise the same standardised test, but each sets the minimum score necessary for their applicants to be admitted.

Figure 5.4.A.2 – 1 provides a quick reference list of the symbol quality parameters depending on their type and their application.

Figure 5.4.A.2 – 1

Symbology	Application or ID Code	ISO (ANSI) Symbol Grade	Aperture	Wavelength
EAN/UPC	EAN/UCC-8	1.5 (C)	6 mils	670 nm +/-10
EAN/UPC	UCC-12	1.5 (C)	6 mils	670 nm +/-10
EAN/UPC	EAN/UCC-13	1.5 (C)	6 mils	670 nm +/-10
UCC/EAN-128	Extended Coupon Code	1.5 (C)	6 mils	670 nm +/-10
UCC/EAN-128	EAN/UCC-14	1.5 (C)	10 mils	670 nm +/-10
UCC/EAN-128	SSCC-18	1.5 (C)	10 mils	670 nm +/-10
UCC/EAN-128	Small Shipping Packages	1.5 (C)	10 mils	670 nm +/-10
ITF-14 (<0.635 mm (0.025 in.) X)	EAN/UCC-14	1.5 (C)	10 mils	670 nm +/-10
ITF-14 (≥0.635 mm (0.025 in.) X)	EAN/UCC-14	0.5 (D)	20 mils	670 nm +/-10

For example, an EAN/UPC Symbol will always be verified using a 6 mil (0.006 in.) aperture, a 670 nm (nanometer) +/-10 nm wavelength of light, and requires a minimum symbol grade of 1.5 (overall symbol grade on a 4.0 scale) equivalent to a “C” under the ANSI X3.182 standard. On a bar code purchase order this would typically be expressed as 1.5/06/670.

5.4.A.3 APPENDIX 3: USING A THERMAL BAR CODE LABEL PRINTER

Direct thermal and thermal transfer printers are capable of generating high quality bar code symbols (typically ISO grade 4 or 3). The printers may be stand-alone, or they may be integrated into an application such as a weighing and labelling system. In many cases the user has no control over the size or placement of the bar code symbol. Quality printing is easily maintained by observing the following guidelines, taken from Guidelines for Producing Quality Symbols.

5.4.A.3.1 Symbol Design Considerations for Direct Thermal and Thermal Transfer Printers

Direct thermal and thermal transfer printers typically contain all of the low-level software required to generate bar code symbols. This means that various symbol formats are loaded into the firmware of the printer. The bar code design software simply sends commands to address the firmware in the printer to create the symbol. These commands typically relate to data characters, symbol size, symbol orientation, and symbol placement. Before reviewing the unique design factors for this class of printers, review the suggestions made in Guidelines for Producing Quality Symbols.

The following special factors should be considered when designing a symbol for direct thermal and thermal transfer printers:

- Generate symbols at an X-dimension* that is supported by the resolution of the specified printer (refer to Guidelines for Symbol Design Software Providers for detailed technical information on corrected magnification). For example, the closest bar width to 0.013 inches a 203 DPI printer can achieve is 14.76 mils. This is because each bar width is constructed with three 203 DPI dots, which individually measure 4.92 mils wide. Figure 5.4.A.3.5 – 2 lists achievable X-dimensions when using the EAN/UPC Symbology (after correction) addressed by several resolutions of direct thermal and thermal transfer printers.

*Note: a process of altering the desired dimensions of a symbol to create modules consisting of a consistent integer number of addressable imaging device dots

- Use a bar code graphic file that was designed for the resolution of the specified printer.

5.4.A.3.2 General Considerations for Direct Thermal Printing

Direct thermal printing should be avoided whenever the symbol may be exposed to direct sunlight or extreme temperatures or has a shelf life exceeding one year. These labels fade very quickly in direct sunlight, and the background darkens at elevated temperatures. Some fading also occurs as labels age at room temperature under normal indoor lighting. As labels fade or darken, the contrast decreases so that at some point the symbol can no longer be scanned.

An example of a good application for thermal labels is in-store marking of meat and other perishable food items. Such labels need last only days or weeks under protected indoor conditions.

5.4.A.3.3 General Considerations for Thermal Transfer Consumable Supplies

Consumable supplies are an important quality consideration. For best results, the correct combination of label and ribbon materials should be chosen for the printer type and application environment. Whenever a different brand or part number of labels or ribbons is loaded on the printer, the initial set-up should be repeated.

5.4.A.3.4 Initial Direct Thermal and Thermal Transfer Printer Set Up

Direct thermal and thermal transfer printers require different settings for best results on different combinations of label and ribbon materials. Manufacturers' recommendations should be followed for making the necessary changes and adjustments.

After any change (e.g., printed format, ribbon type, label type, print speed, or print head heat intensity), it is advisable to print a test symbol and verify it using an ISO-based verifier. If printing a long run of identical symbols, it is appropriate to verify one to determine symbol quality. If printing EAN/UPC Symbols that will vary in data content, a test UPC-A symbol containing the digits "4 12785 12783 2" is recommended for the verification process.

When verifying the test symbol, expect an ISO grade of 4 or 3 using the thermal transfer process. If these grades are not achieved, there probably is a problem with printer adjustments, cleanliness, or some other malfunction. With some direct thermal label materials, only 1.5 grade symbols can be produced. While such symbols do conform to the quality specifications, there is a smaller margin for process variations and degradation from handling and ageing.

In addition to verification, examine the test symbol for adequate Quiet Zones, bar height, and the legibility of the Human Readable Interpretation.

5.4.A.3.5 Maintaining Acceptable Quality

The quality of printed symbols tends to degrade as deposits build up on the thermal print head. Regular cleaning of the print head and guide surfaces in accordance with manufacturers' recommendations is strongly advised.

Thermal print heads eventually wear out to the point where one or more dot elements fail to heat properly. When this occurs, the printed symbols may no longer be scannable. One solution to this problem is frequent verification to assure continuing quality. Some printers can be equipped with on-line verification devices that will indicate when a problem is detected. Although such on-line verifiers may not test all of the parameters for ISO, they can be very useful for monitoring the printing process. This is particularly true after supplies replacement or printer maintenance.

An alternative method for detecting dot burnout is to print a line across the length of the symbol. Any dot failure will be immediately visible to the operator as a small break in the line as shown in Figure 5.4.A.3.5 – 1 below:

Figure 5.4.A.3.5 – 1



Figure 5.4.A.3.5 – 2

Achievable X-Dimensions for Thermal Printed EAN/UPC Symbols

Reference DPI	Actual DPI	Dots Per Millimetre	Actual Dot Width (Centre Point to Centre Point)		Dots Per Module Width	Module Width (X-Dimension)		*Corrected Magnification
			Inch	mm		Mils	mm	
200	203.2	8	0.00492	0.12500	2	9.843	0.2500	**75.76%
200	203.2	8	0.00492	0.12500	3	14.76	0.3750	113.64%
200	203.2	8	0.00492	0.12500	4	19.68	0.5000	151.52%
200	203.2	8	0.00492	0.12500	5	24.60	0.6250	189.39%
300	304.8	12	0.00328	0.08333	3	9.843	0.2500	**75.76%
300	304.8	12	0.00328	0.08333	4	13.12	0.3333	100.01%
300	304.8	12	0.00328	0.08333	5	16.40	0.4166	126.26%
300	304.8	12	0.00328	0.08333	6	19.68	0.5000	151.52%
300	304.8	12	0.00328	0.08333	7	22.96	0.5833	176.77%
400	406.4	16	0.00246	0.06250	4	9.843	0.2500	**75.76%
400	406.4	16	0.00246	0.06250	5	12.30	0.3125	94.70%
400	406.4	16	0.00246	0.06250	6	14.76	0.3750	113.64%
400	406.4	16	0.00246	0.06250	7	17.22	0.4375	132.58%
400	406.4	16	0.00246	0.06250	8	19.68	0.5000	151.52%
400	406.4	16	0.00246	0.06250	9	22.14	0.5625	170.45%
400	406.4	16	0.00246	0.06250	10	24.60	0.6250	189.39%
600	609.6	24	0.00164	0.04167	6	9.843	0.2500	**75.76%
600	609.6	24	0.00164	0.04167	7	11.48	0.2916	88.38%
600	609.6	24	0.00164	0.04167	8	13.12	0.3333	101.01%
600	609.6	24	0.00164	0.04167	9	14.76	0.3750	113.64%
600	609.6	24	0.00164	0.04167	10	16.40	0.4166	126.26%
600	609.6	24	0.00164	0.04167	11	18.04	0.4583	138.89%
600	609.6	24	0.00164	0.04167	12	19.68	0.5000	151.52%
600	609.6	24	0.00164	0.04167	13	21.32	0.5416	164.14%
600	609.6	24	0.00164	0.04167	14	22.96	0.5833	176.77%
600	609.6	24	0.00164	0.04167	15	24.60	0.6250	189.39%

*Note: The nominal EAN/UPC Symbol can be based on a module width (X-dimension) of either 0.013 inch or 0.33 mm. In North America, long-standing Uniform Code Council (UCC™) specifications have set the nominal module size (X-dimension) at 0.013 inch or 13 mils. EAN, International specifications and the ISO/IEC specification for EAN/UPC Symbols set the nominal module size (X-dimension) at 0.33 mm. The international metric nominal is 0.0606 percent smaller than the original inch-based nominal. The data in the right-most column labelled "Corrected Magnification" are based on a nominal module width (X-dimension) of 0.33 mm.

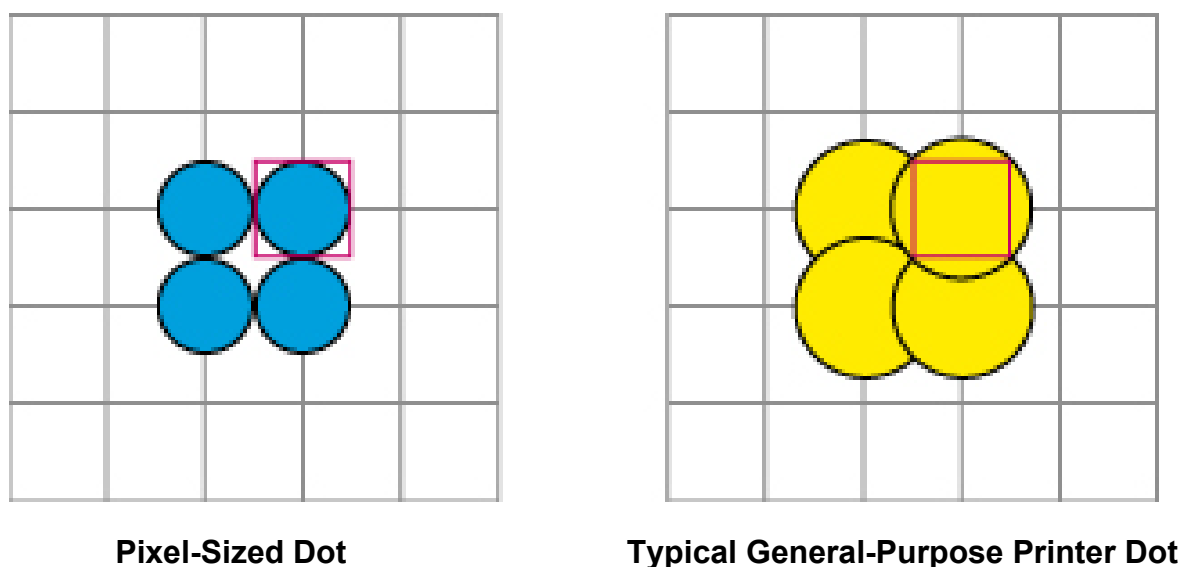
**Note: These values are less than the specified minimum for EAN/UPC Symbols printed under normal conditions (see notes on [Figure 5.4.1.6.7 – 1](#)).

5.4.A.4 APPENDIX 4: USING A GENERAL OFFICE PRINTER

General-purpose printing devices are capable of printing high quality bar codes when operated by experienced people equipped with a high quality bar code design software product. This category includes laser, desktop, ink-jet, ion deposition, and mechanical matrix office printers. These devices are primarily designed for printing full size pages of text and graphics. However, they can be used to print retail tags by using pre-cut labels on page-size backing paper. Some are also equipped with a continuous feed mechanism for producing symbols in large quantities. The following information is taken from Guidelines for Producing Quality Symbols.

It is more difficult for the user to create high quality bar code symbols with general-purpose printers than it is with direct thermal transfer label printers. There are two reasons for this difficulty. First, the printed dot size for general-purpose printers is appreciably larger than the pixel dimension, as shown in Figure 5.4.A.4 – 1. This causes the bars (dark bars) to be printed wider and the spaces (light bars) to be narrower than nominal, unless the software driving the printer corrects for this distortion. Second, the software that constructs the bar code may itself introduce dimensional errors.

Figure 5.4.A.4 – 1



5.4.A.4.1 Symbol Design Considerations for General Purpose Printers

There are a wide variety of software packages for creating symbols using general-purpose printers. Unfortunately, many of these packages are capable of producing symbols with totally unacceptable quality. Before reviewing the unique design factors for this class of printers, review the suggestions in Guidelines for Producing Quality Symbols. Then the following special factors should be considered when designing a symbol for general-purpose printers:

- Generate symbols at an X-dimension that is supported by the resolution of the specified printer (see Guidelines for Symbol Design Software Providers for technical information on corrected magnification). For example, the closest X-dimension to 0.330 mm (0.013 in) a 300 DPI printer can achieve is 0.3387 mm (.01333 in). This is because each module is constructed using four pixels, which individually measure 1/300 inch or 0.00333 inch (0.08467 mm). Figure 5.4.A.4.3 – 1 lists the achievable EAN/UPC Symbol magnifications (after correction) addressed by general-purpose printers. EAN/UPC Symbol magnifications other than those listed in this figure will be printed inaccurately and may or may not achieve the minimum acceptable verifier grades.

- Specify one or more dots (pixels) of uniform Bar Width Reduction (BWR) to compensate for excessive bar width that is typical of general-purpose printers. For example, with a typical 300 DPI laser printer and four dots per module, best print quality is often achieved with one pixel (or dot) of BWR.
- When a bar code graphic file is transferred between two parties, the printer resolution attribute should be communicated. If the printer resolution changes, the bar code file should be recreated. The symbol should be treated as a fixed design element. It should not be resized, rotated, scaled, or stretched.
- When the bar code graphic file is transferred between two parties, they should determine which symbol design attributes should be communicated. The following list are optional attributes that can be useful in assuring symbol quality:
 - Printer resolution for bar width (strongly suggested)
 - Corrected X-dimension (or magnification factor)
 - Corrected BWR factor

These specifications should not be altered at any later stage within illustration or page layout software programs. These suggestions should provide quality symbols when output conditions match design attributes. The most predictable results are obtained using software packages that drive the printer directly by low-level software. Often when bar code images are passed from one software application to another, the bar code symbol may become distorted. These distorted symbols may or may not achieve the minimum acceptable verifier grades.

5.4.A.4.2 Initial General Purpose Printer Set Up

Once you have the required software, hardware, and consumable materials in place, determine the symbol X-dimension and other parameters that you will be using to produce bar code labels or tags. Next, print at least two UPC-A or four EAN-13 test symbols in which all of the left and right hand digits are represented. For example, the following bar codes test all combinations of symbol characters:

UPC-A	0 12345 01234 1
UPC-A	6 78912 56789 0
EAN-13	6 601234 012346
EAN-13	5 504125 567899
EAN-13	3 376788 246808
EAN-13	9 991357 135792

Verify the test symbols per the ISO method. It is desirable to achieve grade 2.5 (B) or better in this initial set-up. If one or both of the test symbols are below grade 2.5 (B), the quality may be improved by changing some of the software or printer variables. At the minimum, grade 1.5 (C) symbols are acceptable, but they leave a minimal margin for process variations and possible degradation from handling. In addition to verification, examine the test symbols for adequate Quiet Zones, bar height, and legibility of the Human Readable Interpretation.

For small operations, the investment in a bar code verifier that conforms to the ISO method may not be justified. The alternative is to submit test symbols to a qualified testing organisation.

Whenever changes are made in software parameters, the initial set-up procedures should be repeated.

5.4.A.4.3 Maintaining Acceptable Quality

All printers require periodic maintenance. Laser printers, for example, not only consume toner, but also require periodic replacement of components such as drums, developers, fusers, and brushes. All of the consumable parts may be contained in a single replacement cartridge, or they may be separately installed, depending on the make and model of printer. Because bar code labels contain a higher percentage of black printing than occurs in ordinary text, fewer pages can be printed between maintenance intervals.

Printed symbols should be visually checked for consistent appearance and verified whenever they appear doubtful. Symbol verification, whether conducted onsite or consulted, can be an effective tool for maintaining quality within a conscientiously applied program of quality assurance. Verification should be employed as a quality sampling technique, particularly after any supplies replacement or printer maintenance. For answers to frequently asked questions regarding EAN/UPC Symbol verification, see the *UCC Technical Bulletin 1: Methods for Assessing Symbol Quality*.

Figure 5.4.A.4.3 – 1

***General-Purpose 300 DPI Printer: Achievable X-Dimensions Using the EAN/UPC Symbology**

Reference DPI	Actual DPI	Dots Per Millimetre	Actual Dot Width (Centre Point to Centre Point)		Dots Per Module Width	Module Width (X-Dimension)		*Corrected Magnification
			Inch	mm		Mils	mm	
300	300	11.812	0.00333	0.0846	3	10.000	0.25387	**76.96%
300	300	11.812	0.00333	0.0846	4	13.333	0.33863	102.61%
300	300	11.812	0.00333	0.0846	5	16.667	0.42329	128.27%
300	300	11.812	0.00333	0.0846	6	20.000	0.50795	153.92%
300	300	11.812	0.00333	0.0846	7	23.333	0.59261	179.58%

*Note: The nominal EAN/UPC Symbol can be based on an X-dimension of either 0.013 inch or 0.33 mm. In North America, the long-standing Uniform Code Council (UCC™) specifications have set the nominal X-dimension at 0.013 inch or 13 mils. International EAN.UCC System specifications and ISO/IEC 15420 (symbology specification for EAN/UPC Symbols) set the nominal X-dimension at 0.33 mm. The international metric nominal is 0.0606 percent smaller than the original inch-based nominal. The data in the right-most column labelled “Corrected Magnification” are based on an X-dimension of 0.33 mm.

**Note: This value is less than the specified minimum for EAN/UPC Symbols printed under normal conditions (see notes in [Figure 5.4.1.6.7 – 1](#)).

5.4.A.5 APPENDIX 5: PRINT PROCESS CHARACTERISATION TECHNIQUES

5.4.A.5.1 Introduction

Electronic (digital) creation of package printing images is widely used in the printing industry today. It has a positive impact on quality, cost, and speed of manufacture. The Global Symbology Committee (GSC) has worked closely with printing industry associations and their members to develop contemporary methods of press characterisation based on digital imaging for plate-based printing processes. This work is ongoing and is presented here along with traditional Film Master (analog) approaches to press characterisation.

5.4.A.5.2 General Information

Manufacturers monitor EAN/UPC Symbol quality on the final packaged product to provide an indication of how well their product will perform in a particular scanning environment. It is important for printers to understand the limitations of their printing process and educate their customers on what they are capable of producing. Some printing companies relate warranties and disclaimers for print quality based on the symbol design conforming to their internal policies and EAN.UCC System specifications. This communication allows the manufacturer to weigh product design goals in a balance between production process capabilities and the critical functionality of each EAN.UCC Symbol to customers.

Press characterisation (or fingerprinting) is a common practice among printing companies. It is a prerequisite for producing quality bar code symbols. There are many fingerprinting approaches taken by printing companies, but all of these methods should provide the printer with two key pieces of information:

- The minimum symbol size that can be reproduced consistently with acceptable quality grades
- The proper bar width compensation (BWC) to be applied in the design stage

There are two major approaches to bar code symbol design and two corresponding approaches to characterisation:

- For those utilising digital bar code files or bar code design software, a characterisation method has evolved utilising a symbol matrix. The symbol matrix is analysed using ISO-based verification results for Decodability. This method is described in [Section 5.4.A.5.3](#).
- For those who use Film Masters, an approach exists that utilises an analog-based Film Master or Print Gain Gauge to provide the minimum size and nominal BWC. This method is discussed in [Section 5.4.A.5.4](#).

5.4.A.5.3 Digital Production Methods of Characterisation: Symbol Matrix Characterisation Method

Flexographic Technical Association: Flexographic Image Reproduction Specifications and Tolerances, Second Edition, November 1999

Ms. Cindy Cole, Technical Director, FTA Flexographic Training Center
1302 Concourse Drive, Suite 303
Linthicum, MD 21090, USA
Telephone: + 1 (410) 691-5314
Website: <http://www.fta-ffa.org>

The symbol matrix characterisation method specifies a procedure for selecting the optimum X-dimension and Bar Width Reduction (BWR) for pre-press design of bar code symbols created using digital methods. It describes how to select the X-dimension/BWR that will provide the best results for the range of impression encountered on press, using *ISO/IEC 15416*-based verifiers. This is appropriate for use with any bar code symbol. The U.S. Flexographic Technical Association has developed this method with the assistance of members of the Global Symbology Committee (GSC) for plate-based printing methods. It may be used as a template for most digital production methods:

Figure 5.4.A.5.3 – 1



5.4.A.5.4 Characterisation Approach for Film Master Based Processes

The production of a symbol in its finished state involves a number of separate processes, each of which contributes to the quality of the final result. The three main processes in the production of a symbol using a Film Master are:

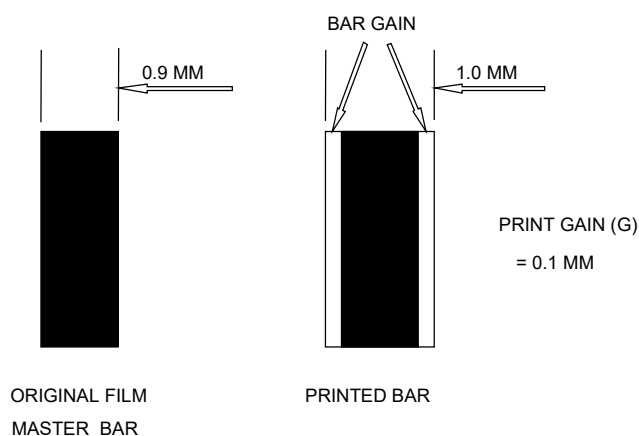
- The production of a Film Master representing the symbol
- The fabrication of the printing plates that incorporate the Film Master
- The package printing from plates incorporating the Film Master

These processes will normally be undertaken by specialists, who may employ techniques at their own discretion in order to produce symbols of acceptable reliability for scanning. In order to refine the standards required, the following subsections outline the considerations that apply to the production processes and give methods whereby acceptable quality can be achieved.

5.4.A.5.4.1 Bar Gain and Variation

If a Film Master containing symbol bars of nominal width is converted into a printing plate and printed onto a package, the bars as finally printed will usually be found to be wider than the original bars on the Film Master. This is due to many factors, such as plate making, print pressure, absorbent material, and ink viscosity. This increase in width is known as the bar gain (see Figure 5.4.A.5.4.1 – 1).

Figure 5.4.A.5.4.1 – 1



Bar Gain

In the course of a print run, it is to be expected that the extent of bar gain will differ between individual impressions. The bar gain may be either positive or negative. This difference in the amount of bar gain is known as variation.

5.4.A.5.4.2 Assessment of Printing Conditions

In preparation for printing a symbol on a package, it is first necessary to assess the average bar gain and extent of variation normally encountered in the day-to-day printing of the packaging. Assessments can be made using either a Film Master of an actual symbol (e.g., an ITF-14 Symbol representing a standard value 999 .. reserved for this use) or a special Film Master that serves as a gauge (see [Section 5.4.A.5.4.5](#)). The film must be integrated into the printing plates using the standard procedure normally used in the particular operation.

Assessments should be carried out on actual production runs, using qualities of inks and substrate in normal use.

The assessment should include both:

- Bars printed parallel to the direction of printing
- Bars printed at right angles to the direction of printing

The assessment should include all the variations likely to be encountered in practice and all the factors affecting print quality so that the effects of extremes of printing conditions can be measured. A basic method of print quality assessment is to use proper sampling over a sufficient variety of production runs and directly measure the bars in printed symbols to find:

- The average of extremes of bar gain
- The variation in bar gain

Compensation for both these factors must be made when the Film Master is prepared. The extent of variation in bar gain determines the X-dimension of the symbol. The extent of average bar gain determines the Bar Width Reduction (BWR). This is the amount by which the bars on the Film Master must be reduced, or increased in width, to correct for the bar gain.

The space required on the package must be within the allowable range of sizes for the symbol based on the application area and scanning environment. Reliability is always enhanced by selecting an X-dimension larger than the minimum that the space on the package permits.

Note that the minimum X-dimension is always determined by the print quality. It is not possible to select an arbitrary symbol size to fit a predetermined space on the package. The bars on the Film Master are corrected to allow for bar gain by reducing (or in rare instances increasing) the width of each bar on the Film Master, symmetrically (on both left and right) by a total equal to the average bar gain in each case. The BWR applied is the same for each bar, irrespective of the width of the bar.

The amount of BWR required is equal to the average bar gain in all cases and is not itself affected by the X-dimension of the symbol. Thus the BWR is applied after the X-dimension has been determined and not the reverse.

Note that the bar spaces (light bars) are wider than the X-dimension of the bars (dark bars) by the same BWR dimension used to narrow the bars (dark bars). The net result is that the overall symbol length meets the nominal dimension specified for the symbol.

5.4.A.5.4.3 Print Gain Gauge Method

[Section 5.4.A.5.4.2](#) describes the basic assessment method for determining the allowances to be made in the printing process. In practice, a simpler alternative operating method can be employed, which uses a specially calibrated Print Gain Gauge.

Where the source of the bar code master image is known to conform with *ISO/IEC 15421*, it is possible to use the Print Gain Gauge method to determine the optimum X-dimension and Bar Width Reduction (BWR) for a given production environment.

There are two types of Print Gain Gauges, the type used for EAN/UPC Symbols, generally known as the Print Gain Gauge, and the type used for ITF-14 symbols, generally known as the H gauge. Each consists of a very precise design in the form of a positive or negative master and contains a range of gauges so that the capability of a wide range of print processes can be assessed. Both types contain elements oriented at right angles to one another. This enables print quality to be assessed both in print direction and across print direction. Print Gain Gauges are normally obtainable commercially from film master suppliers.

The Print Gain Gauge should be introduced to the process as if it were a bar code master. Each step of the process should be carried out as it would normally be carried out. Any special measures taken to improve the accuracy of any part of the process could result in a false characterisation of the process.

The Print Gain Gauge must be used as it is supplied. Any photographic enlargement or reduction of the gauge will defeat its purpose.

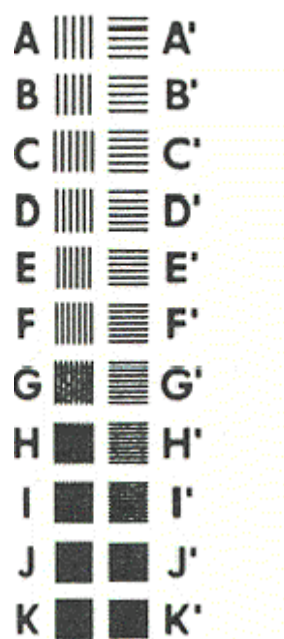
5.4.A.5.4.3.1 The Print Gain Gauge

The Print Gain Gauge is formed from a number of gauges that are identified by the letters of the alphabet from A to K (see [Figure 5.4.A.5.4.3.1 – 1](#)). Each of these elements is composed of two components that are at right angles to each other. Each component is a series of parallel lines that are spaced apart by an amount determined by the letter of the alphabet to identify that gauge. The spacing between the lines that form the gauges is reduced progressively as the gauge designation moves from A to K. The spacing is set empirically, and it is not necessary to know the dimensional values when using this method. Gauges must, however, be produced to a tolerance of ± 0.005 mm (0.0002 in.) in their critical dimensions.

Print Gain Gauges are used to characterise the processes of reproducing the bar code symbol, and, from the results, to determine the amount of compensation required to offset the bar gain or loss of the process and to determine the range of variability that the symbol must be capable of accommodating (see [Section 5.4.A.5.4.4](#) for more information). They are included in actual production runs of the packaging on which the bar codes will eventually be printed, in locations similar to those likely to be used for the symbols, and using the same processing and printing methods. If any significant change is made in the reproduction or printing processes, a new printability trial should be conducted.

The EAN/UPC Print Gain Gauge is intended for use in reproduction and print processes where the bar gain and variability does not exceed 0.2 mm (0.0078 in.).

Figure 5.4.A.5.4.3.1 – 1*



*Note: This illustration is not to scale.

5.4.A.5.4.3.2 The H Gauge

For print processes where the bar width gain is likely to be in the range 0.2 mm (0.0078 in.) to 0.4 mm (0.016 in.), the H gauge is the appropriate means of assessing the reproduction and printing processes (see Figure 5.4.A.5.4.3.2 – 1). H gauges are defined by the numerical values from 1 to 7, where the number of the gauge specifies the spacing in 0.1 mm (0.004 in.) increments, between the uprights of the H. An H1 gauge has a space (light bar) of 0.1 mm (0.004 in.) between the uprights of the H, and an H7 gauge has a spacing of 0.7 mm (0.028 in.) between the uprights of the H. Gauges must be manufactured so that the tolerance on the spacing between the uprights of the H is plus or minus 0.02 mm (0.0008 in.).

Figure 5.4.A.5.4.3.2 – 1

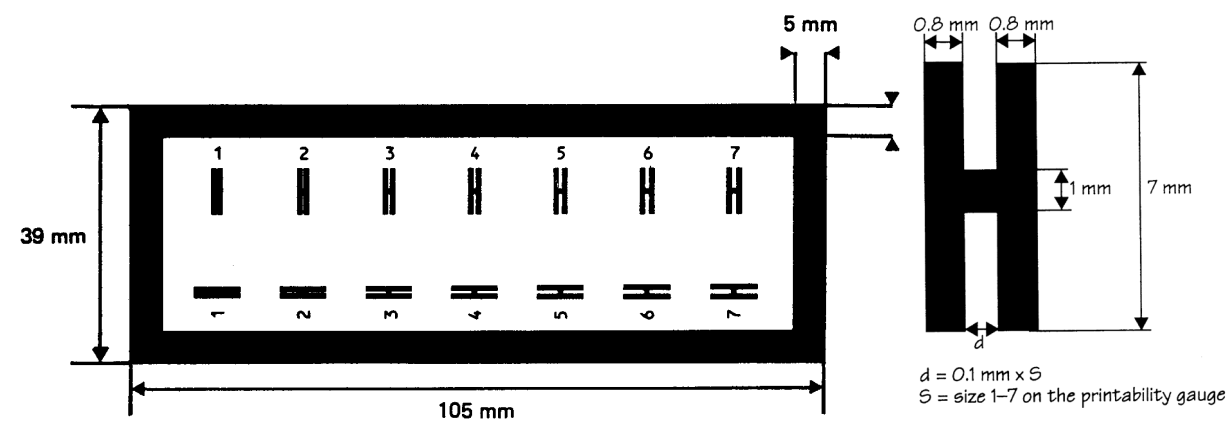


Figure 5.4.A.5.4.3.2

– 2



5.4.A.5.4.4 Evaluation of Print Gain Gauge Results

Samples of prints incorporating a gauge are taken at intervals during the print run. The samples are examined under a magnifying glass to determine the finest gauge pattern where the lines first touch one another in each sample. Small, localised deviations are disregarded in judging where the lines are touching; the lines are considered to be touching when they are in contact along 50 percent or more of their length. Gauges that are printed both in the print direction and across the print direction should be assessed and rated for printability. The gauge at which the lines are touching by 50 percent or more is the printability rating of that sample. In some circumstances it is possible that say gauges A to D remain open and E to K are completely filled in. In cases like this, the printability rating is D.

All of the samples from a print run are assessed and their printability ratings noted. It is normal that the printability rating shall vary at different points in a print run and that the rating will be different for gauges that are in print direction and those that are across print direction. The range of the printability

rating should be noted for both the gauges that are in print direction and those that are across print direction.

For EAN/UPC Symbols, see [Figure 5.4.A.5.4.5.3 – 1](#) and [Figure 5.4.A.5.4.5.3 – 2](#) to determine the minimum X-dimension of the symbol and the Bar Width Reduction (BWR) that should be applied to a bar code symbol, which is to be printed by that process and in that orientation. For printability trials that are conducted using the H gauge, see [Figure 5.4.A.5.4.5.3 – 1](#) for the minimum X-dimension and the BWR to be applied.

5.4.A.5.4.5 Bar Gain/Loss Checks

If allowances for process variability have been properly made in the preparation of the Film Master, it should not be necessary to check the overall quality or performance of every symbol as printed. It should be sufficient to carry out spot check sampling in the course of the print run to ensure that bar gain/loss does not deteriorate below the levels that were recorded during test runs.

Bar gain/loss is particularly important when printing symbols of small size, where even a small change in bar width could seriously reduce decodability. This is because the tolerance below nominal size reduces disproportionately to the reduction in X-dimension.

Please keep in mind the following:

- The final measurement of printed symbol quality should be made using the *ISO 15416* methodology. The minimum symbol grades are specified, application by application, in [Section 5.4.1.6.7](#).
- The H-mark serves as a bar gain/loss control guide. Its interpretation is reserved to the printer. Printers and distributors must, therefore, not use it as a rejection criterion of the printing work.
- The quality control H-marks are located within the box formed by the Bearer Bar aligned with the centre of the bars of the symbol and outside the light margins, right and left (see [Figure 5.4.A.5.4.3.2 – 2](#)).

5.4.A.5.4.5.1 Bar gain/Loss Checks for EAN/UPC Symbols

The appropriate range of elements of the Print Gain Gauge can be incorporated in an inconspicuous part of the print. These should be consistent with the printability range that was determined in the printability trial for that machine and substrate. Spot checks will reveal whether the Print Gain Gauge pattern is being reproduced to the same standard achieved during printability trials. If the range of variability observed in the Print Gain Gauges exceeds that which was observed in the printability trial, it is essential that the process be examined to determine which of the variables in the process has gone out of control. Continuing production when the Print Gain Gauges indicate that the process is not in control may result in the production of symbols that do not comply with the minimum required quality standard for the application.

5.4.A.5.4.5.2 Bar Gain/Loss Checks for ITF-14 Symbols

When quality checking ITF-14 Symbols during a print run, the H gauge can be incorporated into the area to left and right of the symbol (see [Figure 5.4.A.5.4.3.2 – 2](#)). The H gauges should be placed within the Bearer Bar that surrounds the symbol so that the impression conditions are the same for the H gauge as they are for the symbol. Two sizes of gauge should be selected: one to indicate the condition where all of the print tolerance is used up due to bar width gain, and the other to indicate when significant bar width loss is present.

To determine which gauges are the correct ones to use, see the printability trial for the machine and the substrate on which the print run will be made. The gauge that is placed on the right of the symbol should be the same number as that of the lowest number in the printability range. That on the left should be one higher than the highest number in the printability range.

Care must be taken to ensure that the H gauges are clear of the Quiet Zones of the symbol. Provision is made in the symbology standard to allow an additional 3 mm wide zone to left and right of the symbol Quiet Zones when H gauges are required to be incorporated.

5.4.A.5.4.5.3 Bar Gain/Loss Checks for UCC/EAN-128 Symbols

Where the print variation is small, UCC/EAN-128 Symbols should be checked using the method described for the EAN/UPC Symbol. Where the print variation is large, UCC/EAN-128 Symbols should be checked using the method described for ITF-14 Symbols.

Figure 5.4.A.5.4.5.3 – 1

Magnification and Bar Width Reduction for Flexography

Printability Rating Range	Magnification Factor	Line-Width Reduction (Thousandths of an Inch)		Bar Width Reduction (mm)
A - B	2.00	8	± 2	0.20 (± 0.05)
A - C	1.90	8	± 2	0.20 (± 0.05)
A - D	1.85	8	± 2	0.20 (± 0.05)
A - E	1.80	8	± 2	0.20 (± 0.05)
A - F	1.70	9	± 1	0.23 (± 0.02)
A - G	1.60	8	± 1	0.20 (± 0.02)
A - H	1.80	7	± 1	0.18 (± 0.02)
A - I	2.00	6	± 1	0.15 (± 0.02)
B - C	1.85	8	± 2	0.20 (± 0.05)
B - D	1.80	8	± 2	0.20 (± 0.05)
B - E	1.70	8	± 2	0.20 (± 0.05)
B - F	1.60	8	± 1	0.20 (± 0.02)
B - G	1.55	8	± 1	0.20 (± 0.02)
B - H	1.60	7	± 1	0.18 (± 0.02)
B - I	1.80	6	± 1	0.15 (± 0.02)
C - D	1.70	8	± 2	0.20 (± 0.05)
C - E	1.60	7	± 2	0.18 (± 0.05)
C - F	1.55	7	± 2	0.18 (± 0.05)
C - G	1.45	7	± 2	0.18 (± 0.05)
C - H	1.45	7	± 1	0.18 (± 0.02)
C - I	1.60	6	± 1	0.15 (± 0.02)
D - E	1.55	7	± 2	0.18 (± 0.05)
D - F	1.45	7	± 2	0.18 (± 0.05)
D - G	1.40	7	± 2	0.18 (± 0.05)
D - H	1.30	8	± 1	0.20 (± 0.02)
D - I	1.45	6	± 1	0.15 (± 0.02)
E - F	1.40	7	± 2	0.18 (± 0.05)
E - G	1.30	7	± 2	0.18 (± 0.05)
E - H	1.20	7	± 1	0.18 (± 0.02)
E - I	1.30	6	± 1	0.15 (± 0.02)
F - G	1.20	6	± 2	0.15 (± 0.05)
F - H	1.15	6	± 2	0.15 (± 0.05)
F - I	1.15	6	± 1	0.15 (± 0.02)
G - H	1.10	6	± 2	0.15 (± 0.05)
G - I	1.00	6	± 2	0.15 (± 0.05)
H - I	0.90	6	± 1	0.15 (± 0.02)

Figure 5.4.A.5.4.5.3 – 2

Magnification and Bar Width Reduction for Lithography, Gravure, and Letterpress

Printability Rating Range	Magnification Factor	Line-Width Reduction (Thousandths of an Inch)	Bar Width Reduction (mm)
E - F	1.00	11 (+0-3)	0.28 (+0-0.08)
E - G	1.00	10 (+1-2)	0.25 (+0.02-0.05)
E - H	1.20	9 (+2-1)	0.23 (+0.05-0.02)
E - I	1.30	8 (± 2)	0.20 (± 0.05)
E - J	1.40	7 (± 1)	0.18 (± 0.02)
E - K	1.50	6.5 (+2-1)	0.16 (+0.05-0.02)
F - G	0.90	9 (+0.5-2)	0.23 (+0.01-0.05)
F - H	1.00	8 (± 2)	0.20 (± 0.05)
F - I	1.20	7 (+2-1)	0.18 (+0.05-0.02)
F - J	1.25	6 (± 1)	0.15 (± 0.02)
F - K	1.30	5.5 (± 1)	0.14 (± 0.02)
G - H	0.90	7 (+1-2)	0.18 (+0.02-0.05)
G - I	1.00	6 (± 2)	0.15 (± 0.05)
G - J	1.10	5 (+1-2)	0.13 (+0.02-0.05)
G - K	1.20	4.5 (+2-1)	0.11 (+0.05-0.02)
H - I	0.90	5 (+1-2)	0.13 (+0.02-0.05)
H - J	0.95	4 (± 1)	0.10 (± 0.02)
H - K	1.00	3.5 (± 1)	0.09 (± 0.02)
I - J	0.90	3 (± 1)	0.08 (± 0.02)
I - K	0.90	2.5 (± 1)	0.06 (± 0.02)
J - K	0.80	1.5 (± 1)	0.04 (± 0.02)

Figure 5.4.A.5.4.5.3 – 3

**ITF-14 Symbol Marking Determining the X-Dimension and Bar Width
Reduction on the Basis of the Printability Range**

Print Range	X-Dimension		Bar Width Reduction	
	mm	in	mm	in
0 - 0	0.813	0.032	0	0
0 - 1	0.914	0.278	0.10	0.039
1 - 1	0.914	0.278	0.10	0.039
0 - 2	0.914	0.278	0.10	0.039
1 - 2	0.914	0.278	0.10	0.039
2 - 2	0.914	0.278	0.10	0.039
0 - 3	1.016	0.040	0.20	0.078
1 - 3	1.016	0.040	0.20	0.078
2 - 3	1.016	0.040	0.20	0.078
3 - 3	1.016	0.040	0.20	0.078
0 - 4	1.016	0.040	0.20	0.078
1 - 4	1.016	0.040	0.20	0.078
2 - 4	1.016	0.040	0.20	0.078
3 - 4	1.016	0.040	0.20	0.078
4 - 4	1.016	0.040	0.20	0.078
0 - 5	1.118	0.044	0.30	0.118
1 - 5	1.118	0.044	0.30	0.118
2 - 5	1.118	0.044	0.30	0.118
3 - 5	1.118	0.044	0.30	0.118
4 - 5	1.118	0.044	0.30	0.118
5 - 5	1.118	0.044	0.30	0.118
0 - 6	1.220	0.048	0.40	0.158
1 - 6	1.220	0.048	0.40	0.158
2 - 6	1.220	0.048	0.40	0.158
3 - 6	1.220	0.048	0.40	0.158
4 - 6	1.220	0.048	0.40	0.158
5 - 6	1.220	0.048	0.40	0.158
6 - 6	1.220	0.048	0.40	0.158

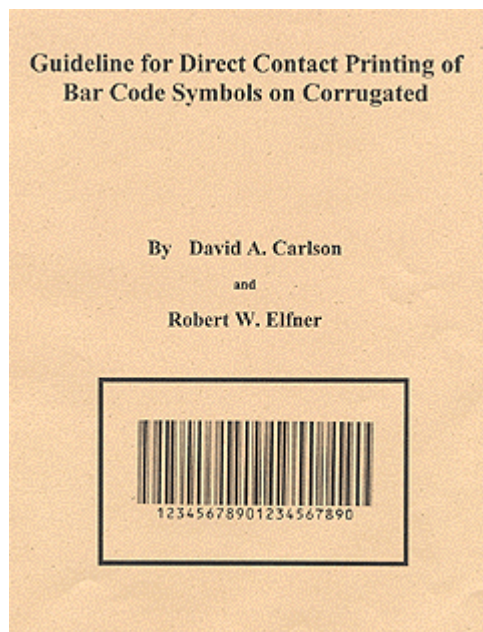
0 - 7	1.220	0.048	0.40	0.158
1 - 7	1.220	0.048	0.40	0.158
2 - 7	1.220	0.048	0.40	0.158
3 - 7	1.220	0.048	0.40	0.158
4 - 7	1.220	0.048	0.40	0.158
5 - 7	1.220	0.048	0.40	0.158
6 - 7	1.220	0.048	0.40	0.158
7 - 7	1.220	0.048	0.40	0.158

5.4.A.6 APPENDIX 6: DIRECT CONTACT PRINTING OF BAR CODE SYMBOLS ON CORRUGATED

Fibre Box Association: *Guideline for Direct Contact Printing of Bar Code Symbols on Corrugated*, 1998

Ms. Mary Opfer, Technical Manager
Fibre Box Association
2850 Gulf Road, Suite 412
Rolling Meadows, IL 6008, USA
Telephone: 1 (847) 364 9600
Website: <http://www.fibrebox.org>

This guideline for printing ITF-14 Symbols directly on corrugated was developed in close coordination with the Global Symbology Committee.



Section 5.5:

Reduced Space Symbology[®] and EAN.UCC Composite Symbology[®]

Table of Contents

5.5.1 Introduction.....	3
5.5.1.1 Composite Symbol Features	5
5.5.2 Reduced Space Symbology[®] (RSS)	6
5.5.2.1 Introduction	6
5.5.2.1.1 Symbology Characteristics	7
5.5.2.1.2 Additional Features	8
5.5.2.2 RSS-14[™] Versions	8
5.5.2.2.1 RSS-14 [™]	9
5.5.2.2.2 RSS-14 Truncated	9
5.5.2.2.3 RSS-14 Stacked	9
5.5.2.2.4 RSS-14 Stacked Omnidirectional	9
5.5.2.3 RSS Limited[™]	10
5.5.2.4 RSS Expanded[™] Versions	11
5.5.2.4.1 RSS Expanded [™]	11
5.5.2.4.2 RSS Expanded Stacked	12
5.5.2.4.3 Compressed Element String Sequences	12
5.5.2.4.3.1 Fixed-Length Sequences	13
5.5.2.4.3.1.1 AI (01) and Weight with Limited Range	13
5.5.2.4.3.1.2 AI (01): Weight and Optional Date	13
5.5.2.4.3.2 Open-Ended Sequences	13
5.5.2.4.3.2.1 AI (01) and Price	13
5.5.2.4.3.2.2 AI (01)	13
5.5.2.5 Human Readable Interpretation in RSS Symbols	13
5.5.2.6 Data Transmission and Symbology Identifier Prefixes	14
5.5.2.6.1 Default Transmission Mode	14
5.5.2.6.2 UCC/EAN-128 Symbol Emulation Mode	14
5.5.2.7 Width of a Module (X)	14
5.5.2.8 Print Quality Grade	15
5.5.2.9 Advice for Selecting the Symbology	15

5.5.3 EAN.UCC Composite Symbology®	16
5.5.3.1 EAN.UCC Composite Symbology® Introduction.....	16
5.5.3.1.1 EAN.UCC Composite Symbology® Characteristics	16
5.5.3.1.2 Additional Features	18
5.5.3.2 Symbol Structure	18
5.5.3.2.1 CC-A Structure	20
5.5.3.2.2 CC-B Structure	21
5.5.3.2.3 CC-C Structure	23
5.5.3.2.4 Special Compressed Element String Sequences	24
5.5.3.3 Human Readable Interpretation in Composite Symbols.....	24
5.5.3.4 Data Transmission and Symbology Identifier Prefixes.....	25
5.5.3.4.1 Default Transmission Mode	25
5.5.3.4.2 UCC/EAN-128 Symbol Transmission Mode.....	25
5.5.3.4.3 Symbol Separator Character.....	25
5.5.3.4.4 2D Composite Component™ Escape Mechanism	25
5.5.3.5 Width of a Module (X).....	26
5.5.3.6 Print Quality	26
5.5.3.7 Advice for Selecting the Symbology	27
5.5.3.8 Sample EAN.UCC Composite Symbols	27

5.5.1 Introduction

This section provides technical specifications for the Reduced Space Symbol, Composite Component™ Symbol and Composite Symbols. EAN International and the Uniform Code Council (UCC™) have developed these new symbolologies with the intent of making them available for open application. Work is currently underway to define specific application standards for these symbolologies. Until the application standards and rollout schedules are established, the symbolologies are not approved by EAN International and the UCC for general use in open supply channels.

The Reduced Space Symbology family of bar code symbols and associated Composite Components have been developed to meet the expressed needs of EAN.UCC System members. The challenge was to provide better ways to automatically identify:

- Very small items (e.g., syringes, vials, and telecommunications circuit boards)
- Random measure retail items utilising full product identification (e.g., meat, poultry, and bagged produce)
- Individual produce items (e.g., apples and oranges)
- Logistic units that required more data to accompany the item than there was space available (e.g., content information for mixed trade item pallets)

To provide a solution for this application requirement, the following minimum technical issues needed to be resolved:

- Some symbols had to perform in an omnidirectional scanning environment.
- The symbol had to fit in a space-constrained area and provide strong performance for its size.
- The symbol had to maximise compatibility with an existing broad-based collection of applications and technologies.
- The symbol had to complement the selection of existing EAN.UCC System data carriers
- The symbol had to provide the simplest set of solutions to fit the largest user base.

The UCC formed both user and technical committees to address this issue. The committees evaluated the EAN-8 Composite Symbology and UCC/EAN-128 Composite Symbology along with two-dimensional (2D) stacked and matrix symbolologies. The committees determined that a new compact linear symbology, RSS, with an associated stacked two-dimensional symbol, versions of MicroPDF417, provided the most efficient and general solution. The combination of a linear symbol and associated 2D symbol is known as a composite symbol. It is the only EAN.UCC System standard 2D symbology. The linear component encodes the item identification and can be read by most scanners.

The RSS family has a higher data density than other linear bar codes because it has a larger symbol character. The RSS Limited™ Bar Code Symbol encodes 2,013,571 values in one symbol character with 26 modules.

Figure 5.5.1 – 1: Data Density Comparison

Symbology	Modules per Digit
ITF-14	8.0

EAN/UPC	7.0
UCC/EAN-128	5.5
RSS Limited	4.1

To allow for broad functionality, the RSS linear component of the composite symbol has been designed in several formats. They include:

- RSS-14™
- RSS-14 Truncated
- RSS Limited
- RSS Stacked
- RSS Stacked Omnidirectional
- RSS Expanded™
- RSS Expanded Stacked

RSS-14, RSS-14 Truncated, RSS Stacked, and RSS Stacked Omnidirectional enable the full 14-digit numbering of items. They are smaller than EAN-13 or UPC-A Bar Code Symbols. Each provides a linkage flag to indicate the existence of a 2D Composite Component. RSS-14 and RSS Stacked Omnidirectional have omnidirectional scanning capability.

RSS Limited is designed for very small item identification. It encodes 14-digit item identification using indicator digits 0 or 1 and provides a linkage flag for the 2D Composite Component.

RSS Expanded and RSS Expanded Stacked encode all EAN.UCC System Application Identifier (AI) Element Strings. Each symbol has a variable length with a capacity of up to 74 characters. Each provides a linkage flag to indicate the existence of a 2D Composite Component. Unlike the UCC/EAN-128 Bar Code Symbol, the RSS Expanded Symbologies are designed to be read in an omnidirectional scanning environment.

The Composite Component (CC) family of symbologies consists of new 2D symbologies that will be used by EAN International and the UCC as an add-on to their linear symbologies in new applications. The family is in the public domain. A symbol that combines a linear symbol with a 2D component is known as a composite symbol.

The 2D component adds supplementary Application Identifier Element String data to EAN.UCC System linear symbologies. It provides the following benefits:

- The composite symbol is the only one with an easily scannable item identification.
- The composite symbols are comparable in size to the matrix symbols but can be scanned with a wider range of scanner technologies.
- The composite symbols are smaller than other laser scannable 2D symbols.

2D components can be added to the RSS family, UCC/EAN-128, and EAN/UPC Bar Code Symbols. There are three versions of the 2D symbol: CC-A, CC-B, and CC-C. The Composite Components increase in size and capacity. CC-C composites have greater capacity than CC-B composites, and CC-B composites have greater capacity than CC-A. The three versions of the Composite Component are based on new versions of MicroPDF417 and PDF417: CC-A (new version of MicroPDF417) up to 56 characters, CC-B (MicroPDF417 variant) up to 338 characters, and CC-C (PDF417 variant) up to 2361 characters.

RSS and composite symbols can encode new features beyond the structure of the standard Element String carried by a UCC/EAN-128 Symbol. The symbol separator allows new structures such as nesting/looping to be used for logistics applications.

A new Symbology Identifier of "je0" is used to differentiate the data transmission from UCC/EAN-128 Bar Code Symbols because the data may easily exceed the 48-character limit for UCC/EAN-128.

Figure 5.5.1 – 2: Symbology Identifiers

	Message Content	Separator
je0	Standard AI Element Strings	none
je1	New ISO 646 structures	"symbol separator"
je2	ISO 8859-1 8-bit data	codeword > 899
je3	ECI escapes and 8/16-bit data	codeword > 899

5.5.1.1 Composite Symbol Features

The primary identification is encoded in the linear symbol that is easily scanned with a low cost scanner. Supplementary AI Element Strings may be encoded in the two-dimensional (2D) component where they take up less space. Specific application guidelines will provide full details.

Composite symbols are designed to be scanned with hand-held laser, linear CCD, or 2D imaging scanners.

Within the EAN.UCC System, there are several possible linear/composite formats:

- RSS-14™ Composite
- RSS-14 Stacked Composite
- RSS Limited™ Composite
- RSS Expanded™ Composite
- UPC-A Composite
- UPC-E Composite
- EAN-8 Composite
- EAN-13 Composite

UCC/EAN-128 Composite (note that the linkage flag is an extra code set character between the last data character and the Symbol Check Character)

Composite Symbols can be selected to provide the best fit to a specific area. For example, the same data can be encoded in RSS-14 Truncated/CC-A, RSS Limited/CC-A, or RSS-14 Stacked/CC-A. Each of the three composites can be used to fit a different maximum height and width space requirement.

To provide assistance for rapid implementation, EAN International and the Uniform Code Council (UCC™) have:

- Patents granted and placed in the public domain
- Reduced Space Symbolology® (RSS) and Composite Symbolology® specifications issued by AIM, Inc.;
- Encoder and decoder models freely available to interested developers
- A verification model available to interested developers
- RSS verifiers available
- Two-dimensional 2D composite symbol verifiers in development.
- Active user application groups
- Completed pilot tests with additional tests underway

The specifications for RSS and Composite Symbolologies contained within this publication are provided for EAN International staff, UCC staff, and technical users of the EAN.UCC System. The information provides a template for implementation of RSS/Composite Symbolology. Technical specifications are referenced in this document for those needing more detailed information.

5.5.2 Reduced Space Symbolology® (RSS)

5.5.2.1 Introduction

Reduced Space Symbolology® (RSS) is a family of linear symbolologies used within the EAN.UCC System. There are three types of RSS symbols, two of which have a number of versions optimised for different application requirements.

RSS-14™ encodes AI (01) in a linear symbol that can be scanned omnidirectionally by suitably programmed slot scanners. RSS Limited™ encodes AI (01) in a linear symbol for use on small items that will not be scanned in an omnidirectional scanning environment. RSS Expanded™ encodes EAN.UCC System primary item identification plus supplementary AI Element Strings, such as weight and “best before” date, in a linear symbol that can be scanned omnidirectionally by suitably programmed slot scanners.

RSS-14 Stacked is a variation of the RSS-14 Symbolology that is stacked in two rows and used when the normal symbol would be too wide for the application. It comes in two versions: a truncated version used for small item marking applications and a taller version that is designed to be read by omnidirectional scanners. RSS Expanded can also be printed in multiple rows as a stacked symbol.

Any member of the RSS family can be printed as a stand-alone linear symbol or as a component of an EAN.UCC composite symbol with an accompanying two-dimensional (2D) Composite Component™ printed above the RSS linear component.

The RSS family is fully described in the Automatic Identification Manufacturers, Inc. document *AIM ITS 99-001 - International Symbology Specification - Reduced Space Symbology (RSS)*.

5.5.2.1.1 Symbology Characteristics

The Reduced Space Symbology® (RSS) family consists of the following versions:

- RSS-14™
- RSS-14 Truncated
- RSS-14 Stacked
- RSS-14 Stacked Omnidirectional
- RSS Limited™
- RSS Expanded™
- RSS Expanded Stacked

The characteristics of the RSS family are:

- Encodable character set:
 - RSS-14 versions and RSS Limited: digits 0 through 9 (with the restriction of RSS Limited to 0 or 1 in the first digit)
 - RSS Expanded: a subset of Table 1 of the *International Standard ISO/IEC 646*, consisting of the uppercase and lowercase letters, digits, spaces, and 20 selected punctuation characters in addition to the Function 1 Character (FNC1)
- Symbol character structure: Different (n,k) symbol characters are used for each member of the family, where each symbol character is n modules in width and is composed of k bars and k spaces.
- Code type: continuous, linear bar code symbology
- Maximum numeric data capacity (including implied Application Identifiers (AIs) where appropriate, but not including any encoded FNC1 characters):
 - RSS-14 versions and RSS Limited: AI (01) plus a 14-digit numeric item identification
 - RSS Expanded: 74 numeric or 41 alphabetic characters
- Error detection:
 - RSS-14 versions: mod 79 checksum
 - RSS Limited: mod 89 checksum
 - RSS Expanded: mod 211 checksum
- Character self-checking

- Bidirectionally decodable
- Quiet Zones: none required

5.5.2.1.2 Additional Features

Additional Reduced Space Symbology® (RSS) features include:

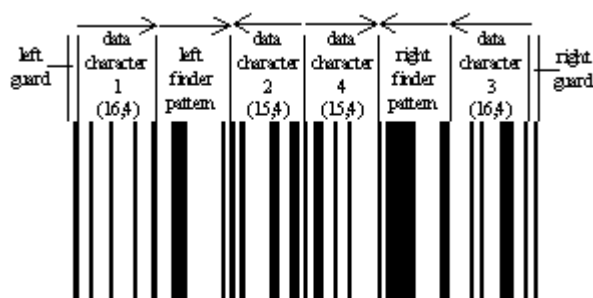
- Data compaction: Each member of the RSS family has data compaction methods optimised for the data strings that it will encode. RSS Expanded™ is also optimised for specific sequences of Application Identifiers (AIs) that are commonly used.
- Component linkage: All RSS symbols include a linkage flag. If the linkage flag is 0, then the RSS symbol stands alone. If the linkage flag is 1, then a 2D Composite Component™ and its separator pattern is printed above the RSS symbol with the separator pattern aligned and contiguous to the RSS symbol.
- Edge to similar edge decoding: All RSS family data characters, finder patterns, and check characters can be decoded using edge-to-edge measurements.
- Large data characters: Unlike EAN/UPC Symbols, an RSS symbol's data characters do not directly correspond to the encoded data character. The symbol's data characters encode thousands of possible combinations to increase the encoding efficiency. They are then combined mathematically to form the encoded data string.
- UCC/EAN-128 Symbol emulation: Readers set to the UCC/EAN-128 Symbol emulation mode transmit the data encoded within the RSS family symbol as if the data were encoded in one or more UCC/EAN-128 Symbols.

5.5.2.2 RSS-14™ Versions

RSS-14™ encodes the Element String AI (01). It has four versions: RSS-14, RSS-14 Truncated, RSS-14 Stacked, and RSS-14 Stacked Omnidirectional. All four versions encode data in an identical manner.

Figure 5.5.2.2 – 1 shows the structure of RSS-14. An RSS-14 Symbol contains four data characters and two finder patterns. The RSS-14 family is capable of being scanned in four separate segments, each consisting of a data character and an adjacent finder pattern. The two finder patterns together encode a modulo 79 check value for data security.

Figure 5.5.2.2 – 1: RSS-14 Structure



The left and right Guard Bar Patterns consist of a narrow bar and narrow space. RSS-14 does not require a Quiet Zone.

5.5.2.2.1 RSS-14™

The RSS-14™ Bar Code Symbol is designed to be read by an omnidirectional scanner, such as a retail slot scanner. Its dimensions are 96X wide, starting with a 1X space and ending with a 1X bar, by 33X high (where X is the width of a module). For example, an RSS-14 Symbol with an X-dimension of 0.25 mm (0.010 in.) would be 24 mm (0.96 in.) wide and 8.25 mm (0.33 in.) high.

Figure 5.5.2.2.1 – 1: RSS-14 Bar Code Symbol



5.5.2.2.2 RSS-14 Truncated

The RSS-14 Truncated Bar Code Symbol is a reduced height version of the RSS-14™ Bar Code Symbol that is designed for small items that will not need to be read by omnidirectional scanners. Its dimensions are 96X wide by 13X high (where X is the width of a module). For example, an RSS-14 Truncated Symbol with an X-dimension of 0.25 mm (0.010 in.) would be 24 mm (0.96 in.) wide by 3.25 mm (0.13 in.) high.

Figure 5.5.2.2.2 – 1: RSS-14 Truncated Bar Code Symbol



(01)00012345678905

5.5.2.2.3 RSS-14 Stacked

The RSS-14 Stacked Bar Code Symbol is a reduced height two-row version of the RSS-14™ Bar Code Symbol that is designed for small items that will not need to be read by omnidirectional scanners. Its dimensions are 50X wide by 13X high (where X is the width of a module). For example, an RSS-14 Stacked Symbol with an X-dimension of 0.25 mm (0.010 in.) would be 12.5 mm (0.50 in.) wide by 3.25 mm (0.13 in.) high. Its structure includes a 1X high separator pattern between the two rows.

Figure 5.5.2.2.3 – 1: RSS-14 Stacked Bar Code Symbol



5.5.2.2.4 RSS-14 Stacked Omnidirectional

The RSS-14 Stacked Omnidirectional Bar Code Symbol is a full height two-row version of the RSS-14™ Bar Code Symbol that is designed to be read by an omnidirectional scanner, such as a retail slot

scanner. Its dimensions are 50X wide by 69X high (where X is the width of a module). For example, an RSS-14 Stacked Omnidirectional Symbol with an X-dimension of 0.25 mm (0.010 in.) would be 12.5 mm (0.50 in.) wide by 17.25 mm (0.69 in.) high. The height of 69X includes a 3X high separator pattern between two rows of 33X each.

Figure 5.5.2.2.4 – 1: RSS-14 Stacked Omnidirectional Bar Code Symbol



5.5.2.3 RSS Limited™

The RSS Limited™ Bar Code Symbol encodes the Element String AI (01). This Element String is based on the UCC-12, EAN/UCC-8, EAN/UCC-13, or EAN/UCC-14 Data Structures. However, when using the EAN/UCC-14 Data Structure, only the indicator value 1 is allowed. The RSS-14™ family must be used for EAN/UCC-14 Data Structures with an indicator value greater than 1.

The RSS Limited Bar Code Symbol is designed for small items that will not need to be read by omnidirectional Point-of-Sale (POS) scanners. Its dimensions are 74X wide, starting with a 1X space and ending with a 1X bar, by 10X high (where X is the width of a module). For example, an RSS Limited Bar Code Symbol with an X-dimension of 0.25 mm (0.010 in.) would be 18.5 mm (0.74 in.) wide by 2.5 mm (0.10 in.) high.

Figure 5.5.2.3 – 1: RSS Limited Bar Code Symbol



Figure 5.5.2.3 – 2 shows the structure of the RSS Limited Bar Code Symbol. An RSS Limited Symbol contains two data characters and a check character. The check character encodes a modulo 89 check value for data security.

Figure 5.5.2.3 – 2: RSS Limited Bar Code Symbol Structure



The left and right Guard Bar Patterns consist of a narrow bar and narrow space. The RSS Limited Bar Code Symbol does not require a Quiet Zone.

5.5.2.4 RSS Expanded™ Versions

RSS Expanded™ is a variable length linear symbology capable of encoding up to 74 numeric or 41 alphabetic characters of AI Element String data. RSS Expanded is designed to encode primary and supplementary data in items for Point-of-Sale (POS) and other applications. It has the same capabilities as an UCC/EAN-128 Symbol except that it is also designed to be scanned by omnidirectional slot scanners. It is designed for variable weight products, perishable products, traceable retail products, and coupons.

Figure 5.5.2.4 – 1 shows the structure of a six-segment RSS Expanded Symbol. RSS Expanded Symbols contain a check character, 3 to 21 data characters and 2 to 11 finder patterns, depending on the symbol length. RSS Expanded is capable of being scanned in separate segments, each segment consisting of a data character or check character and the adjacent finder pattern. The check character encodes a modulo 211 check value for data security.

Figure 5.5.2.4 – 1: RSS Expanded Structure



The left and right Guard Bar Patterns consist of a narrow bar and narrow space. RSS Expanded does not require a Quiet Zone.

5.5.2.4.1 RSS Expanded™

The RSS Expanded™ Bar Code Symbol has a variable width (from 4 to 22 symbol characters, or a minimum of 102X wide and a maximum of 534X wide) and is 34X high (where X is the width of a module). The symbol starts with a 1X space and ends with either a 1X bar or space. For example, the RSS Expanded Symbol shown in Figure 5.5.2.4.1 – 1 with an X-dimension of 0.25 mm (0.010 in.) would be 37.75 mm (1.51 in.) wide by 8.5 mm (0.34 in.) high.

Figure 5.5.2.4.1 – 1: RSS Expanded Bar Code Symbol



5.5.2.4.2 RSS Expanded Stacked

The RSS Expanded Stacked Bar Code Symbol is a multi-row stacked version of RSS Expanded™. It can be printed in widths of 2 to 20 segments and can have from 2 to 11 rows. Its structure includes a 3X high separator pattern between rows. It is designed to be read by an omnidirectional scanner such as a retail slot scanner. The RSS Expanded Stacked Symbol shown in Figure 5.5.2.4.2 – 1 with an X-dimension of 0.25 mm (0.010 in.) would be 25.5 mm (1.02 in.) wide by 17.75 mm (0.71 in.) high.

The white space at the end of the second row of the symbol shown in Figure 5.5.2.4.2 – 1 is not part of the symbol and can be used for other purposes, such as text.

Figure 5.5.2.4.2 – 1: RSS Expanded Stacked Bar Code Symbol



RSS Expanded Stacked is used when the symbol area or print mechanism is not wide enough to accommodate the full single-row RSS Expanded Symbol. It is designed for variable weight products, perishable products, traceable retail products, and coupons.

5.5.2.4.3 Compressed Element String Sequences

While RSS Expanded™ Symbols can encode any sequence of Application Identifier (AI) data up to the maximum capacity of the symbol, certain sequences of AI Element Strings have been selected for special compression in RSS Expanded versions. If the application requires the use of the AI Element Strings in one of these sequences and they are used in the predefined sequence, a smaller symbol will result.

The selected sequences are two types: fixed length, where the sequence of selected AI Element Strings is the only data encoded, and open-ended, where the sequence occurs at the start of the symbol's data, and other AI Element Strings may be added following the sequence. If the data to be encoded in an RSS Expanded Symbol starts with a sequence defined as fixed length but is followed by additional AI Element Strings, all the data will be encoded normally without special compression.

5.5.2.4.3.1 Fixed-Length Sequences

5.5.2.4.3.1.1 AI (01) and Weight with Limited Range

This sequence consists of the two Application Identifier (AI) Element Strings AI (01), followed by AI (3103), AI (3202), or AI (3203) for weight. The AI (01) Element String must start with an indicator value of 9 for variable measure. Using AI (3103) (weight in grams), the special compression can only be applied up to a maximum weight of 32.767 kg. Using AI (3202) (weight in 0.01 lbs.) the special compression can only be applied up to a maximum weight of 99.99 lbs. Using AI (3203) (weight in 0.001 lbs.) the special compression can only be applied up to a maximum weight of 22.767 lbs. If the weight is in excess of these values, the sequence defined in Section 5.5.2.4.3.1.2 still enables special compression to be performed.

5.5.2.4.3.1.2 AI (01): Weight and Optional Date

This sequence consists of the two or three Application Identifier (AI) Element Strings AI (01), AI (310n), or (320n) for weight (n ranging from 0 to 9) and optionally AI (11), AI (13), AI (15), or AI (17) for date. The AI (01) Element String must start with an indicator value of 9 for variable measure. If the date is not needed, this sequence still gives additional compression when the weight is outside the ranges required by the AI (01) and weight with limited range sequence above.

5.5.2.4.3.2 Open-Ended Sequences

5.5.2.4.3.2.1 AI (01) and Price

This sequence consists of the two Application Identifier (AI) Element Strings, AI (01), followed by AI (392x) for price or AI (393x) for price with ISO currency code (where x is in the range of 0 to 3). The AI (01) Element String must start with an indicator value of 9 for variable measure. For example, this sequence is used for an AI (01) Element String, price and weight, because the fixed-length sequence AI (01) and weight does not give additional compression if the AI Element String for price is added to the end since the length of the sequence is fixed.

5.5.2.4.3.2.2 AI (01)

Any sequence that starts with Application Identifier (AI) (01) will have special compression applied to the AI (01). So when the data includes AI (01), it should always be the first Element String encoded.

5.5.2.5 Human Readable Interpretation in RSS Symbols

The Human Readable Interpretation of data in a bar code must be shown below the bar code symbol.

The precise location of the human readable characters and the font used to represent them are not specified for the Reduced Space Symbolology® (RSS) Symbol. However, characters should be clearly legible (such as OCR-B) and must be obviously associated with the symbol.

Application Identifiers (AIs) should be clearly recognisable to facilitate key entry. This is achieved by putting the AI between parentheses in the Human Readable Interpretation.

Note: The parentheses are not part of the data and are not encoded in the bar code symbol, following the same principle that applies to UCC/EAN-128 Symbols.

As an option, the data title (see [Section 3.A.4](#)) may be associated with the data instead of using the AI numbers.

Figure 5.5.2.5 – 1 shows the weight and price identified with text.

Figure 5.5.2.5 – 1: The Human Readable Interpretation



5.5.2.6 Data Transmission and Symbology Identifier Prefixes

5.5.2.6.1 Default Transmission Mode

The EAN.UCC System requires the use of Symbology Identifiers. Reduced Space Symbology® (RSS) family symbols are normally transmitted using Symbology Identifier prefix "je0" (see [Section 5.0.3](#)). For example, an RSS Symbol encoding AI (01) Element String 10012345678902 produces the transmitted data string "je00110012345678902." Data transmission follows the same principles that apply to the concatenation of AI Element Strings from UCC/EAN-128 Symbols.

If a 2D Composite Component™ accompanies a RSS family linear symbol, the AI Element String data from the 2D Composite Component immediately follows the linear component's data. However, readers have an option to transmit only the linear component data and ignore the 2D Composite Component.

5.5.2.6.2 UCC/EAN-128 Symbol Emulation Mode

Readers also have an option for UCC/EAN-128 Symbol emulation mode. This mode emulates the UCC/EAN-128 Symbology for data transmission. This mode is used for applications programmed for UCC/EAN-128 but not yet programmed to recognise the Symbology Identifier prefix "je0." The Symbology Identifier for UCC/EAN-128 emulation mode is "jC1." RSS Expanded™ Symbols that exceed 48 data characters are transmitted as two messages so as not to exceed the maximum UCC/EAN-128 Symbol message length. Each of the two messages has a Symbology Identifier prefix of "jC1" and does not exceed 48 data characters. The two messages are split at a boundary between two Element Strings. This mode is inferior to the normal transmission mode as message integrity may be lost when a message is split.

5.5.2.7 Width of a Module (X)

The range of the X-dimension will be defined by the application specification, having due regard to the availability of equipment for the production and reading of symbols and complying with the general requirements of the application.

The X-dimension shall be constant throughout a given symbol.

5.5.2.8 Print Quality Grade

The International Standard *ISO/IEC 15416 Automatic identification and data capture techniques – Bar code print quality test specification – Linear symbols* methodology should be used for measuring and grading the Reduced Space Symbology® (RSS) family of symbols. The *ISO/IEC 15416* print quality specification is functionally identical to the older ANSI and CEN print quality specifications. The print quality grade is measured by verifiers that comply with the standard. The grade includes a grade level, measuring aperture, and the wavelength of light used for the measurement.

The minimum quality grade for RSS Symbols is:

1,5 / 6 / 670

where

- 1,5 is the overall symbol quality grade.
- 6 is the measuring aperture reference number (corresponding to an 0.15 mm or 0.006 in. diameter aperture).
- 670 is the peak response wavelength in nanometres.

In addition to the minimum print quality grade, all elements in the row separator patterns should be visually distinguishable.

5.5.2.9 Advice for Selecting the Symbology

Any use of Reduced Space Symbology® (RSS) should comply with EAN.UCC System global application guidelines. RSS is not meant to replace other EAN.UCC System Symbologies. Existing applications that are satisfactorily utilising EAN/UPC Symbols, ITF-14 Symbols, or UCC/EAN-128 Symbols should continue to use them.

Note: Scanning systems that need to read RSS Symbols must be appropriately programmed.

If RSS is used on items that will be read by omnidirectional slot scanners, then RSS-14™, RSS-14 Stacked Omnidirectional, RSS Expanded™, or RSS Expanded Stacked should be used. If only an AI (01) is to be encoded, then RSS-14 or RSS-14 Stacked Omnidirectional should be used. The selection of one or the other depends on the aspect ratio of the area available for the symbol.

If supplementary Application Identifier (AI) Element Strings are required or the primary identification has an AI other than AI (01), then RSS Expanded or RSS Expanded Stacked must be used. The selection of one or the other depends on the width of the print head or the area available for the symbol.

If RSS is used on small items that do not need omnidirectional scanning capability, then RSS-14 Stacked, RSS Limited™, or RSS-14 Truncated should be used. RSS Limited cannot be used to encode an EAN/UCC-14 number structure with an indicator value greater than 1. Otherwise RSS-14 or RSS-14 Stacked must be used. RSS-14 Stacked is the smallest symbol; however as the heights of both rows are very low, it is harder to scan and cannot be used with wand scanners. If space is

available, RSS Limited can be used for number structures that it can encode. Otherwise RSS-14 Truncated should be used for EAN/UCC-14 Data Structures with an indicator value greater than 1.

If the symbol is an RSS Composite Symbol, then using a wider RSS Symbol such as RSS-14 Truncated instead of RSS Limited may be preferable because the wider companion 2D Composite Component™ may result in an RSS Composite Symbol of lower overall height even though the RSS component itself is slightly taller.

If the data capacity in a two-column or three-column CC-B 2D Composite Component is inadequate to encode the required 2D component's data message, then the linear component can be changed to increase the number of columns of the companion CC-B component. This will increase the maximum data capacity of the CC-B component as shown in Figure 5.5.2.9 – 1.

Figure 5.5.2.9 – 1: Data Capacity of CC-B

Number of CC-B Columns	Used with	Maximum Numeric Characters	Maximum Alpha Characters
2	RSS-14 Stacked RSS-14 Stacked Omnidirectional	95	55
3	RSS Limited	219	127
4	RSS-14 RSS Expanded RSS Expanded Stacked	338	196

5.5.3 EAN.UCC Composite Symbology®

5.5.3.1 EAN.UCC Composite Symbology® Introduction

The EAN.UCC Composite Symbology® integrates both an EAN.UCC System linear symbol and a 2D Composite Component™ as a single symbology. There are three types of EAN.UCC Composite Symbols A, B and C, each with different encoding rules. The encoder model is designed to automatically select the appropriate type and optimise.

The linear component encodes the item's primary identification. The adjacent 2D Composite Component encodes supplementary data, such as a batch number and expiration date. The EAN.UCC Composite Symbol always includes a linear component so that the primary identification is readable by all scanning technologies. The EAN.UCC Composite Symbol always includes a multi-row 2D Composite Component that can be read with linear- and area-CCD scanners, and with linear and rastering laser scanners.

The EAN.UCC Composite Symbology is described in the Automatic Identification Manufacturers, Inc. *AIM ITS 99-002 - International Symbology Specification - EAN.UCC Composite Symbology*.

5.5.3.1.1 EAN.UCC Composite Symbology® Characteristics

The characteristics of the EAN.UCC Composite Symbology® are:

- Encodable character set:

– Linear components:

- EAN/UPC Symbol, RSS-14™ Symbol versions, and RSS Limited™ Symbol: digits 0 through 9
- UCC/EAN-128 Symbol and RSS Expanded™ Symbol: a subset of Table 1 of the International Standard ISO/IEC 646, consisting of the uppercase and lowercase letters, digits, spaces, and 20 selected punctuation characters in addition to the Function 1 Character (FNC1)

– 2D Composite Components™:

- All types: UCC/EAN-128 Symbols and RSS Expanded Symbols together with the symbol separator character
- Additionally, for CC-B and CC-C: 2D Composite Component escape character
- Symbol character structure: Various (n,k) symbol characters are used in accordance with the underlying symbology of the selected linear and 2D Composite Components of the symbol.
- Code type:
 - Linear component: continuous, linear bar code symbology
 - 2D Composite Component: continuous, multi-row bar code symbology
- Maximum numeric data capacity:
 - Linear component:
 - UCC/EAN-128 Symbol: up to 48 digits
 - EAN/UPC Symbol: 8, 12, or 13 digits
 - RSS Expanded Symbol: up to 74 digits
 - Other RSS Symbols: 16 digits
 - 2D Composite Component:
 - CC-A: up to 56 digits
 - CC-B: up to 338 digits
 - CC-C: up to 2,361 digits

- Error detection and correction:
 - Linear component: a modulo check value for error detection
 - 2D Composite Component: a fixed or variable number of Reed-Solomon error correction codewords, depending upon the specific 2D Composite Component
- Character self-checking
- Bi-directionally decodable

5.5.3.1.2 Additional Features

The following is a summary of additional EAN.UCC Composite Symbology® features:

- Data compaction: The 2D Composite Components™ utilise a bit-oriented compaction mode designed to encode data efficiently using Application Identifiers (AIs).
- Component linkage: The 2D Composite Component of each EAN.UCC Composite Symbol contains a linkage flag, which indicates to the reader that no data shall be transmitted unless the associated linear component is also scanned and decoded. All linear components except EAN/UPC Symbols also contain an explicit linkage flag.
- UCC/EAN-128 Symbol emulation: Readers set to the UCC/EAN-128 Symbol emulation mode transmit the data encoded within the EAN.UCC Composite Symbol as if the data were encoded in one or more UCC/EAN-128 Symbols.
- A symbol separator character: a flag character to support future applications that instructs the reader to terminate transmission of the message at that point and to transmit the remaining data as a separate message
- 2D Composite Component escape mechanism: a mechanism to support future applications that require data content beyond the ISO 646 subset encodable in the standard form of the EAN.UCC Composite Symbology

5.5.3.2 Symbol Structure

Each EAN.UCC Composite Symbol consists of a linear component and a multi-row 2D Composite Component™. The 2D Composite Component is printed above the linear component. The two components are separated by a separator pattern. Up to 3X of light space is permitted between the separator pattern and 2D Composite Component to facilitate printing the two components separately; however, if the two components are printed at one time, the nominal alignment should be followed as shown in Figure 5.5.3.2 – 1.

Figure 5.5.3.2 – 1: RSS Limited Composite Symbol with CC-A



(01)13112345678906(17)010615(10)A123456

In Figure 5.5.3.2 – 1, the AI (01) Global Trade Item Number™ (GTIN™) is encoded in the RSS Limited™ linear component. The AI (17) expiration date and the AI (10) lot number are encoded in the CC-A 2D Composite Component.

The linear component is one of the following:

- A member of the EAN/UPC Symbology (EAN-13, EAN-8, UPC-A, or UPC-E)
- A member of the Reduced Space Symbology® (RSS) family
- A UCC/EAN-128 Symbol

The choice of linear component determines the name of the EAN.UCC Composite Symbol, such as an EAN-13 Composite Symbol, or a UCC/EAN-128 Composite Symbol.

The 2D Composite Component (abbreviated as CC) is chosen based on the selected linear component and on the amount of supplementary data to be encoded. The three 2D Composite Components, listed in order of increasing maximum data capacity, are:

- CC-A: a variant of MicroPDF417
- CC-B: a MicroPDF417 symbol with new encoding rules
- CC-C: a PDF417 symbol with new encoding rules

Figure 5.5.3.2 – 2: UCC/EAN-128 Composite Symbol with CC-C



(01)03812345678908(10)ABCD123456(410)3898765432108

In Figure 5.5.3.2 – 2, the AI (01) GTIN is encoded in the UCC/EAN-128 Symbol linear component. The AI (10) lot number and the AI (410) ship-to location are encoded in the CC-C 2D Composite Component.

Based upon the width of the linear component, a choice of “best-fit” 2D Composite Component is specified. Figure 5.5.3.2 – 3 lists all of the permissible combinations.

Figure 5.5.3.2 – 3: Permissible Combinations of Linear and 2D Composite Components

Linear Component	CC-A/CC-B	CC-C
UPC-A and EAN-13	Yes (4-columns)	No
EAN-8	Yes (3-columns)	No
UPC-E	Yes (2-columns)	No
UCC/EAN-128	Yes (4-columns)	Yes (variable width)
RSS-14™ and RSS-14 Truncated	Yes (4-columns)	No
RSS-14 Stacked and RSS-14 Stacked Omnidirectional	Yes (2-columns)	No
RSS Limited	Yes (3-columns)	No
RSS Expanded™ and RSS Expanded Stacked	Yes (4-columns)	No

5.5.3.2.1 CC-A Structure

CC-A is a variant of MicroPDF417 with a unique combination of row address patterns (RAP). It is the smallest of the 2D Composite Components™ and can encode up to 56 digits. It has from 3 to 12 rows and 2 to 4 columns.

Each row is a minimum of 2X high (where X is the width of a module, narrow bar or space). A 1X high minimum separator pattern is positioned between the linear component and 2D Composite Component. (A different separator pattern, 6X high, is used in EAN.UCC Composite Symbols with EAN/UPC linear components).

Each column contains one $n,k = 17,4$ data or error correction character (codeword) per row (n is the number of modules, and k is the number of bars and also the number of spaces). So the width of a codeword is 17X.

In addition to the codeword columns, CC-A has two or three $n,k = 10,3$ RAP columns that encode the row numbers (each 10X wide). The rightmost RAP column is terminated on the right by a 1X bar so it is 11X instead of 10X wide.

Each row also requires a 1X Quiet Zone at each end. There is no Quiet Zone required above CC-A. The separator pattern is printed directly above the linear component and no Quiet Zone is required below the CC-A.

The two-column and three-column CC-A versions have two RAP columns, and the four-column CC-A version has three RAP columns, as shown in Figure 5.5.3.2.1 – 1.

Figure 5.5.3.2.1 – 1: CC-A Column Structures

Two-Column CC-A Structure

Quiet Zone	RAP Column	Codeword Column	Codeword Column	RAP Column	Quiet Zone

Three-Column CC-A Structure

Quiet Zone	Codeword Column	RAP Column	Codeword Column	Codeword Column	RAP Column	Quiet Zone

Four-Column CC-A Structure

Quiet Zone	RAP Column	Codeword Column	Codeword Column	RAP Column	Codeword Column	Codeword Column	RAP Column	Quiet Zone

Figure 5.5.3.2.1 – 2 lists all possible column and row combinations for CC-A. It also shows the capacity and size of the 2D Composite Components. For example, a two-column, five-row CC-A would be 57X wide (including 1X for the extra right-most guard bar) by 10X high (not including the separator pattern). With an X-dimension of 0.25 mm (0.010 in.), it would be 14.25 mm (0.57 in.) wide by 2.50 mm (0.10 in.) high.

Figure 5.5.3.2.1 – 2: CC-A Row and Column Sizes

Number of Data Columns (c)	Number of Rows (r)	Total CWs in Data Region	Number of EC CWs (k)	Percent of CWs for EC	Number of CWs for Data	Max Alpha Chars	Max Digits	Component Width, in X (see Note 1)	Component Height, in X (see Note 2)
2	5	10	4	40.00%	6	8	16	57	10
2	6	12	4	33.33%	8	12	22	57	12
2	7	14	5	35.71%	9	13	24	57	14
2	8	16	5	31.25%	11	17	30	57	16
2	9	18	6	33.33%	12	18	33	57	18
2	10	20	6	30.00%	14	22	39	57	20
2	12	24	7	29.17%	17	26	47	57	24
3	4	12	4	33.33%	8	12	22	74	8
3	5	15	5	33.33%	10	15	27	74	10
3	6	18	6	33.33%	12	18	33	74	12
3	7	21	7	33.33%	14	22	39	74	14
3	8	24	7	29.17%	17	26	47	74	16
4	3	12	4	33.33%	8	12	22	101	6
4	4	16	5	31.25%	11	17	30	101	8
4	5	20	6	30.00%	14	22	39	101	10
4	6	24	7	29.17%	17	26	47	101	12
4	7	28	8	28.57%	20	31	56	101	14

CW = Codeword; EC = Error Correction

Note 1: Includes a 1X Quiet Zone on each side

Note 2: Assumes row height = 2X; does not include separator pattern

5.5.3.2.2 CC-B Structure

CC-B is a MicroPDF417 symbol uniquely identified by the codeword 920 as the first codeword in the symbol. Encoding systems normally automatically select CC-B when the data to be encoded exceeds the capacity of CC-A. CC-B can encode up to 338 digits. It has from 10 to 44 rows and 2 to 4 columns.

Each row is a minimum of 2X high (where X is the width of a module, narrow bar or space). A 1X high minimum separator pattern is positioned between the linear component and 2D Composite Component™. (A different separator pattern, 6X high, is used in EAN.UCC Composite Symbols with EAN/UPC linear components).

Each column contains one n,k = 17,4 data or error correction character (codeword) per row (where n is the number of modules, and k is the number of bars and also the number of spaces). So the width of a codeword is 17X.

In addition to the codeword columns, CC-B has two or three n,k = 10,3 row address pattern (RAP) columns that encode the row numbers (each 10X wide). The rightmost RAP column is terminated on the right by a 1X bar, so it is 11X instead of 10X wide.

Each row also requires a 1X Quiet Zone on each end. There is no Quiet Zone required above CC-B. The separator pattern is printed directly above the linear component and no Quiet Zone is required below the CC-B.

The two-column CC-B version has two RAP columns and the three- and four-column CC-B versions have three RAP columns, as shown in Figure 5.5.3.2.2 – 1.

Figure 5.5.3.2.2 – 1: CC-B Column Structures

Two-Column CC-B Structure

RAP Column	Codeword Column	Codeword Column	RAP Column

Three-Column CC-B Structure

RAP Column	Codeword Column	RAP Column	Codeword Column	Codeword Column	RAP Column

Four-Column CC-B Structure

RAP Column	Codeword Column	Codeword Column	RAP Column	Codeword Column	Codeword Column	RAP Column

CC-B differs from CC-A in the three-column structure in that CC-B has a third RAP column on the left end that is missing in CC-A.

Figure 5.5.3.2.2 – 2 lists all the possible column and row combinations for CC-B. It also shows the capacity and size of the 2D Composite Components. For example a four-column, 10-row CC-B would be 101X wide by 20X high (not including the separator pattern). With an X-dimension of 0.25 mm (0.010 in.), it would be 25.25 mm (1.01 in.) wide by 5.00 mm (0.20 in.) high.

Figure 5.5.3.2.2 – 2: CC-B Row and Column Sizes

Number of Data Columns (c)	Number of Rows (r)	Total CWs in Data Region	Number of EC CWs (k)	Percent of CWs for EC	Number of non-EC CWs	Number of CWs for Data (Note 1)	Max Alpha chars	Max Digits	CC-B Width, in X (see Note 2)	CC-B Height, in X (see Note 3)
2	17	34	10	29	24	22	34	59	57	34
2	20	40	11	28	29	27	42	73	57	40
2	23	46	13	28	33	31	48	84	57	46
2	26	52	15	29	37	35	55	96	57	52
3	15	45	21	47	24	22	34	59	84	30
3	20	60	26	43	34	32	50	86	84	40
3	26	78	32	41	46	44	68	118	84	52

3	32	96	38	40	58	56	88	153	84	64
3	38	114	44	39	70	68	107	185	84	76
3	44	132	50	38	82	80	127	219	84	88
4	10	40	16	40	24	22	34	59	101	20
4	12	48	18	38	30	28	43	75	101	24
4	15	60	21	35	39	37	58	100	101	30
4	20	80	26	33	54	52	82	141	101	40
4	26	104	32	31	72	70	111	192	101	52
4	32	128	38	30	90	88	139	240	101	64
4	38	152	44	29	108	106	168	290	101	76
4	44	176	50	28	126	124	196	338	101	88

CW = Codeword; EC = Error correction

Note 1: Excludes EC codewords and 2 codewords to define CC-B encodation

Note 2: Including 1X Quiet Zones on either side

Note 3: Assumes Y = 2X; does not include separator pattern

5.5.3.2.3 CC-C Structure

CC-C is a PDF417 symbol uniquely identified by the codeword 920 as the first codeword in the symbol following the symbol length descriptor. CC-C can be used as a 2D Composite Component™ within a UCC/EAN-128 Composite Symbol. It has the greatest data capacity of the EAN.UCC Composite Symbols, encoding up to 2,361 digits. It has from 3 to 30 rows and 1 to 30 data/EC codeword columns.

Each row is a minimum of 3X high (where X is the width of a module, narrow bar or space). A 1X high minimum separator pattern is positioned between the linear component and 2D Composite Component.

Each column contains one $n,k = 17,4$ data or error correction character (codeword) per row (where n is the number of modules, and k is the number of bars and also the number of spaces). So the width of a data/EC codeword is 17X.

In addition to the codeword columns, CC-C has two $17,4$ row indicator columns, a 17X wide start pattern, and a 18X wide stop pattern as illustrated in Figure 5.5.3.2.3 – 1.

Each row also requires a 2X Quiet Zone on each end. There is no Quiet Zone required above CC-C. The separator pattern is printed directly above the linear component, and no Quiet Zone is required below the CC-C.

Figure 5.5.3.2.3 – 1: CC-C Row Structure

Start Pattern	Left Row Indicator Column	1 to 30 Data/EC Codeword Columns	Right Row Indicator Column	Stop Pattern

CC-C is normally printed with the number of columns that will result in a width nearly matching the width of the UCC/EAN-128 Symbol linear component. However, as an option, the user may specify a wider CC-C to be printed. This reduces the height of the 2D Composite Component. A lower EAN.UCC Composite Symbol may be needed to fit in a height-restricted application. A wider CC-C may also be required if the amount of data would not fit in the default width CC-C.

5.5.3.2.4 Special Compressed Element String Sequences

While 2D Composite Components™ can encode any sequence of Application Identifier (AI) Element Strings up to the maximum capacity of the component, certain sequences of AI Element Strings have been selected for special compression in 2D Composite Component Symbols. If the application requires the use of the AI Element Strings in one of these sequences, and they are used in the predefined sequence, a smaller symbol will result.

For special compression to be performed, the AI Element String sequence must occur at the start of the 2D Composite Component's data. Other AI Element Strings may be added following the sequence.

The AI Element Strings selected for special compression are:

- Production date and lot number: AI (11) production date followed by AI (10) lot number
- Expiration date and lot number: AI (17) expiration date followed by AI (10) lot number
- AI (90): AI (90) followed by the Element String data starting with an alphabetic character and a digit; AI (90) may be used to encode data identifier data; the AI (90) followed by data in the data identifier format has special compression applied only if it is the start of the first Element String.

5.5.3.3 Human Readable Interpretation in Composite Symbols

The Human Readable Interpretation of the linear component of the EAN.UCC Composite Symbol must be shown below the linear component. If there is a Human Readable Interpretation of the 2D Composite Component™, there is no required location, but it should be close to the EAN.UCC Composite Symbol.

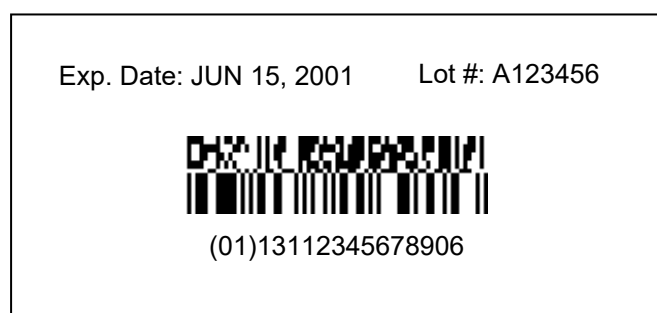
The precise location of the human readable characters and the font used to represent them are not specified for EAN.UCC Composite Symbols. However, the characters should be clearly legible (such as OCR-B) and must be obviously associated with the symbol.

Application Identifiers (AIs) should be clearly recognisable to facilitate key entry. This is achieved by putting the AI between parentheses in the Human Readable Interpretation.

Note: The parentheses are not part of the data and are not encoded in the bar code symbol, following exactly the same principle that applies to UCC/EAN 128 Symbols.

As an option, the data title (see [Section 3.A.4](#)) may be associated with the data instead of using AIs. Figure 5.5.3.3. – 1 shows the expiration date and lot number identified with text. This can be compared with [Figure 5.5.3.2 – 1](#), where the same data is shown using the all-AI format.

Figure 5.5.3.3. –1: The Human Readable Interpretation



For EAN.UCC Composite Symbols encoding a large amount of data, it may not be practical to display all the data in Human Readable Interpretation form or, even if there is space to show it in this form, it may not be practical to key enter that much data. In these instances, some of the data may be omitted from the Human Readable Interpretation. However, primary identification data such as the Global Trade Item Number™ (GTIN™) and Serial Shipping Container Code (SSCC) must always be shown. Application specifications provide guidance on Human Readable Interpretation.

5.5.3.4 Data Transmission and Symbology Identifier Prefixes

5.5.3.4.1 Default Transmission Mode

The EAN.UCC System requires the use of Symbology Identifiers. EAN.UCC Composite Symbols are normally transmitted using Symbology Identifier prefix “je0,” with the data from the 2D Composite Component™ directly appended to that of the linear component. For example, an EAN.UCC Composite Symbol encoding (01)10012345678902(10)ABC123 produces the data string “je0011001234567890210ABC123” (note that the Symbology Identifier prefix “je0” is different from the Symbology Identifier prefix “JE0,” which has an uppercase “E” and is used for standard EAN/UPC Symbols). However, readers have an option to transmit only the linear component data and ignore the 2D Composite Component.

Data transmission follows the same principles that apply to the concatenation of Application Identifier (AI) Element Strings from UCC/EAN-128 Symbols. If the linear component data ends with a variable length AI Element String, an ASCII 29 character (Gs) is inserted between it and the first character of the data from the 2D Composite Component.

5.5.3.4.2 UCC/EAN-128 Symbol Transmission Mode

Readers also have an option for UCC/EAN-128 Symbol emulation mode. This mode emulates the UCC/EAN-128 Symbology for data transmission. It can be used for applications programmed for UCC/EAN-128 Symbols but not yet programmed to recognise the Symbology Identifier prefix “je0.” The Symbology Identifier for UCC/EAN-128 Symbol emulation mode is “jC1.” EAN.UCC Composite Symbols that exceed 48 data characters are transmitted as two or more messages so as not to exceed the maximum UCC/EAN-128 Symbol message length. Each of the messages has a Symbology Identifier prefix of “jC1” and does not exceed 48 data characters. The messages are split at boundaries between Element Strings. This mode is inferior to the normal transmission mode as message integrity may be lost when a message is split into multiple messages.

5.5.3.4.3 Symbol Separator Character

The 2D Composite Component™ can encode symbol separator characters as defined in the decoder. This character instructs the reader to terminate the current EAN.UCC Composite Symbol’s data message and transmit the data following the symbol separator as a separate message. This new message will have the Symbology Identifier prefix of “je1.” This feature will be used for future EAN.UCC System applications such as encoding the mixed contents of a logistical container.

5.5.3.4.4 2D Composite Component™ Escape Mechanism

The CC-B and CC-C also can encode 2D Composite Component™ escape mechanism codewords. These instruct the reader to terminate the current EAN.UCC Composite Symbol’s data message and transmit the data following the escape mechanism codeword as a separate message. This new

message has the Symbology Identifier prefix of “]e2” for standard data message or “]e3” if the data message includes an ECI codeword. The codewords following the escape mechanism codeword are encoded and decoded using the standard PDF417 encoding defined in *ISO/IEC 15438 – Automatic identification and data capture techniques - Symbology specification - PDF417*. This feature is used for future EAN.UCC System applications that require characters beyond the ISO 646 character subset defined for Application Identifier (AI) Element String data.

5.5.3.5 Width of a Module (X)

The X-dimension of the 2D Composite Component™ must be the same as that of the associated linear component. Refer to the linear component's X-dimension requirements.

5.5.3.6 Print Quality

The print quality assessment methodology defined in the International Standard *ISO/IEC 15416* should be used for measuring and grading the linear components. The ISO print quality specification is functionally identical to the older ANSI and CEN print quality specifications. The print quality grade is measured by verifiers that apply the standard. The print quality grade reported includes a grade level, measuring aperture, and the wavelength of light used for the measurement.

AIM ITS 99-002 – International Symbology Specification - MicroPDF417 and *ISO/IEC 15438 – Automatic identification and data capture techniques - Symbology specification - PDF417* specify the methods for determining the print quality grade of the 2D Composite Components™ CC-A/B and CC-C respectively. An additional grading parameter unused error correction (UEC) is defined in these specifications.

The minimum quality grade for EAN.UCC Composite Symbols is:

$$1,5 / 6 / 670$$

where

- 1,5 is the overall symbol quality grade.
- 6 is the measuring aperture reference number (corresponding to an 0.15 mm or 0.006 in. diameter aperture).
- 670 is the peak response wavelength in nanometres. In addition to the print quality grade, all elements in the separator patterns should be visually distinguishable.

Both the linear component and the 2D Composite Component must independently achieve the minimum print quality grade.

Note: An international standard methodology for quality grading two-dimensional symbologies is under development and may eventually supersede the method defined in the above specifications.

5.5.3.7 Advice for Selecting the Symbology

Any use of the 2D Composite Component™ should comply with EAN.UCC System global application guidelines. The linear component of an EAN.UCC Composite Symbol should be selected according to the application rules defined in the *General EAN.UCC Specifications*, but where a choice of linear components is available for the application, consideration should also be given to the 2D Composite Component options available. A wider linear component will result in a shorter 2D Composite Component and, particularly for CC-B, a higher capacity symbol.

For CC-A and CC-B, the selection of the linear component automatically determines the number of columns of the 2D Composite Component. The selection of CC-A or CC-B is automatically determined by the amount of data to be encoded. CC-A is always used unless the data exceeds its capacity.

When the linear component is a UCC/EAN-128 Symbol, the user may specify CC-A/B or CC-C. CC-A/B will produce a smaller 2D Composite Component. However, CC-C can increase in width to match the width of the UCC/EAN-128 Symbol or be selected to be even wider. This may produce an EAN.UCC Composite Symbol of lower height. CC-C also has a larger data capacity, so it is suitable for applications such as logistics.

5.5.3.8 Sample EAN.UCC Composite Symbols

Figure 5.5.3.8 – 1: EAN-13 Symbol with a Four-Column CC-A Component



Figure 5.5.3.8 – 2: UPC-A Symbol with a Four-Column CC-B Component



Figure 5.5.3.8 – 3: EAN-8 Symbol with a Three-Column CC-A



Figure 5.5.3.8 – 4: UPC-E Symbol with a Two-Column CC-A



Figure 5.5.3.8 – 5: RSS-14™ Symbol with a Four-Column CC-A:



(01)03612345678904(11)990102

Figure 5.5.3.8 – 6: RSS-14 Stacked Symbol with a Two-Column CC-A



(01)03412345678900(17)010200

Figure 5.5.3.8 – 7: RSS Limited™ Symbol with a Three-Column CC-B



(01)03512345678907

Note: The three-column CC-B is wider than the three-column CC-A shown in [Figure 5.5.3.2 – 1](#).

Figure 5.5.3.8 – 8: RSS Expanded™ Symbol with a Four-Column CC-A

(01)93712345678904(3103)001234
(91)1A2B3C4D5E

Figure 5.5.3.8 – 9: UCC/EAN-128 Symbol with a Four-Column CC-A



Section 6.0:

Symbol Placement Guidelines

Table of Contents

6.1.INTRODUCTION.....	4
6.2.GENERAL PLACEMENT PRINCIPLES	4
6.2.1 Number of Symbols	4
6.2.2 Scanning Environment	4
6.2.3 Orientation	5
6.2.3.1 Printing Direction	5
6.2.3.2 Trade Items with Curved Surfaces	5
6.2.3.3 Avoiding Scanning Obstacles.....	6
6.3.GENERAL PLACEMENT GUIDELINES FOR POINT-OF-SALE	6
6.3.1 Number of Symbols	6
6.3.2 Identifying the Back of the Trade Item.....	6
6.3.3 Symbol Placement	6
6.3.3.1 Preferred Placement	6
6.3.3.2 Undesirable Alternative	7
6.3.3.3 Edge Rule.....	7
6.3.3.4 Avoid Truncated Symbols.....	7
6.3.3.5 Bottom Marking.....	7
6.3.3.6 Exceptions to the General Placement Guidelines.....	7
6.3.3.7 Special Packaging Considerations for Bar Code Placement	9
6.3.3.8 Operational Considerations of Bar Code Placement.....	12
6.4.PLACEMENT GUIDELINES FOR SPECIFIC PACKAGE TYPES	13
6.4.1 Bags	15
6.4.2 Blister Packs.....	17

6.4.3	Bottles and Jars	19
6.4.4	Boxes	21
6.4.5	Cans and Cylinders	22
6.4.6	Carded Items.....	24
6.4.7	Egg Cartons	25
6.4.8	Jugs	26
6.4.9	Large, Heavy, or Bulky Items	28
6.4.10	Multipacks.....	32
6.4.11	Publishing Items.....	34
6.4.12	Thin Items or Containers	37
6.4.13	Trays.....	38
6.4.14	Tubes.....	39
6.4.15	Tubs.....	40
6.4.16	Unpackaged Items.....	41
6.5.	SYMBOL PLACEMENT FOR CLOTHING AND FASHION ACCESSORIES.....	43
GENERAL FORMAT GUIDELINES FOR CLOTHING AND FASHION ACCESSORIES.....		64
6.6.1	Information Zones Concept.....	65
6.6.1.1.1	General Label Information Zones	65
6.6.1.2	<i>General Label Format</i>	67
6.6.2	Hangtag (Hanging Label) Format.....	68
6.6.2.1	<i>Hangtag Label Information Zones</i>	68
6.6.2.2	<i>Hanging Tag Label Examples</i>	70
6.6.3	Sewn-On (Joker) Label Format	70
6.6.3.1	<i>Sewn-On (Joker) Label Information Zones</i>	71
6.6.3.2	<i>Sewn-On (Joker) Label Examples</i>	72
6.6.4	Sewn-In Label Formats	73
6.6.4.1	<i>Sewn-In Label Information Zones</i>	73

6.6.5	Plastic Packaged Products Label Location Guidelines	74
6.6.5.1	<i>Plastic Packaged Products Label Information Zones.....</i>	<i>75</i>
6.6.5.2	<i>Plastic Packaged Products Label Placement Guidelines.....</i>	<i>77</i>
6.6.5.3	<i>Plastic Packaged Products Label Example</i>	<i>78</i>
6.6.6	Boxed Products Label Formats	78
6.6.6.1	<i>Boxed Products Label Information Zones</i>	<i>79</i>
6.6.6.2	<i>Box Marking Versus Item Marking.....</i>	<i>81</i>
6.6.6.3	<i>Boxed Products Label Placement Guidelines</i>	<i>81</i>
6.6.6.4	<i>Boxed Products Label Examples.....</i>	<i>82</i>
6.6.7	Banded Products Label Formats	83
6.6.7.1	<i>Banded Products Label Information Zones</i>	<i>84</i>
6.7.	GENERAL PLACEMENT GUIDELINES FOR ITEMS USED IN DISTRIBUTION	86
6.7.1	Symbol Location	86
6.7.1.1	<i>Units Less Than 1 Metre in Height.....</i>	<i>86</i>
6.7.1.2	<i>For Pallets Less Than 1 Metre in Height</i>	<i>88</i>
6.7.1.3	<i>Units Greater Than 1 Metre in Height</i>	<i>88</i>
6.7.2	Shallow Trays and Cases	89
6.7.3	Add-On Symbols	91
6.A.1	APPENDIX 1: GENERAL RULES FOR CURVED SURFACES	92
6.7.4		92

6.1. INTRODUCTION

This section includes guidelines for the placement of bar code symbols on packages and containers. It gives the general principles that apply, mandatory rules, and recommendations for symbol placement on specific packaging and container types.

Consistency of symbol placement is critical to successful scanning. With manual scanning, variation of symbol placement makes it difficult for the scanning operator to predict where the symbol is located, and this reduces efficiency. With automated scanning, the symbol must be positioned so that it will pass through the field of vision of a fixed scanner as it travels past. Respecting the guidance in this section will result in the consistency and predictability required.

The guidelines in this global specification replace previous local recommendations; however, manufacturers should not scrap packaging that has been printed according to a previous guidance. When packaging is redesigned, the global specifications in this document should be observed.

If government regulatory guidelines are inconsistent with those in this manual, the government guidelines should always take precedence.

Note: Bar code symbols in this guideline that are used as examples are FPO Symbols (For Position Only) and are not intended to denote correct symbol type, size, colour, or quality.

6.2. GENERAL PLACEMENT PRINCIPLES

The following general principles for bar code symbol placement should be considered for any package type, whether it is scanned at the Point-of-Sale or elsewhere in the supply chain. Trade items intended to be scanned at a Point-of-Sale must be marked with an EAN-13, UPC-A, EAN-8*, or UPC-E* Bar Code Symbol. The bar code symbols that are scanned elsewhere are the EAN-13, UPC-A, ITF-14, and UCC/EAN-128 Bar Code Symbols.

*EAN-8 and UPC-E Bar Code Symbols are intended for use on very small trade items sold at the Point-of-Sale.

6.2.1 Number of Symbols

Bar code symbols representing different Global Trade Item Numbers™ (GTINs™) must never be visible on any one item. Although a minimum of one is required, two symbols representing the same GTIN are recommended on trade items for scanning in warehousing or General Distribution Scanning environments (see [Section 6.7](#)). Two or more symbols representing the same GTIN are recommended on heavy or bulky items for Point-of-Sale (see [Section 6.4.9](#)) and are permissible on random wraps intended for Point-of-Sale (see [Section 6.3.3.6](#)).

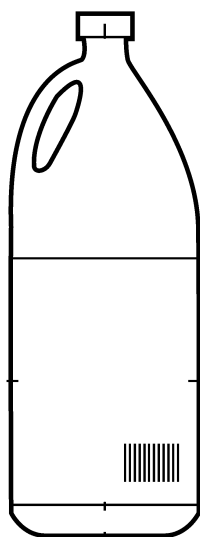
6.2.2 Scanning Environment

Before considering the package type, determine whether the item will be scanned in a Point-of-Sale or a General Distribution Scanning environment. If the item is scanned at a Point-of-Sale only, the bar code symbol placement guidelines in [Sections 6.4](#) and [6.5](#) apply. However, if the item is scanned in both a Point-of-Sale and General Distribution Scanning environment or in a General Distribution Scanning environment only, the requirements in [Section 6.7](#) take precedence.

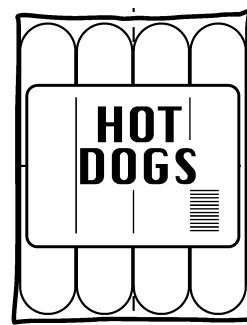
6.2.3 Orientation

Bar code symbol orientation is determined primarily by the print process and any curvature of the item. If the printing process and curvature allow, the preferred placement is Picket Fence Orientation rather than Ladder Orientation; that is, the bars of the bar code symbol should be perpendicular to the surface on which the package stands in its normal display position. On a Picket Fence Orientation Bar Code Symbol, the Human Readable Characters beneath the symbol should read from left to right. The text and orientation of the Ladder Orientation Bar Code Symbol can be read either from the top down, or from the bottom up, whichever is consistent with other text and graphics on the container. Empirical data has demonstrated that it makes no difference to the scanning process one way or the other. Rules for positioning bar code symbols on curved surfaces are given in [Section 6.A.1](#).

Figure 6.2.3 – 1



Picket Fence
Orientation



Ladder
Orientation

6.2.3.1 Printing Direction

Bar code orientation is often determined by the printing process. Some printing processes give much higher quality results if the bars of the symbol run in the direction of print, also known as the web direction. The printing company should always be consulted.

6.2.3.2 Trade Items with Curved Surfaces

When a bar code symbol is printed onto a curved surface it is sometimes possible for the extremes of the symbol to disappear around the curve, so that both ends cannot be visible to the scanner at the same time. This is more likely to occur the bigger the symbol and the tighter the curve of the packaging. There are certain combinations of X-dimension and diameter of curved surface in which the bars must be printed around the curve (e.g., in Ladder Orientation on a can, in Picket Fence Orientation on a cylindrical packet of biscuits). The effect of this is to ensure that the curve results in an apparent loss of height of the bars rather than the more serious apparent loss of complete bars.

The angle between the tangent to the centre of the curved symbol and the tangent to the extremity of the curved symbol (outer edge of the guard bars for symbols in the EAN/UPC Symbology family) must be less than 30°. If this angle is more than 30°, the symbol must be oriented such that the bars are perpendicular to the generating lines of the surface of the item. See [Section 6.A.1](#).

6.2.3.3 Avoiding Scanning Obstacles

Anything that will obscure or damage a bar code symbol will reduce scanning performance and should be avoided. For example:

- Never position the bar code symbol on the item in an area with inadequate space. Do not let the other graphics encroach on the space for the bar code.
- Never place bar code symbols, including Quiet Zones, on perforations, die-cuts, seams, ridges, edges, tight curves, folds, flaps, overlaps, and rough textures.
- Never put staples through a bar code symbol or its Quiet Zones.
- Never fold a symbol around a corner.
- Never place a symbol under a package flap.

6.3. GENERAL PLACEMENT GUIDELINES FOR POINT-OF-SALE

This section outlines the guidelines for bar code symbol placement on trade items that will be scanned at the Point-of-Sale. For detailed information on specific package types, see Sections [6.4](#) and [6.5](#). [Section 6.7](#) outlines the guidelines for bar code symbol placement on trade items that will be scanned in warehousing or General Distribution Scanning environments.

6.3.1 Number of Symbols

Only one bar code symbol should be visible on a trade item intended for the Point-of-Sale. Exceptions include large or bulky items (see [Section 6.4.9](#)) and random or unregistered wrapping (see [Section 6.3.3.6](#)).

Trade items should never have more than one bar code symbol carrying a single Global Trade Item Number™ (GTIN™) visible. At the Point-of-Sale, this is particularly relevant to multipacks, such as over-wrapped items, sleeved items, and banded items, where the individual inner units carry a different GTIN from that on the outer wrapper or container. The bar code symbols on the inner products must be totally obscured so that they cannot be read by the Point-of-Sale system. (See [Section 6.3.3.6](#) for over-wrap special considerations.)

6.3.2 Identifying the Back of the Trade Item

The front of the trade item is the primary trading/advertising area, which typically displays the product name and the company's logo. The back of the trade item is directly opposite the front and is the preferred placement area for the bar code symbol on most trade items.

6.3.3 Symbol Placement

Information in this section is provided to guide symbol placement when developing packaging for new products and should be adopted if economically feasible when changing the graphics of existing products.

6.3.3.1 Preferred Placement

Preferred bar code symbol placement is on the lower right quadrant of the back, respecting the proper Quiet Zone areas around the bar code symbol and the edge rule (see the Edge Rule in [Section 6.3.3.3](#) and special considerations in [Section 6.3.3.7](#)).

6.3.3.2 Undesirable Alternative

The undesirable alternative placement for a bar code symbol is the lower right quadrant of another side of the container.

6.3.3.3 Edge Rule

The bar code symbol must not be closer than 8 mm (0.3 in.) or farther than 102 mm (4 in.) from any edge of the package/container. Previous guidelines suggested a distance of 5 mm (0.2 in.) as a minimum. Practical experience has shown this to be inadequate. For example, cashiers often grab bags and other trade items on the edge with their thumbs. Avoid placing the bar code symbol too close to the edge. Such placement reduces efficiency at the Point-of-Sale.

6.3.3.4 Avoid Truncated Symbols

Truncation of a bar code symbol is the reduction of the height of a bar code symbol relative to its length. Truncation is not recommended because it destroys the ability of a symbol to be scanned omnidirectionally at the Point-of-Sale. A truncated symbol can only be scanned when the trade item is oriented in particular directions across the scanning beam. Truncation, therefore, reduces checkout efficiency. The more the height of the symbol is reduced, the more critical becomes the alignment of the symbol across the scanning beam. Truncation should be avoided unless absolutely necessary and then the maximum height possible should be printed. See [Section 6.A.1](#) for the relationship between the diameter and X-dimension.

6.3.3.5 Bottom Marking

Bottom marking of the trade item with the bar code symbol continues to be acceptable, except for large, heavy or bulky trade items. However, back (side) marking is preferred.

6.3.3.6 Exceptions to the General Placement Guidelines

Some trade items require special considerations for bar code symbol placement.

- Bags

Settling of the contents usually results in bag edges bulging to the extent that bar code symbols located on the lower right quadrant may not be flat enough to permit successful scanning. For this reason, bar code symbols on bags should be placed in the centre of the back about one third up from the bottom and as far from the edge as possible while respecting the edge rule. (See [Section 6.4.1](#) for more details on bags.)

- Blister packs or unpackaged items

Trade items that cause scanners to read beyond the flat plane include blister packs and unpackaged items (e.g., deep bowls). For these package types, the distance between the scanner window and the bar code symbol on the container or item must be considered. The bar code symbol cannot be closer than 8 mm (0.3 in.) or farther than 102 mm (4 in.) from any edge of the package/container. (See [Section 6.4](#) for more details on blister packs and unpackaged items.)

- Large, heavy, or bulky items

Any package/container weighing more than 13 kg (28 lb.) or having two dimensions greater than 45 cm (18 in.) (width/height, width/depth, or height/depth) is considered a large, heavy, or bulky item. Large, heavy, or bulky items tend to be hard to handle. Large bags require two symbols, one on top and one on the bottom of opposite quadrants of the bag. Large, heavy, or bulky bottles, boxes, cans, jars, jugs, and tubs require only one label. (See [Section 6.4](#) for more details on large, heavy, or bulky items.)

- Thin items or containers

Thin Items or Containers are packages/containers with a dimension less than 3 cm (1 in.) (height, width, or depth). Examples of thin items or containers are packages of pizza, powdered drink mixes, and writing pads. Any placement of the symbol on the edge hinders effective scanning because the symbol is obscured from the cashier and is likely to be truncated. (Refer to [Section 6.4](#) for more details on thin items or containers.)

6.3.3.7 Special Packaging Considerations for Bar Code Placement

Specific packaging methods require special considerations for bar code symbol placement.

- Over-wrap

Trade items to be sold in multiples are mechanically gathered and covered with clear over-wrap material that will carry print. Typical over-wrapped items are small cereal boxes and chocolate bars. Package over-wrap can create two distinct problems:

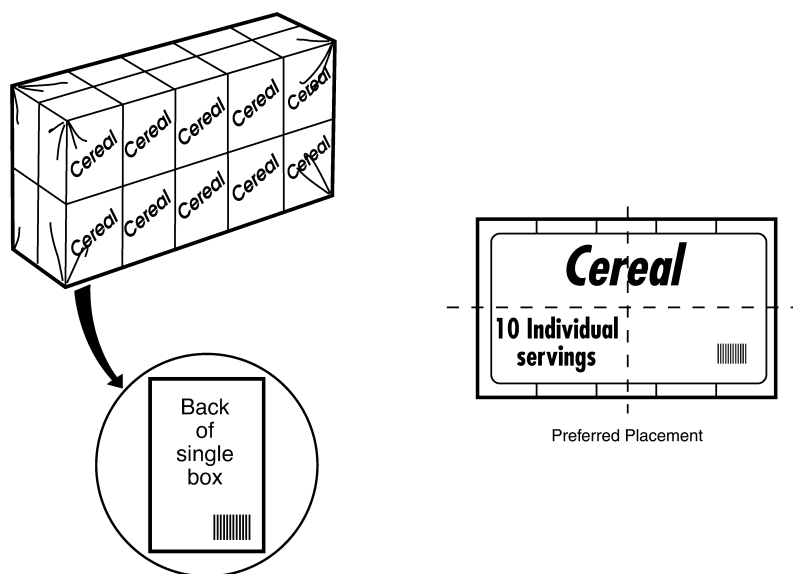
- Obscuring the bar code symbols on individual units inside the multipack is necessary so they are not confused with the outer multipack bar code symbol, which must be different.

- Over-wrapping with such materials as cellophane causes diffraction or reflection of the light beam of the scanner and can reduce contrast, which causes scanning inefficiencies.

To determine proper bar code symbol placement for over-wrapped packaging, follow the guidelines specific to the applicable package type/shape. (Refer to [Section 6.4](#) for details on symbol placement for specific package types.)

Figure 6.3.3.7 – 1

Bar Code Symbol Placement on Over-Wrapped Item



- Random (unregistered) wrap

Some wrappers, like those used on sandpaper or margarine, have a repeating design and are neither cut nor placed on the product such that a particular part of the design always appears in the same location. This is referred to as random or unregistered wrapping. As the wrapper is not registered, it is unlikely that the symbol will appear on one face of the package when the wrapper is placed on the product.

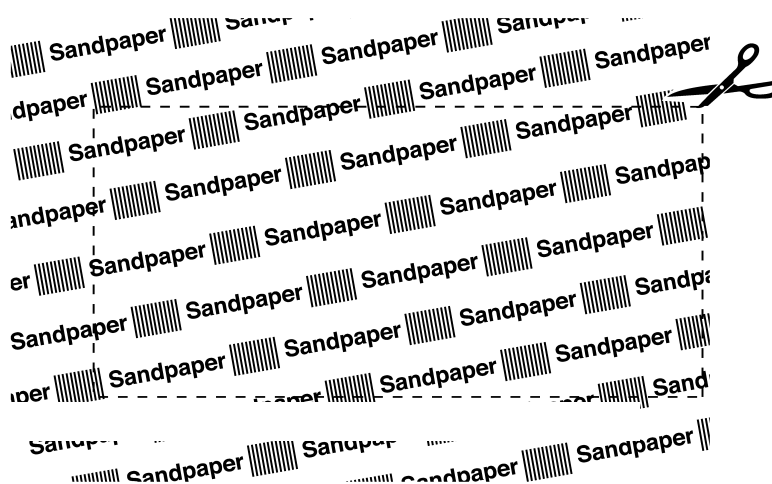
Experience has shown that the presence of more than one bar code symbol on a package can have a detrimental effect on scanning productivity and, more importantly, can lead to a double read. For this reason, the use of registered packaging is preferred. If random wrap must be used, the minimum requirement is to print the symbol with sufficient frequency that a full symbol will appear on one package face.

Double reads are more likely when the gaps between the symbols are larger. Repeating symbols should never be more than 150 mm (6 in.) apart.

Consideration should also be given to elongating the bars of the symbol to ensure a full symbol on one face, instead of repeating the symbol.

Figure 6.3.3.7 – 2

Bar Code Symbol Placement on Random-Wrapped Item



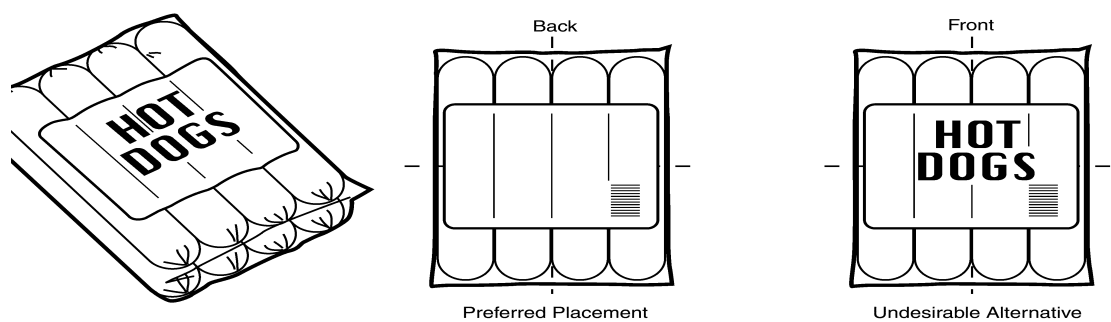
- Shrink film/vacuum-formed packages

The bar code symbol on an item packaged in shrink film or that is vacuum-formed should be located on a flat surface and in an area free of creases, wrinkles, or other types of distortions. Refer to Figure 6.3.3.7 – 3, which shows bar code symbol placement on hot dogs. Since the curvature of the hot dogs was greater than the diameter shown within the [Section 6.A.1](#) figures, a Ladder Orientation Bar Code Symbol was selected.

To determine proper bar code symbol placement for shrink film/vacuum-formed packaging, follow the guidelines specific to the applicable package type/shape. (Refer to [Section 6.4](#) for details on symbol placement for specific package types/shapes.)

Figure 6.3.3.7 – 3

Bar Code Symbol Placement on Shrink Film/Vacuum-Formed Item



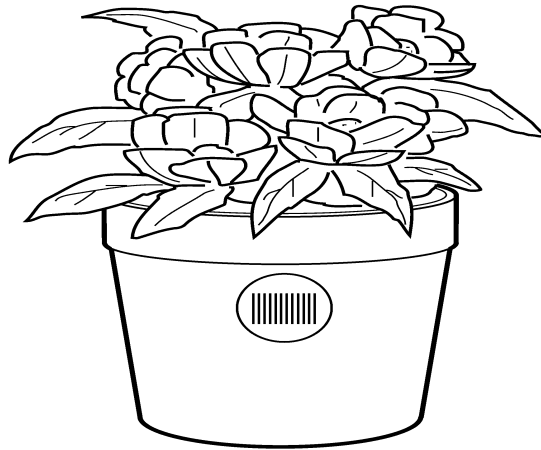
- Spot labels

Bar code symbols printed on spot labels that are applied to the trade item are acceptable alternatives that incorporate symbols into existing packaging graphics or for use on items without packages, such as some pots, pans, and glassware. The most suitable type of spot labels are those that cannot be removed from the item without destroying the symbol.

To determine proper bar code symbol placement on items bearing spot bar code symbol labels, follow the guidelines specific to the applicable package type/shape. (Refer to [Section 6.4](#) for details on symbol placement for specific package types.)

Figure 6.3.3.7 – 4

Bar Code Symbol Placement with a Spot Label



6.3.3.8 Operational Considerations of Bar Code Placement

Speed, efficiency, and effectiveness in scanning operations are the ultimate goals of proper bar code symbol placement. To ensure that scanning performance will not be compromised, consider the following matters before deciding on final bar code symbol placement:

- Consistent symbol location

Compare your package/container to packaging for like products to ensure equivalent symbol placement. The ease with which bar code symbols are located by a cashier from product to product essentially relies on consistent symbol placement.

- Hand motion effectiveness

Pass the bar code symbol across the scanner with your hand to test the initial bar code symbol placement. This test is intended to confirm that the bar code symbol placement does not necessitate unnatural hand motions while you are scanning the symbol.

- Quality validation

Use a pen to draw a line through the bar code symbol. Continue the line of ink from left to right emulating a scanner beam across the bar code symbol. Such a test should indicate the path of the scanner beam, thus enabling inspection for obstructions or item texture that could create potential scanning obstacles.

6.4. PLACEMENT GUIDELINES FOR SPECIFIC PACKAGE TYPES

The following bar code symbol placement guidelines apply to specific package types. Section 6.5 contains diagrams illustrating symbol placement for clothing and fashion accessories. Figure 6.4 – 1, Package Type Reference, describes the main packaging categories and products. This figure can be used to determine correct bar code symbol placement by product or packaging. For example, according to the figure, a package of flower seeds in a 5.1 cm (2 in.) by 7.6 cm (3 in.) envelope is classified as a thin item or container. The example given of this type of package is powdered soft drink mix. According to the first column of the Package Type Reference, the correct bar code symbol placement for this package type can be determined by looking at Section 6.4.12.

Figure 6.4 – 1
Package Type Reference

Section	Package Type	Package Characteristics	Product Examples
<u>6.4.1</u>	Bags	Sealed cylindrical or rounded-corner wrapped units	Potato chips, flour, sugar, bird seed
<u>6.4.2</u>	Blister packs	Flat card backing a formed clear plastic bubble placed over product	Toys, hardware parts
<u>6.4.3</u>	Bottles and jars	Small or large-mouth vessels sealed with removable lids	Barbecue sauce, fruit jelly
<u>6.4.4</u>	Boxes	Folded, sealed heavy paper or corrugated cardboard cartons	Crackers, cereal, detergent
<u>6.4.5</u>	Cans and cylinders	Cylindrical-shaped units sealed at each end	Soups, drinks, cheese, biscuits
<u>6.4.6</u>	Carded items	Items mounted or sealed on flat cards	Hammers, parcels of candy, kitchen utensils
<u>6.4.7</u>	Egg cartons	Irregular hexahedrons of plastic or molded pulp with hinged lids	Eggs
<u>6.4.8</u>	Jugs	Glass or plastic vessel with built-in handle(s) and removable lid(s)	Household cleaners, cooking oil
<u>6.4.9</u>	Large, heavy, bulky items	Items having physical dimension of 45 cm (18 in.) or more in any two dimensions and/or weight in excess of 13 kg (28 lbs.)	Pet food, unassembled furniture, sledge hammers
<u>6.4.10</u>	Multipacks	Multiple items mechanically bound to create one package	Soft drink cans
<u>6.4.11</u>	Publishing items	Printed paper media that is bound, stapled, or folded	Books, magazines, newspapers, tabloids
<u>6.4.12</u>	Thin items or containers	Items or containers with one dimension less than 3 cm (1 in.)	Boxes of pizza, CD jewel boxes, powdered soft drink mix packages, writing pads
<u>6.4.13</u>	Trays	Flat, formed receptacles holding product covered with over-wrap	Prepared meats, pastries, snacks, pies, pie crusts
<u>6.4.14</u>	Tubes	Firmly packed cylinders sealed at both ends, or sealed at one end with a cap or valve on the other end	Toothpaste, sausage, caulk
<u>6.4.15</u>	Tubs	Deep vessels with removable lids	Margarine, butter, ice cream, whipped cream
<u>6.4.16</u>	Unpackaged	Trade items that have no packaging, are often of an unusual shape, and are hard to label and scan	Frying pans, mixing bowls, cooking pots, wrapped cheese

6.4.1 Bags

Although this category is referred to as “bags,” these packages/containers are often called sacks or pouches. This category includes paper or plastic containers that are:

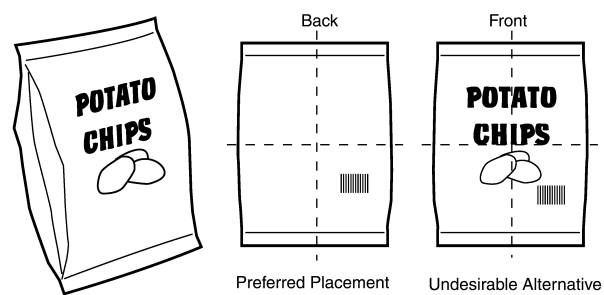
- Fold-sealed on both ends (e.g., flour and sugar)
- Fold-sealed on one end and pinched sealed at the other end (e.g., potato chips)
- Pinch-sealed at both ends (e.g., cough drops)
- Fold-sealed on one end and gathered at the other end (e.g., bread)

Note: Some bags are sealed at both ends and carded for display, such as bags of sweets. These types of items are not considered bags but fall into the carded items category. (See [Section 6.4.6](#) for more details on carded items.)

- Package characteristics: Sealed cylindrical or rounded-corner wrapped units
- Unique considerations: Bags have a tendency to have contents that shift and bulge. Consequently, the bar code symbol placement must be on an area of the bag that is most likely to remain flat.
- Bar code symbol placement: Identify the front of the package/container. (Refer to [Section 6.3.2, Identifying the Back of the Trade Item](#), for instructions on how to identify the package front.)
 - Preferred placement: On the centre of the back, about one third up from the bottom and away from the edge, respecting the proper Quiet Zone areas around the bar code symbol
 - Undesirable alternative: On the centre of the front, about one third up from the bottom and away from the edge, respecting the proper Quiet Zone areas around the bar code symbol
 - Edge rule: The bar code symbol cannot be closer than 8 mm (0.3 in.) or farther than 102 mm (4 in.) from any edge of the package/container.

Figure 6.4.1 – 1

Symbol Placement on Bags



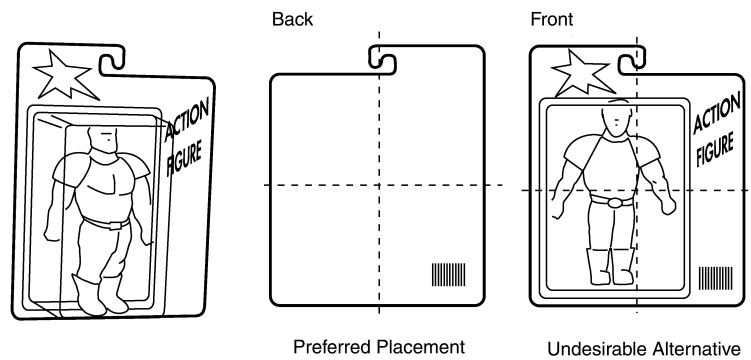
6.4.2 Blister Packs

Blister packs are pre-formed clear plastic bubbles, or blisters, containing a product and backed or topped with cardboard stock.

- Package characteristics: Flat card, backing a formed clear plastic bubble placed over the product
- Unique considerations: To ensure quality scanning, the bar code symbol must be clear of the edges of the blister. Avoid placing the symbol under the blister pack or placing the symbol over any perforations on the back of the package.
- Bar code symbol placement: Identify the front of the package/container. (Refer to Section 6.3.2, Identifying the Back of the Trade Item, for instructions on how to identify the package front.)
 - Preferred placement: On the lower right quadrant of the back, near the edge, respecting the proper Quiet Zone areas around the bar code symbol
 - Undesirable alternative: On the lower right quadrant of the front, near the edge, respecting the proper Quiet Zone areas around the bar code symbol
 - Edge rule: The bar code symbol cannot be closer than 8 mm (0.3 in.) or farther than 102 mm (4 in.) from any edge of the package/container

Figure 6.4.2 – 1

Symbol Placement on Blister Packs



6.4.3 Bottles and Jars

Bottles and jars normally carry spot labels applied to confined areas of the package, not covering the entire surface or wrapping around the entire perimeter.

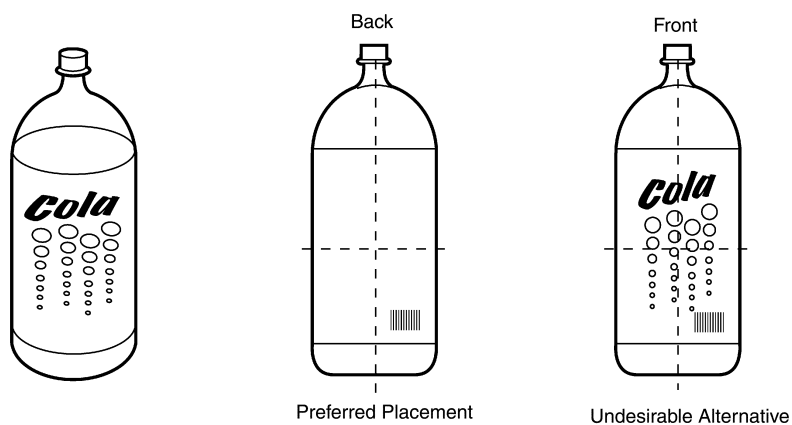
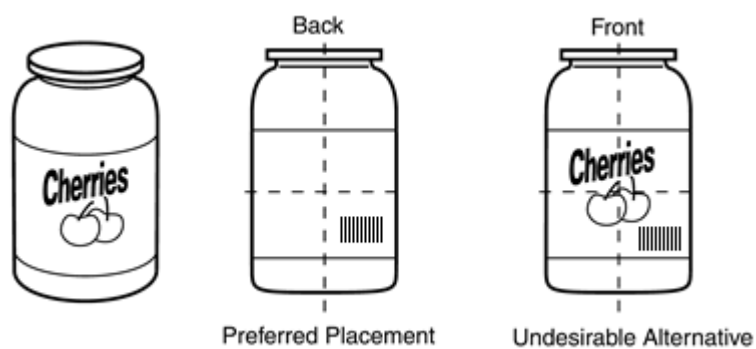
- Package characteristics: Small or large-mouth containers sealed with removable lids
- Unique considerations: Application of the bar code symbol to the neck of a bottle is not allowed. Symbol placement on the neck of the bottle necessitates additional handling at the Point-of-Sale, and space limitations on this area of the bottle usually result in symbol truncation.

See Section 6.A.1 for rules on the relationship between the diameter of the item and the bar code symbol X-dimension.

- Bar code symbol placement: Identify the front of the package/container. (Refer to Section 6.3.2, Identifying the Back of the Trade Item, for instructions on how to identify the package front.)
 - Preferred placement: On the lower right quadrant of the back, near the edge, respecting the proper Quiet Zone areas around the bar code symbol
 - Undesirable alternative: On the lower right quadrant of the front, near the edge, respecting the proper Quiet Zone areas around the bar code symbol
 - Edge rule: The bar code symbol cannot be closer than 8 mm (0.3 in.) or farther than 102 mm (4 in.) from any edge of the package/container.

Figure 6.4.3 – 1

Symbol Placement on Bottles and Jars



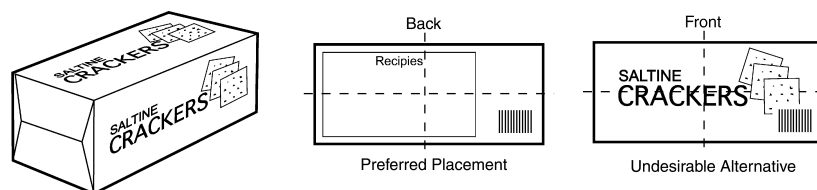
6.4.4 Boxes

This package type includes cuboid or cylindrical cardboard or plastic cartons, as well as rectangular sleeves (used for products such as light bulbs). These packages might contain anything from crackers or cereal to detergent.

- Package characteristics: Folded, sealed heavy paper or corrugated cardboard cartons
- Unique considerations: There are no unique considerations that apply to this package type.
- Bar code symbol placement: Identify the front of the package/container. (Refer to Section 6.3.2, Identifying the Back of the Trade Item, for instructions on how to identify the package front.)
 - Preferred placement: On the lower right quadrant of the back, near the edge, respecting the proper Quiet Zone areas around the bar code symbol
 - Undesirable alternative: On the lower right quadrant of the front, near the edge, respecting the proper Quiet Zone areas around the bar code symbol
 - Edge rule: The bar code symbol cannot be closer than 8 mm (0.3 in.) or farther than 102 mm (4 in.) from any edge of the package/container.

Figure 6.4.4 – 1

Symbol Placement on Boxes



6.4.5 Cans and Cylinders

This category includes cylindrical shaped containers (usually made of plastic or metal) that are sealed at each end. Some containers have removable lids or openings. Common examples are canned fruit and vegetables, paints, and adhesives.

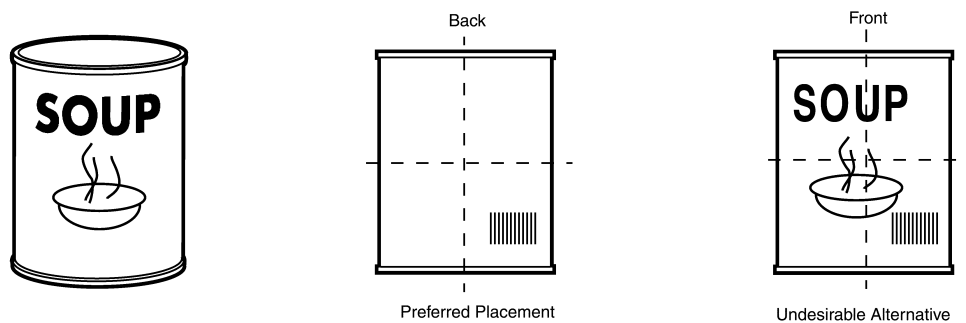
- Package characteristics: Cylindrical-shaped units sealed at each end
- Unique considerations: Obstacles, such as beading, seams, and/or ridges on the package/container should be avoided, as they will reduce scanning performance.

See [Section 6.A.1](#) for rules on the relationship between the diameter of the item and the X-dimension.

- Bar code symbol placement: Identify the front of the package/container. (Refer to [Section 6.3.2, Identifying the Back of the Trade Item](#), for instructions on how to identify the package front.)
 - Preferred placement: On the lower right quadrant of the back, near the edge, respecting the proper Quiet Zone areas around the bar code symbol
 - Undesirable alternative: On the lower right quadrant of the front, near the edge, respecting the proper Quiet Zone areas around the bar code symbol
 - Edge rule: The bar code symbol cannot be closer than 8 mm (0.3 in.) or farther than 102 mm (4 in.) from any edge of the package/container.

Figure 6.4.5 – 1

Symbol Placement on Cans and Cylinders



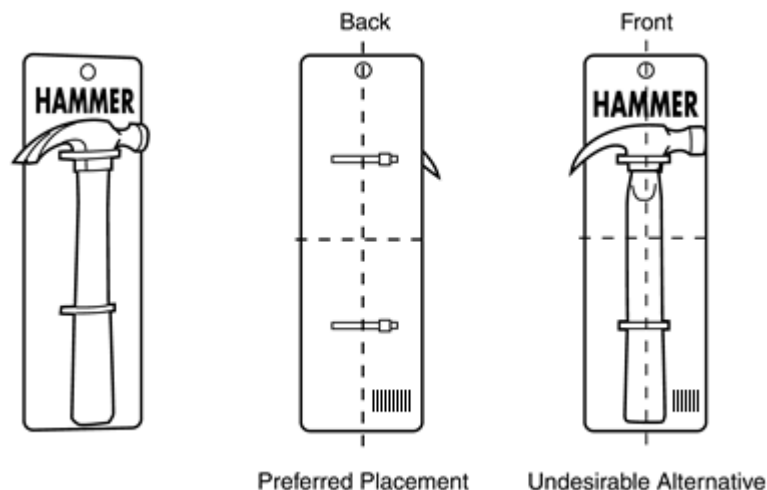
6.4.6 Carded Items

Small, loose, or non-packaged items that are difficult to label are placed on cards that are marked with a bar code symbol. Examples include hammers, toys, and kitchen utensils.

- Package characteristics: Items mounted or sealed on flat cards
- Unique considerations: When placing bar code symbols on carded items, it is important to take into consideration the proximity of the bar code symbol to the product. Be sure to allow adequate space for the symbol, avoiding any obstructions that might be caused by placing the symbol too close to the product. In addition, do not place the symbol over any perforations or other obstructions on the package.
- Bar code symbol placement: Identify the front of the package/container. (Refer to [Section 6.3.2, Identifying the Back of the Trade Item](#), for instructions on how to identify the package front.)
 - Preferred placement: On the lower right quadrant of the back, near the edge, respecting the proper Quiet Zone areas around the bar code symbol
 - Undesirable alternative: On the lower right quadrant of the front, near the edge, respecting the proper Quiet Zone areas around the bar code symbol
 - Edge rule: The bar code symbol cannot be closer than 8 mm (0.3 in.) or farther than 102 mm (4 in.) from any edge of the package/container.

Figure 6.4.6 – 1

Symbol Placement on Carded Items



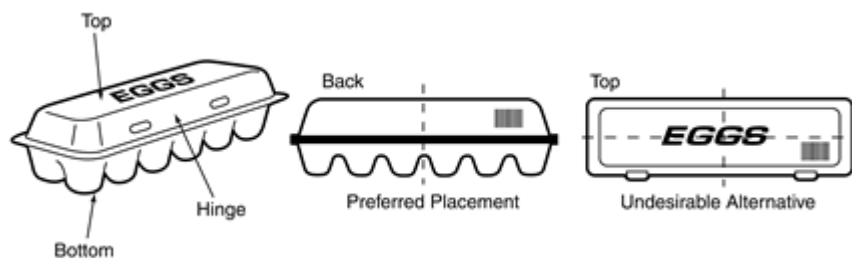
6.4.7 Egg Cartons

Molded pulp, foam, or plastic egg cartons come in sizes according to the count of the eggs contained.

- Package characteristics: Irregular shaped hexahedrons of plastic or molded pulp with a hinged lid
 - Unique considerations: The recommended symbol placement is on the side of the lid portion of the egg carton that opens and closes to cover the eggs. The uneven surface of the molded bottom of an egg carton prevents bar code symbol placement in this area.
 - Bar code symbol placement: To determine bar code symbol placement on an egg carton, first identify the top of the carton by locating the primary trading/advertising area, which is marked with the product name and the company's logo. The bottom of the egg carton is the molded area directly opposite the top in which the eggs sit. The sides are divided horizontally by a hinged lid. The front of the carton is the long side containing the opening/closing mechanism. The back of the carton is directly opposite the front, on the long side with the hinge.
- Preferred placement: Near the edge, on the right half of the back, above the hinge on the lid, respecting the proper Quiet Zone areas around the bar code symbol
- Undesirable alternative: On the lower right quadrant of the top, on the lid adjacent to the opening/closing mechanism, near the edge, respecting the proper Quiet Zone areas around the bar code symbol
- Edge rule: The bar code symbol cannot be closer than 8 mm (0.3 in.) or farther than 102 mm (4 in.) from any edge of the package/container.

Figure 6.4.7 – 1

Symbol Placement on Egg Cartons



6.4.8 Jugs

Jugs are glass or plastic containers with built-in handle(s) that aid in pouring of contents. Jugs normally carry spot labels applied to defined areas of the package, not covering the entire surface of the trade item or wrapping around the entire perimeter of the item.

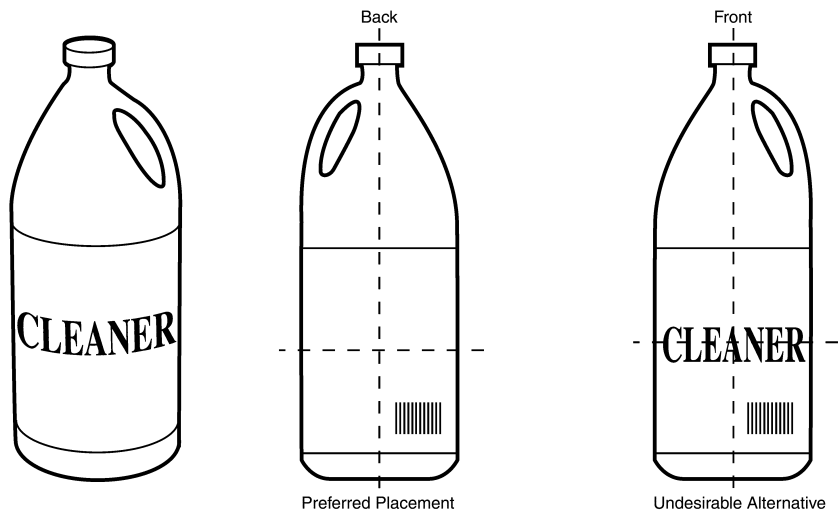
- Package characteristics: Glass or plastic vessels with built-in handles and removable lids
- Unique considerations: Application of the symbol to the neck of the jug is not allowed. Placement of the symbol on the neck of the jug necessitates additional handling at the Point-of-Sale, and space limitations on the neck usually result in symbol truncation.

See [Section 6.A.1](#) for rules on the relationship between the diameter of the item and the X-dimension.

- Bar code symbol placement: Identify the front of the package/container. (Refer to [Section 6.3.2, Identifying the Back of the Trade Item](#), for instructions on how to identify the package front.)
 - Preferred placement: On the lower right quadrant of the back, near the edge, respecting the proper Quiet Zone areas around the bar code symbol
 - Undesirable alternative: On the lower right quadrant of the front, near the edge, respecting the proper Quiet Zone areas around the bar code symbol.
 - Edge rule: The bar code symbol cannot be closer than 8 mm (0.3 in.) or farther than 102 mm (4 in.) from any edge of the package/container.

Figure 6.4.8 – 1

Symbol Placement on Jugs

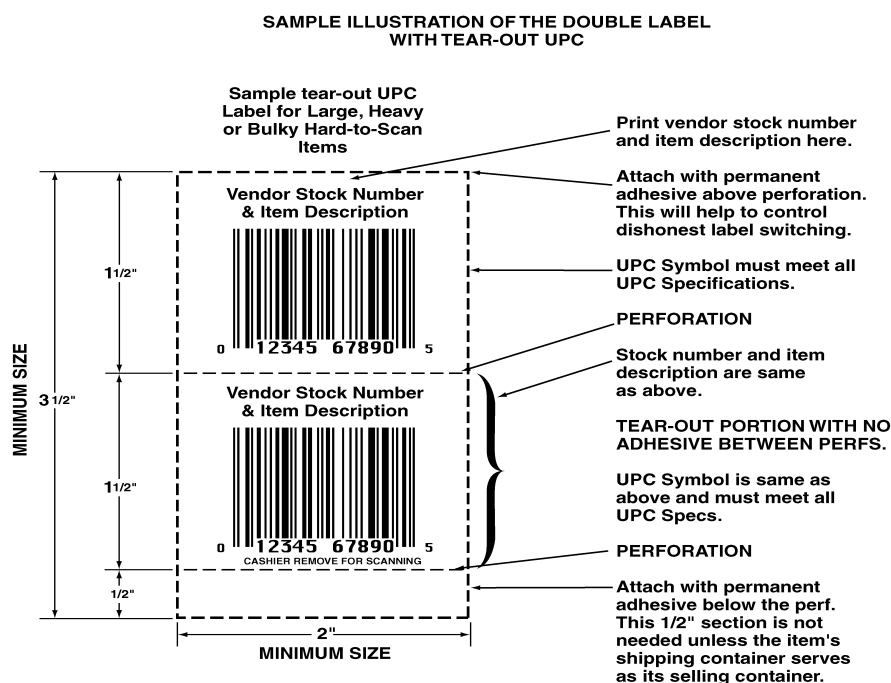


6.4.9 Large, Heavy, or Bulky Items

Large, heavy, or bulky items of any kind are difficult to handle and scan, and, therefore, different symbol placement guidelines apply.

- Package characteristics: Items considered large, heavy, or bulky have a physical dimension of 45 cm (18 in.) or more in any two dimensions (width/height, width/depth, or height/depth), and/or weigh in excess of 13 kg (28 lbs.).
- Unique considerations:
 - Number of symbols: For large or heavy bags, two bar code symbols should be used, one on top of the front and one on the bottom of the back in opposite quadrants. For boxes, bottles, jars, cans, jugs, tubs, and unpackaged items, one bar code symbol is used.
 - Special labels: A special double label with a tear-out bar code symbol may be applied to large, heavy, or bulky items that are too heavy or too awkward to pick up and pass over a fixed scanner. This label has one section that is permanently adhered to the item's box (or to a hang-tag or card if the item is not boxed). This section has a Human Readable Interpretation number and item description printed above a full-size bar code symbol. Beneath a perforation, a second section contains exactly the same human readable information and an identical full-size bar code symbol. The two sections are virtually identical except that the section below the perforation has no adhesive on its back.

Figure 6.4.9 – 1



When the item is brought to the Point-of-Sale, the lower half of the label below the perforation is removed. The cashier then either scans the label, or if the symbol cannot be scanned, the cashier key-enters the human readable information beneath the symbol. The top label remains attached to the item or its box.

In the instances where the large, heavy, or bulky item is displayed and sold in its shipping container, a third section of label is recommended. Beneath the tear-out label, a second perforation and a 12 mm (0.50 in.) section with permanent adhesive should be added. This provides a more secure vehicle for the tear-out section and makes it less likely to tear off in transit.

- Human Readable Interpretation: Human readable numbers or text on large, heavy, or bulky items should be a minimum of 16 mm (5/8 in.) high. This facilitates easier capture of the number by the cashier without having to pick up the product and move it across the scanner.

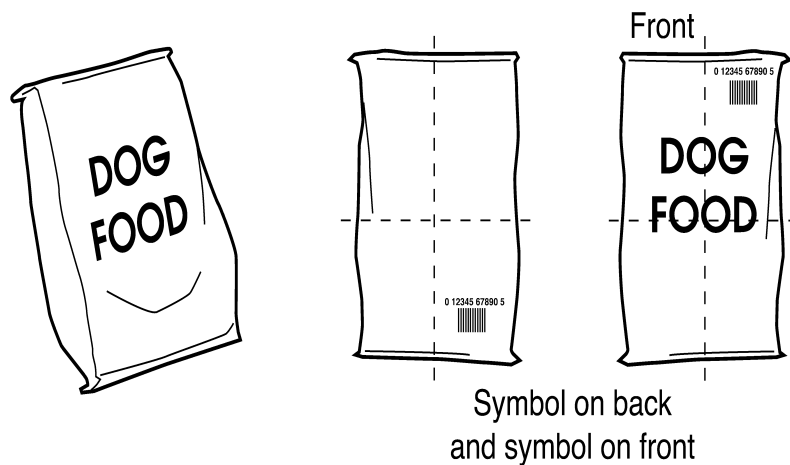
- Bar code symbol placement: Identify the front of the package/container. (See Section 6.3.2, Identifying the Back of the Trade Item, for instructions on how to identify the package front.)

- Preferred placement:

- Bags: Two bar code symbols are required, one on the front of the bag, at the top of the upper right quadrant, near the edge, and the other on the back of the bag, centred in the lower right quadrant, near the edge (to accommodate settling of contents).

Figure 6.4.9 – 2

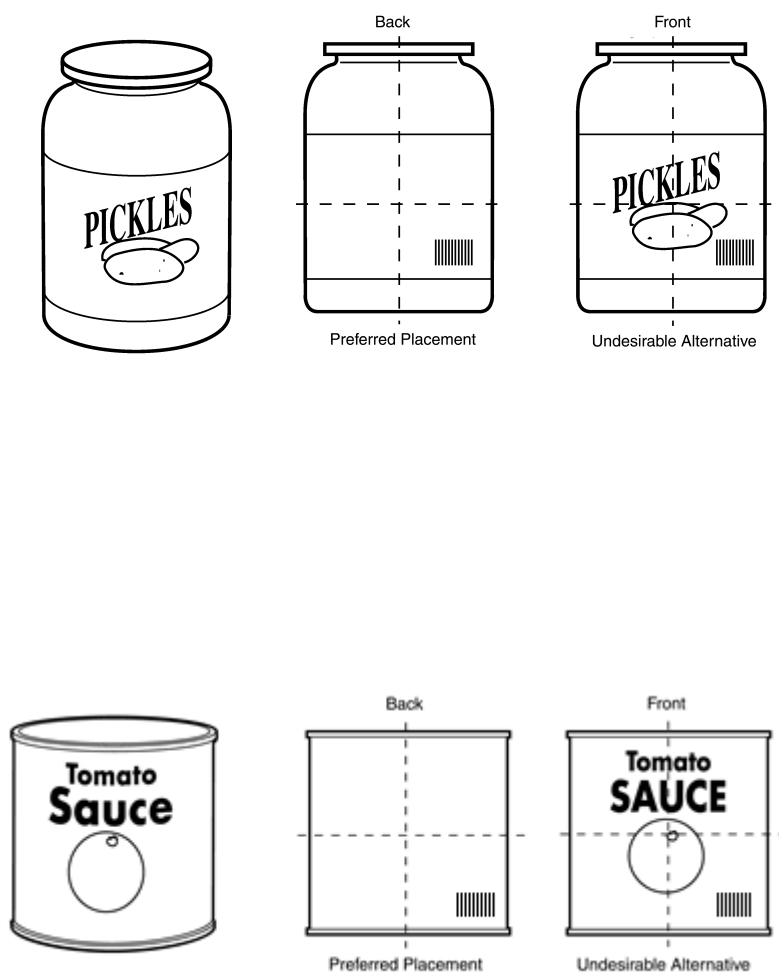
Symbol Placement on Large, Heavy, or Bulky Bags



- Bottles, jars, boxes, cans, jugs, tubs, and unpackaged items: These items are subject to the same symbol placement guidelines as corresponding smaller sized items. (Refer to the appropriate subsection in [Section 6.4](#) for symbol placement guidelines for specific package types.)

Figure 6.49 – 3

Symbol Placement on Large, Heavy, or Bulky Jars, Cans, Jugs, or Tubs



- Undesirable alternative: On the lower right quadrant of the front, near the edge, respecting the proper Quiet Zone areas around the bar code symbol

- Edge rule: The bar code symbol cannot be closer than 8 mm (0.3 in.) or farther than 102 mm (4 in.) from any edge of the package/container.

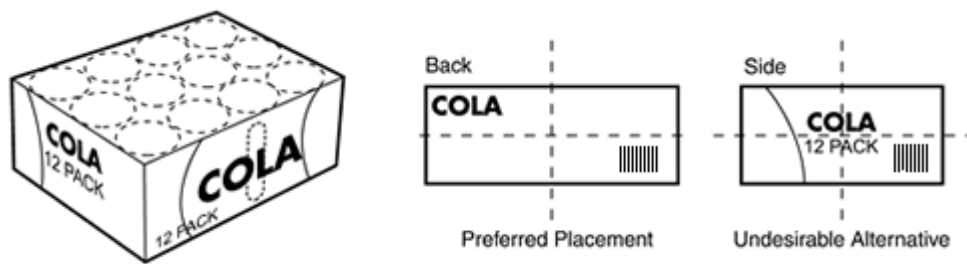
6.4.10 Multipacks

Multipacks are single items that are packaged together as one unit or trade item. Multipacks provide convenience to the consumer and/or may represent a price reduction compared to purchasing items individually. Typical multipacks contain bottles, cans, jars, and tubs.

- Package characteristics: Multiple single items bound together to create one package
- Unique considerations: As a general rule, a bar code symbol should be placed on every consumer package traded through the supply chain. Consequently, items sold in multipacks as well as those sold individually must carry a unique bar code symbol for each consumer package variation or aggregation. To avoid confusion at the Point-of-Sale, the multipack bar code symbol should be the only visible symbol when both the multipack and individual items are symbol-marked. The binder of the multipack acts as a screen to obscure the symbols on the individual items.
- Special note for can multipacks: Avoid placing the symbol on the top or bottom of the container as shown in Figure 6.4.10 – 1, since the cans have a tendency to cause impressions in the cardboard and distort the symbol. These can impressions in the symbol may reduce the quality of the scanning.
- Bar code symbol placement: Identify the front of the package/container. (Refer to [Section 6.3.2, Identifying the Back of the Trade Item](#), for instructions on how to identify the package front.)
 - Preferred placement: On the lower right quadrant of the back, near the edge, respecting the proper Quiet Zone areas around the bar code symbol
 - Undesirable alternative: On the lower right quadrant of the side, near the edge, respecting the proper Quiet Zone areas around the bar code symbol
 - Edge rule: The bar code symbol cannot be closer than 8 mm (0.3 in.) or farther than 102 mm (4 in.) from any edge of the package/container.

Figure 6.4.10 – 1

Symbol Placement on Multipacks

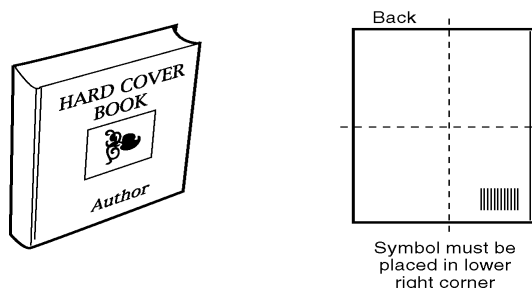


6.4.11 Publishing Items

Publishing items represent printed materials sold individually for consumer use including books, magazines, newspapers, and tabloids. Bar code symbol placement on published items varies depending on type.

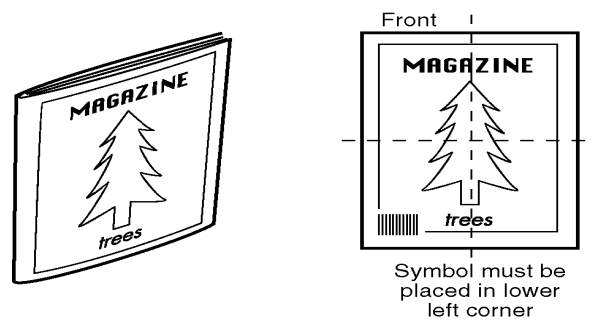
- Package characteristics: Printed paper media that is bound, stapled, or folded
 - Unique considerations: In addition to the regular bar code symbol, some publishing items have Add-On Symbols that carry supplementary information such as an Issue Code. Bar code symbol placement on published items varies depending on the media type. If an Add-On Symbol is used, it must be located to the right of the regular bar code symbol and parallel to it.
 - Bar code symbol placement: Identify the front of the package/container. (Refer to [Section 6.3.2, Identifying the Back of the Trade Item](#), for instructions on how to identify the package front.)
- Preferred placement:
- Books: On the lower right quadrant of the back, near the spine, respecting the proper Quiet Zone areas around the bar code symbol

Figure 6.4.11 – 1



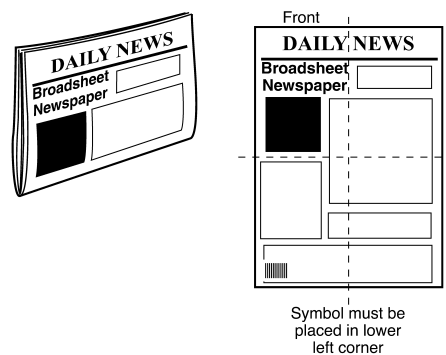
- Magazines: On the lower left quadrant of the front, near the edge, respecting the proper Quiet Zone areas around the bar code symbol

Figure 6.4.11 – 2



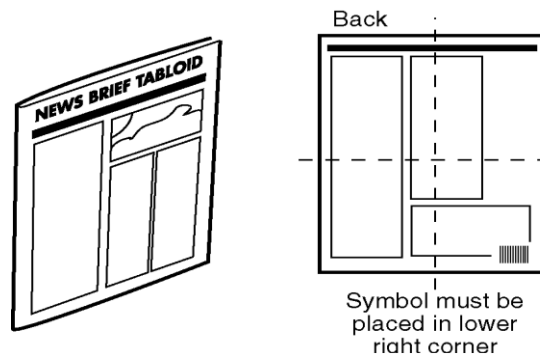
- Newspapers: When displayed for sale as shown on the left in Figure 6.4.11 – 3, place the symbol on the lower left quadrant of the front, near the edge, respecting the proper Quiet Zone areas around the bar code symbol. If an Add-On Symbol is used, it must be located to the right of the regular bar code symbol and parallel to it.

Figure 6.4.11 – 3



When displayed for sale as shown in Figure 6.4.11 – 4, place the symbol on the lower right quadrant of the back, near the edge, respecting the proper Quiet Zone areas around the bar code symbol. If an Add-On Symbol is used, it must be located to the right of the regular bar code symbol and parallel to it.

Figure 6.4.11 – 4



- Undesirable alternative: The undesirable alternative is not feasible for this package type.
- Edge rule: The bar code symbol cannot be closer than 8 mm (0.3 in.) or farther than 102 mm (4 in.) from any edge of the package/container.

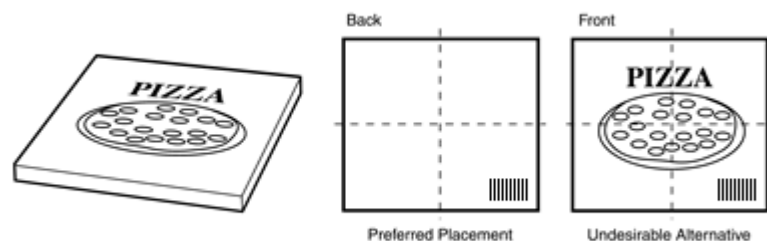
6.4.12 Thin Items or Containers

This package type is so named as items or containers in this category have one physical dimension (height, width, or depth) less than 3 cm (1 in.). Boxes of pizza, compact disk boxes, packages of powdered drink mix, and writing pads are examples.

- Package characteristics: Items or containers with one dimension less than 3 cm (1 in.)
- Unique considerations: There are no unique considerations that apply to this package type.
- Bar code symbol placement: Identify the front of the package/container. (Refer to [Section 6.3.2, Identifying the Back of the Trade Item](#), for instructions on how to identify the package front.)
 - Preferred placement: On the lower right quadrant of the back, near the edge, respecting the proper Quiet Zone areas around the bar code symbol
 - Undesirable alternative: On the lower right quadrant of the front, near the edge, respecting the proper Quiet Zone areas around the bar code symbol
 - Edge rule: The bar code symbol cannot be closer than 8 mm (0.3 in.) or farther than 102 mm (4 in.) from any edge of the package/container.

Figure 6.4.12 – 1

Symbol Placement on Thin Items or Containers



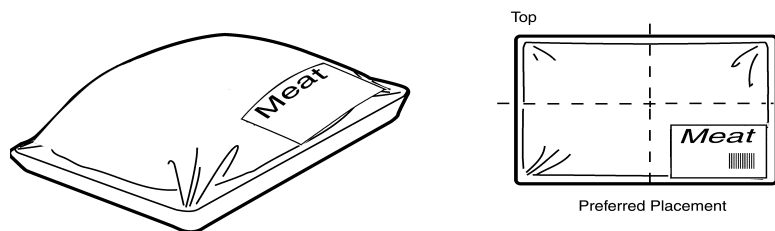
6.4.13 Trays

This package type includes thin square, rectangular, or circular trays holding items that are covered with over-wrap of clear shrink-film or that are vacuum-sealed. Examples include prepared meats, pastries, snacks, and pies or piecrusts.

- Package characteristics: Flat, formed receptacles holding product covered with over-wrap
- Unique considerations: See [Section 6.A.1](#) for the rules on the relationship between the diameter of the item and the X-dimension.
- Bar code symbol placement: Identify the front of the package/container. (Refer to [Section 6.3.2, Identifying the Back of the Trade Item](#), for instructions on how to identify the package front.)
 - Preferred placement: On the upper left quadrant of the front, near the edge, respecting the proper Quiet Zone areas around the bar code symbol
 - Edge rule: The bar code symbol cannot be closer than 8 mm (0.3 in.) or farther than 102 mm (4 in.) from any edge of the package/container.

Figure 6.4.13 – 1

Symbol Placement on Trays



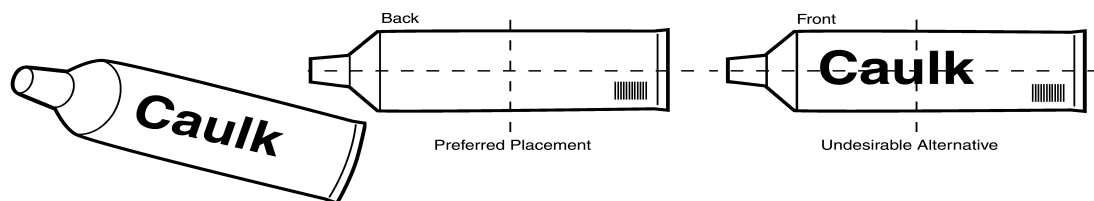
6.4.14 Tubes

Tubes are cylindrical shaped items or containers that are either sealed at both ends, such as sausage or refrigerated dough, or that are sealed at one end and have a cap or valve on the other end, such as toothpaste or caulk.

- Package characteristics: Firmly packed cylinders sealed at both ends, or sealed at one end with a cap or valve on the other end
- Unique considerations: See [Section 6.A.1](#) for the rules on the relationship between the diameter of the item and the X-dimension.
- Bar code symbol placement: Identify the front of the package/container. (Refer to [Section 6.3.2, Identifying the Back of the Trade Item](#), for instructions on how to identify the package front.)
 - Preferred placement: On the lower right quadrant of the back, near the edge, respecting the proper Quiet Zone areas around the bar code symbol
 - Undesirable alternative: On the lower right quadrant of the front, near the edge, respecting the proper Quiet Zone areas around the bar code symbol
 - Edge rule: The bar code symbol cannot be closer than 8 mm (0.3 in.) or farther than 102 mm (4 in.) from any edge of the package/container.

Figure 6.4.14 – 1

Symbol Placement on Tubes



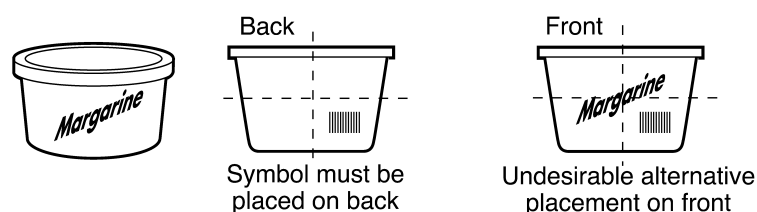
6.4.15 Tubs

Tubs are circular containers (usually made of paper, plastic, or metal) that have removable lids. In most cases, they have spot labels that do not cover the entire surface of the container. Examples include margarine, butter, ice cream, and whipped topping.

- Package characteristics: Deep vessels with removable lids
- Unique considerations: There are no unique considerations that apply to this package type.
- Bar code symbol placement: Identify the front of the package/container. (Refer to [Section 6.3.2, Identifying the Back of the Trade Item](#), for instructions on how to identify the package front.)
 - Preferred placement: On the lower right quadrant of the back, near the edge, respecting the proper Quiet Zone areas around the bar code symbol
 - Undesirable alternative: On the lower right quadrant of the front, near the edge, respecting the proper Quiet Zone areas around the bar code symbol
 - Edge rule: The bar code symbol cannot be closer than 8 mm (0.3 in.) or farther than 102 mm (4 in.) from any edge of the package/container.

Figure 6.4.15 – 1

Symbol Placement on Tubs



6.4.16 Unpackaged Items

These are square, rectangular, circular, concave, or convex shaped items, including bowls, pots, pans, skillet, cups, vases, and other products (with or without contents), that lack an upright surface suitable for symbol placement.

- Package characteristics: These are items that are unpackaged and sold with spot labels or carded sleeves.
 - Unique considerations: When selecting symbol placement, consider the product's concave shape on the inside or irregular curvature on the outside while respecting the scanning distances defined in the edge rule below.
 - Bar code symbol placement: Bar code symbol placement on unpackaged items depends on the shape and type of the item. The following examples illustrate symbol placements appropriate to specific item types.
- Preferred placement: The figures that follow indicate acceptable placement locations for other shaped items.

Figure 6.4.16 – 1

Option 1

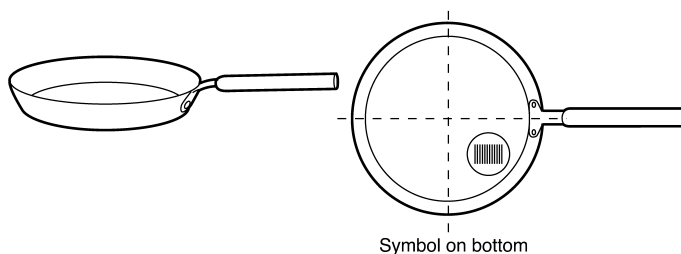


Figure 6.4.16 – 2

Option 2

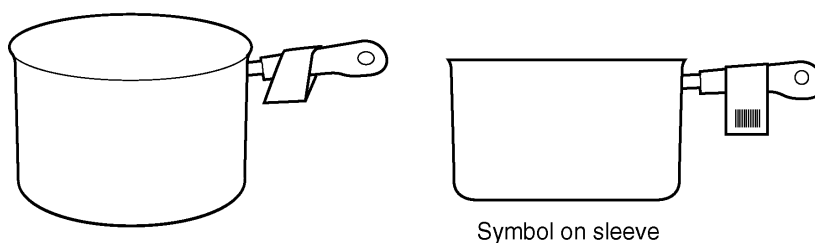


Figure 6.4.16 – 3Option 3

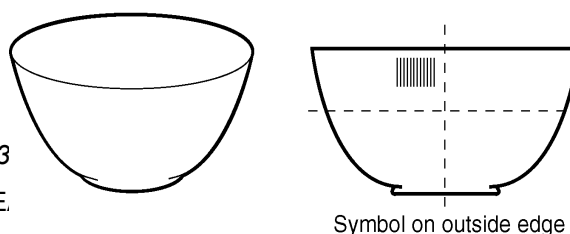
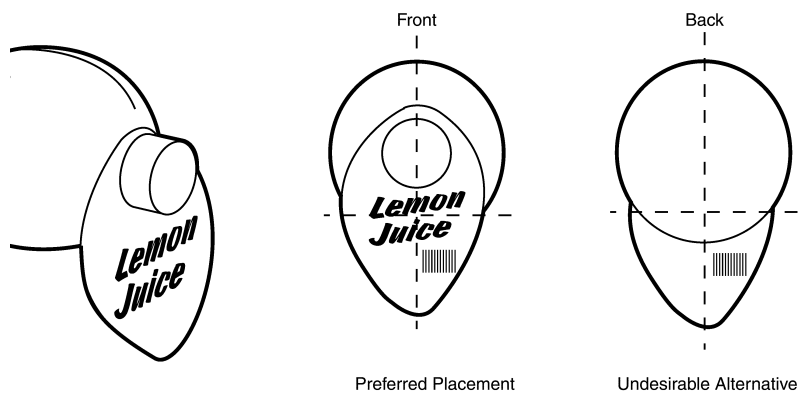


Figure 6.4.16 – 4

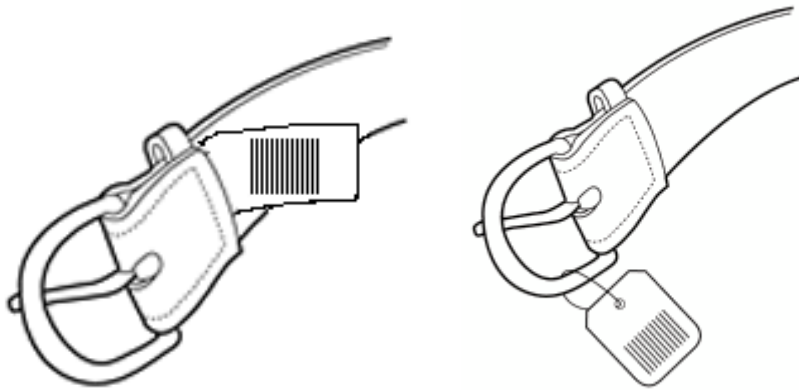
Option 4



- Undesirable alternative: The undesirable alternative is not applicable.
- Edge rule: The bar code symbol cannot be closer than 8 mm (0.3 in.) or farther than 102 mm (4 in.) from any edge of the package/container.

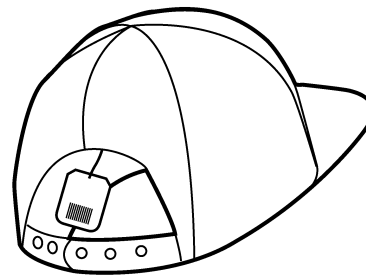
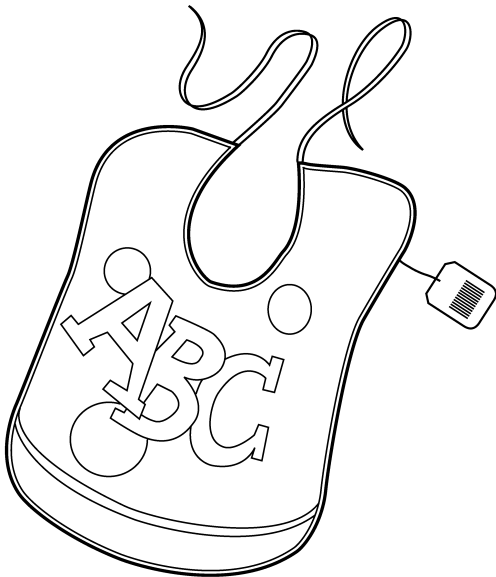
6.5. SYMBOL PLACEMENT FOR CLOTHING AND FASHION ACCESSORIES

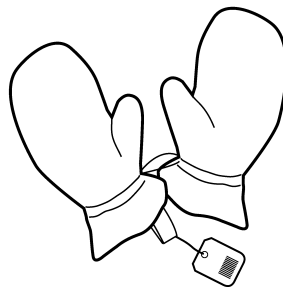
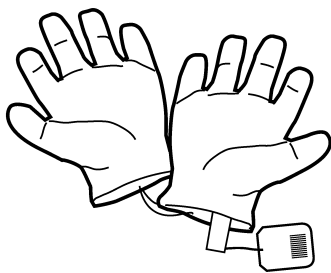
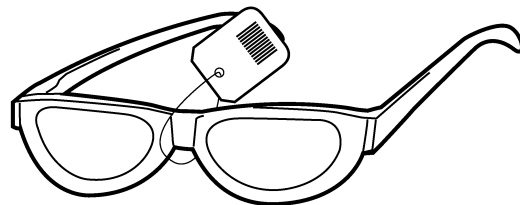
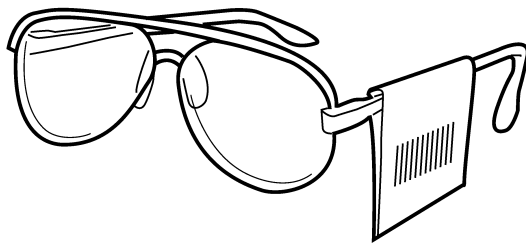
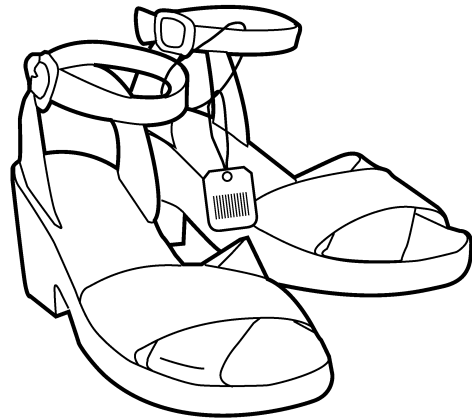
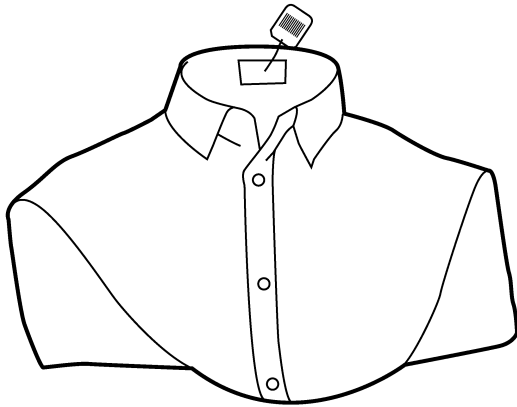
The following examples show recommended placement of symbols on clothing and fashion accessories.

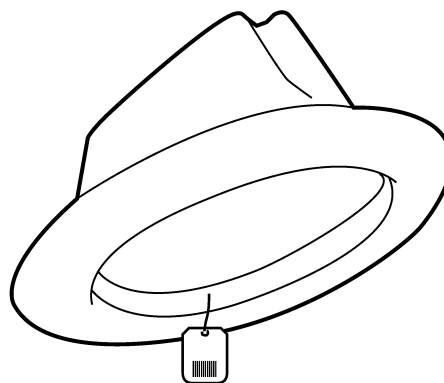
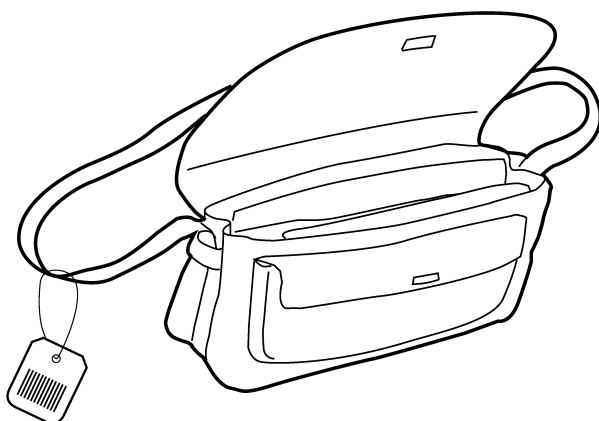
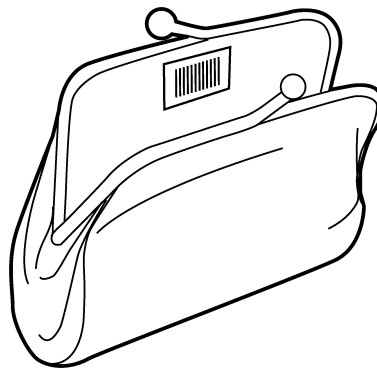
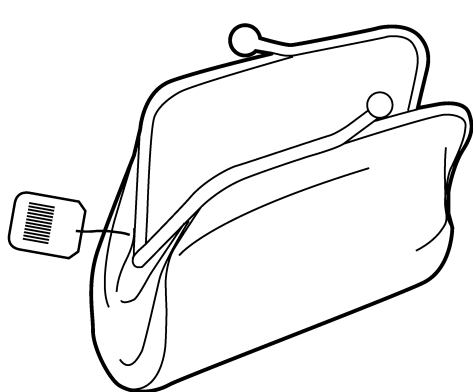


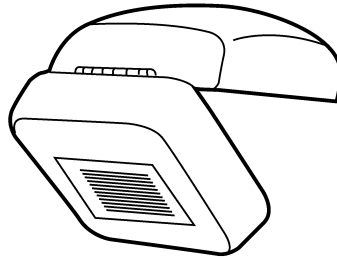
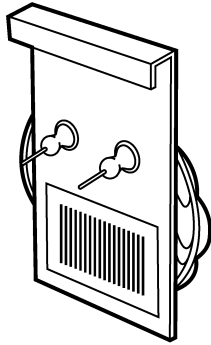
Option 1

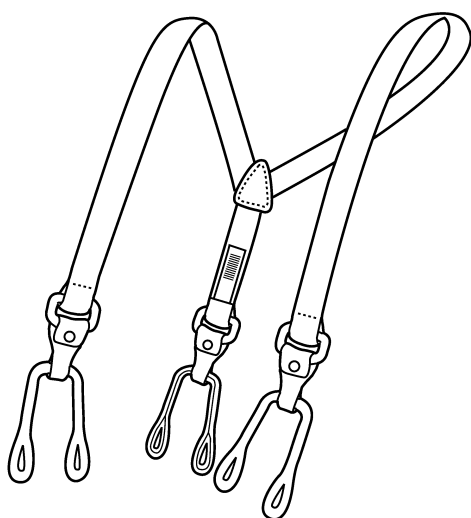
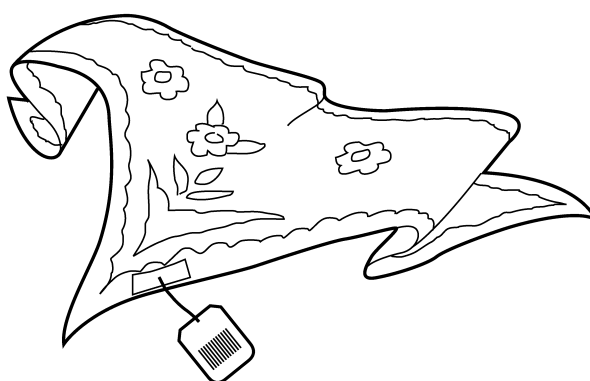
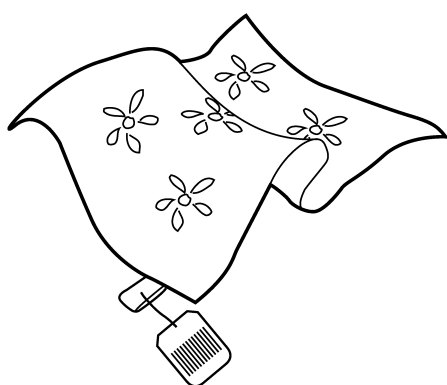
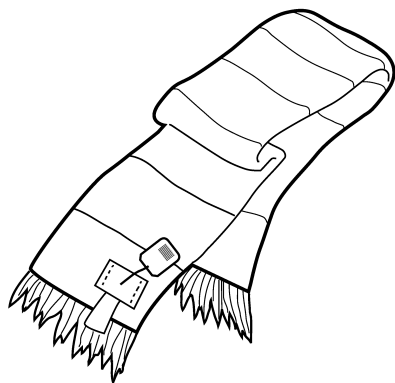
Option 2

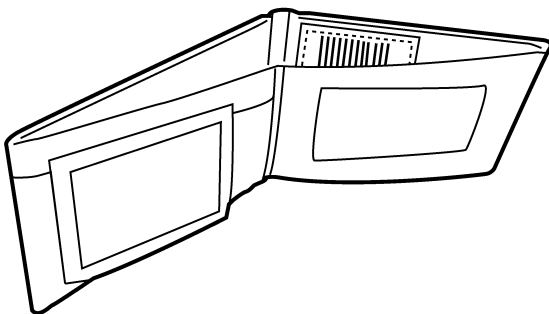
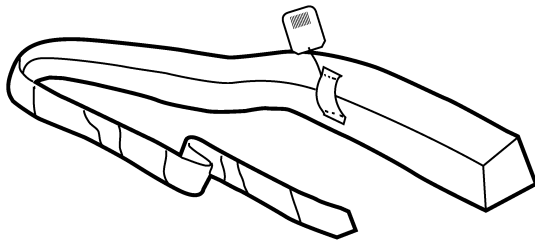
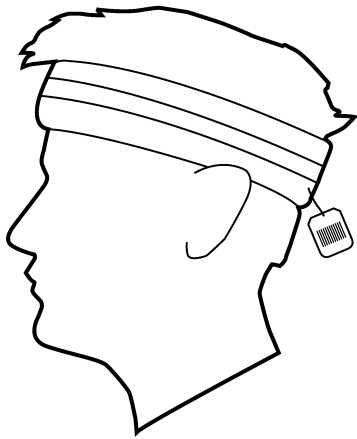


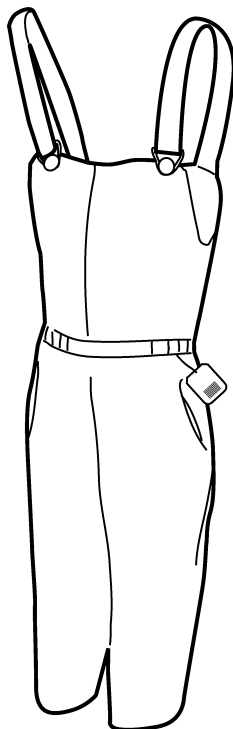
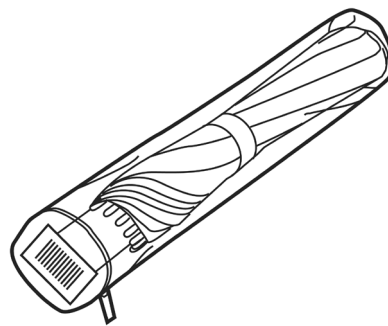
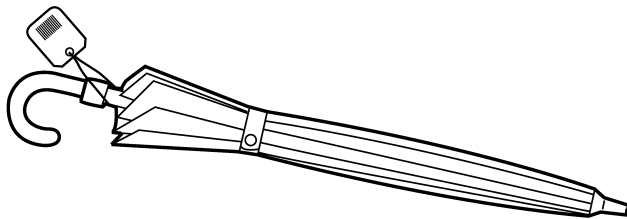
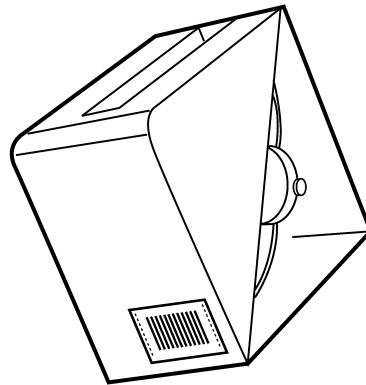
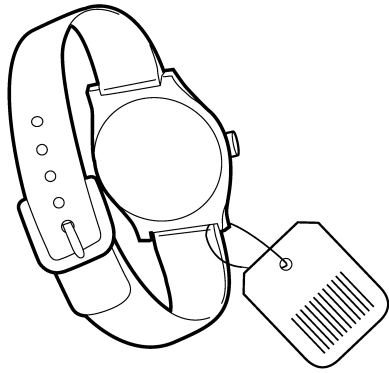


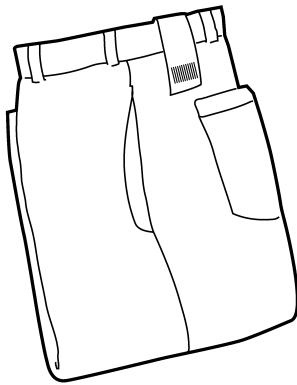






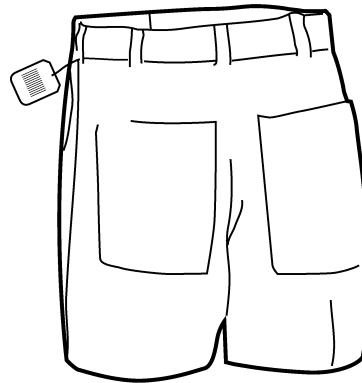
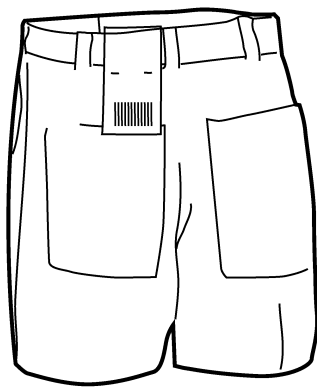






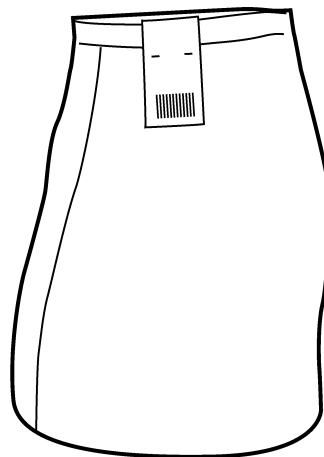
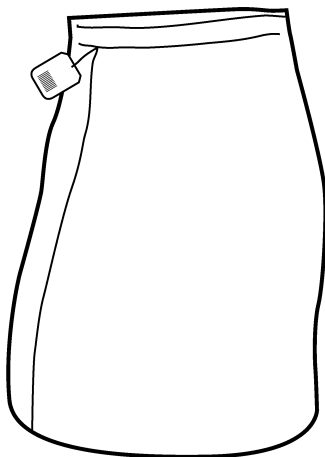
Option 1

Option 2



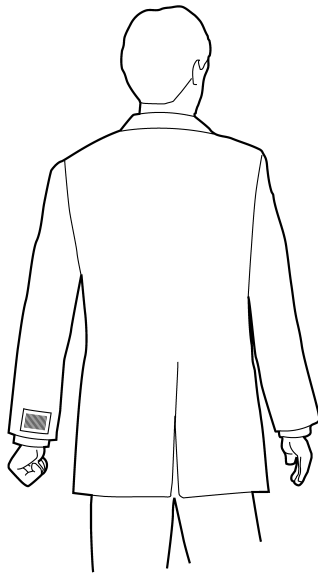
Option 1

Option 2



Option 1

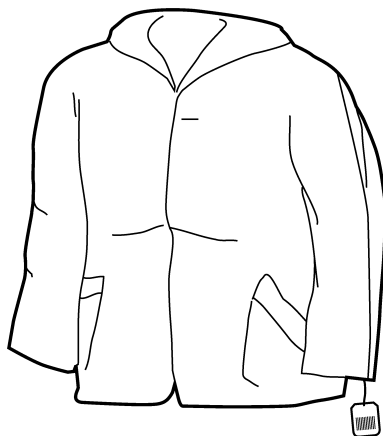
Option 2

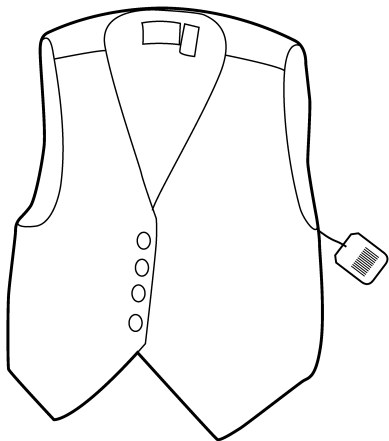


Option 1

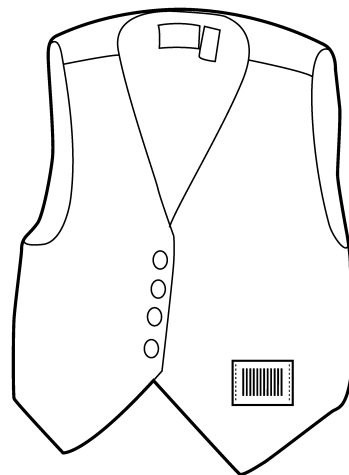


Option 2

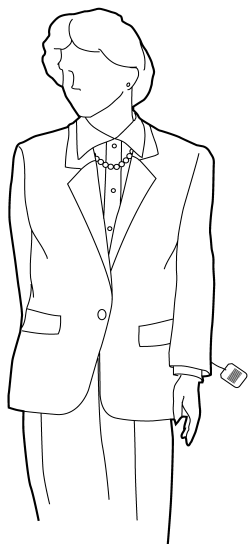




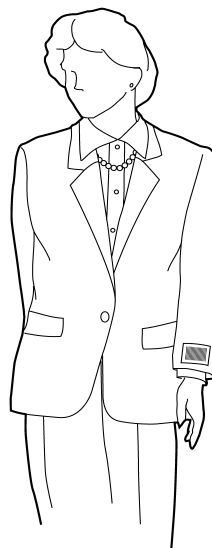
Option 1



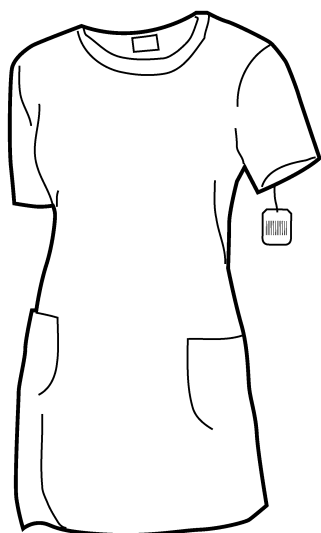
Option 2



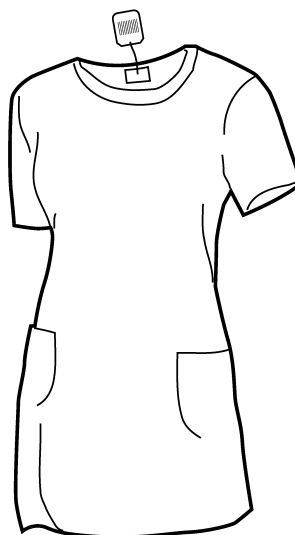
Option 1



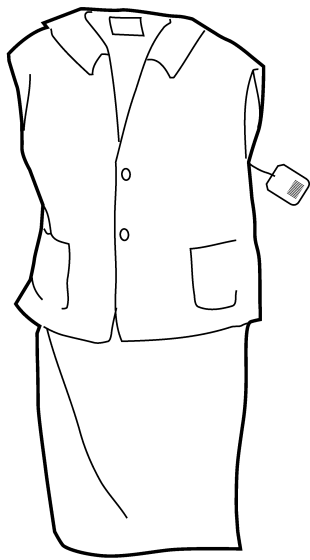
Option 2



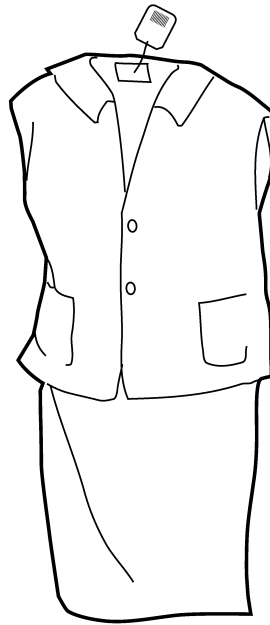
Option 1



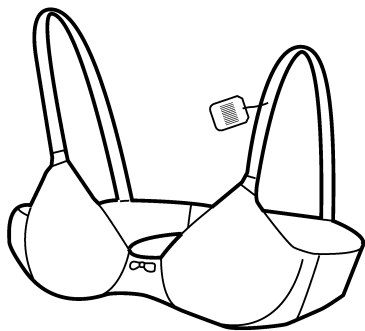
Option 2



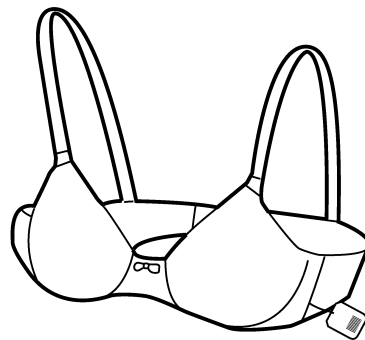
Option 1



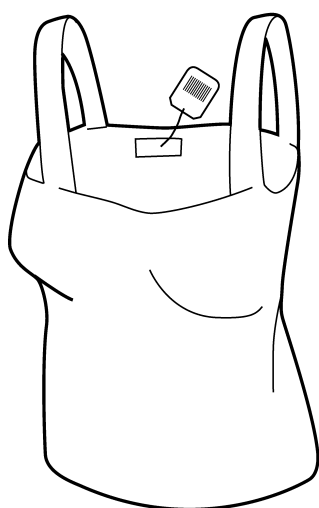
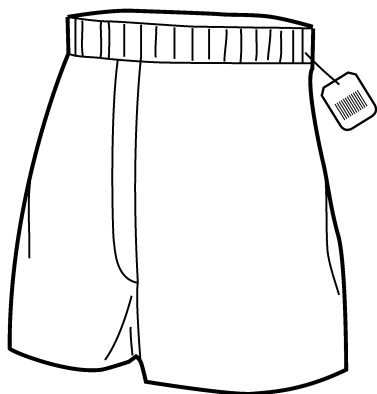
Option 2



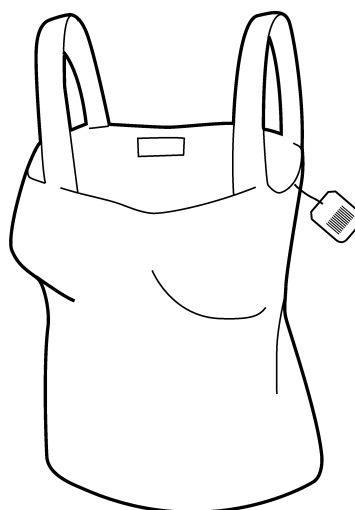
Option 1



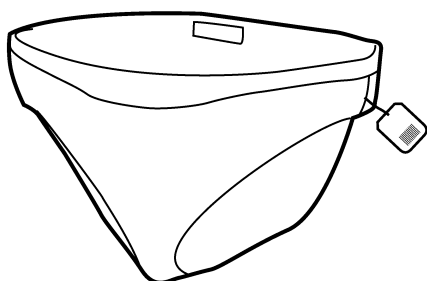
Option 2



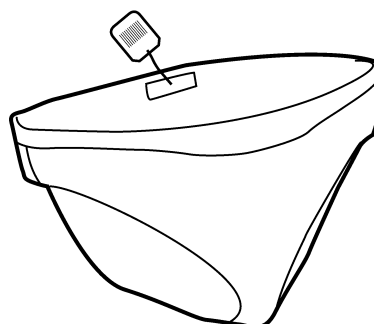
Option 1



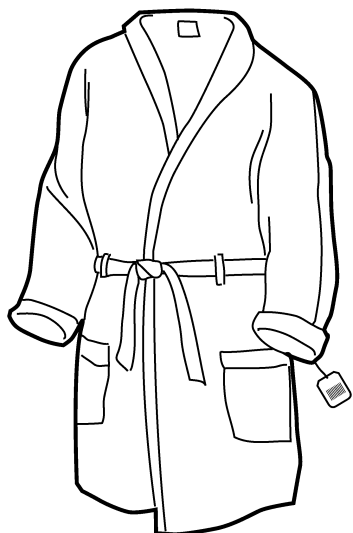
Option 2



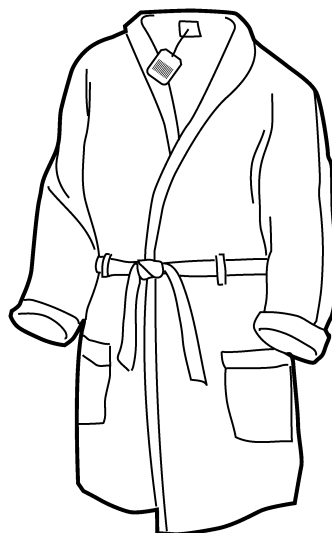
Option 1



Option 2



Option 1



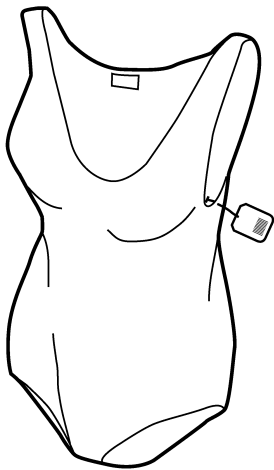
Option 2



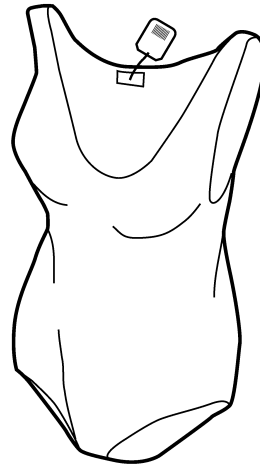
Option 1



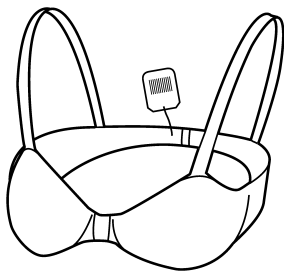
Option 2



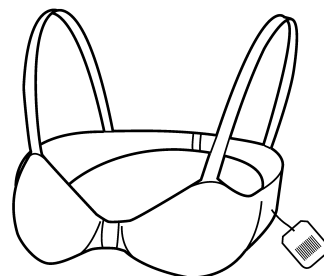
Option 1



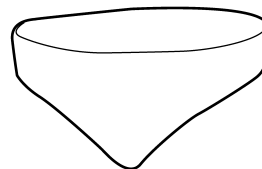
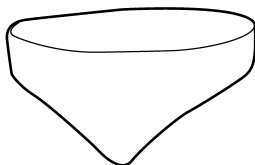
Option 2

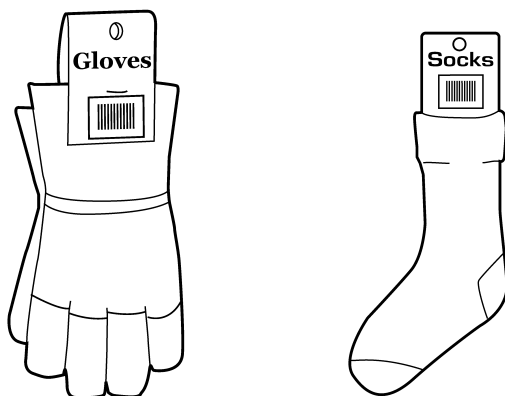
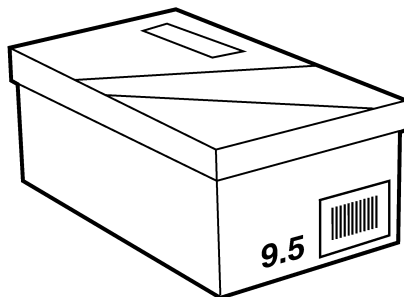
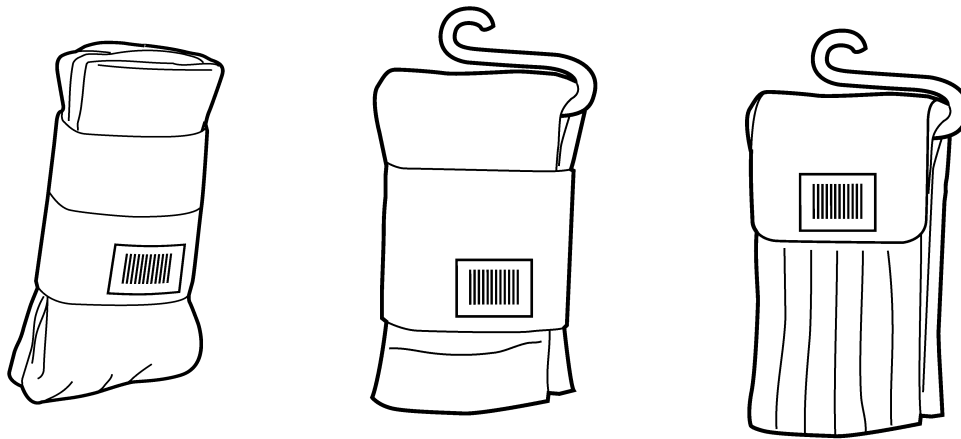


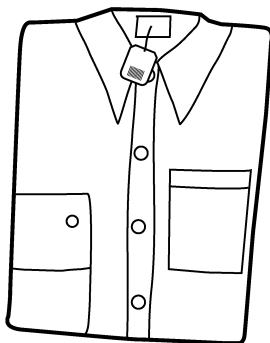
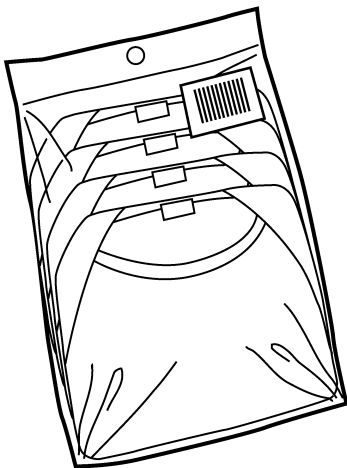
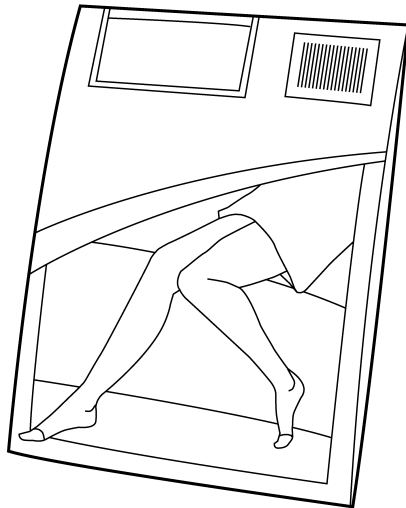
Option 1

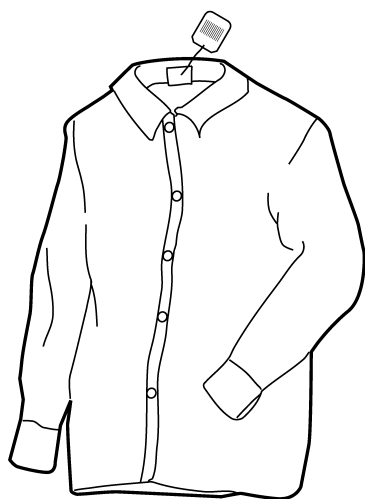
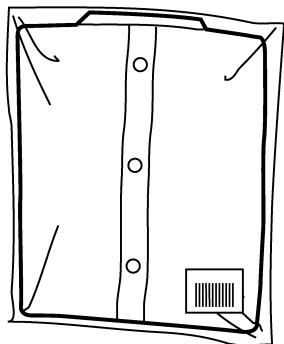


Option 2









Option 1



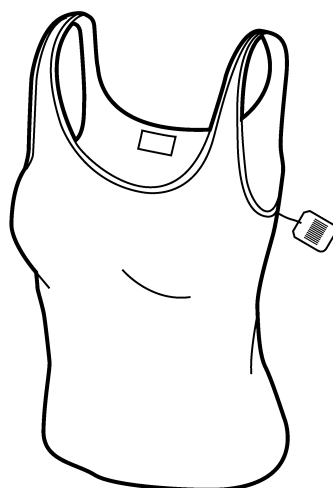
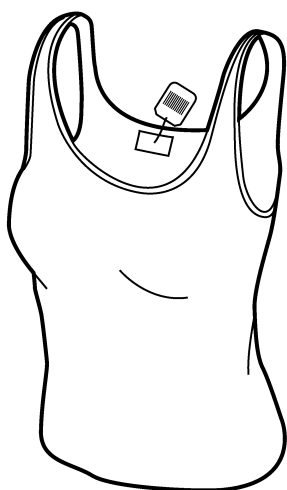
Option 2



Option 1

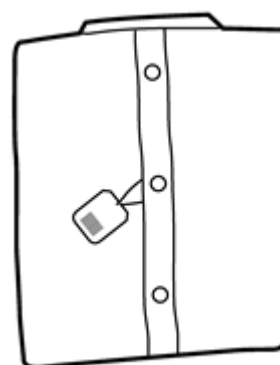
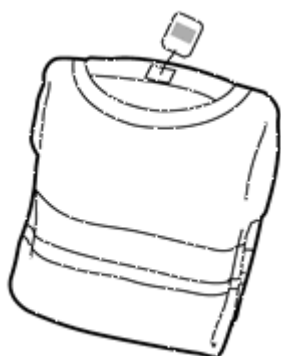
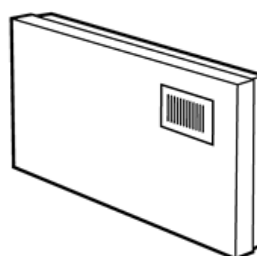
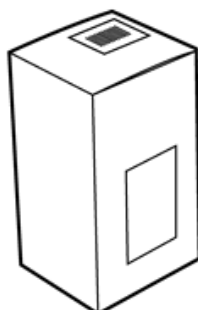
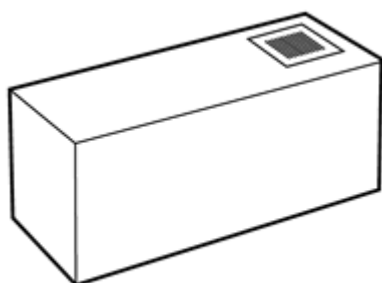


Option 2



Option 1

Option 2

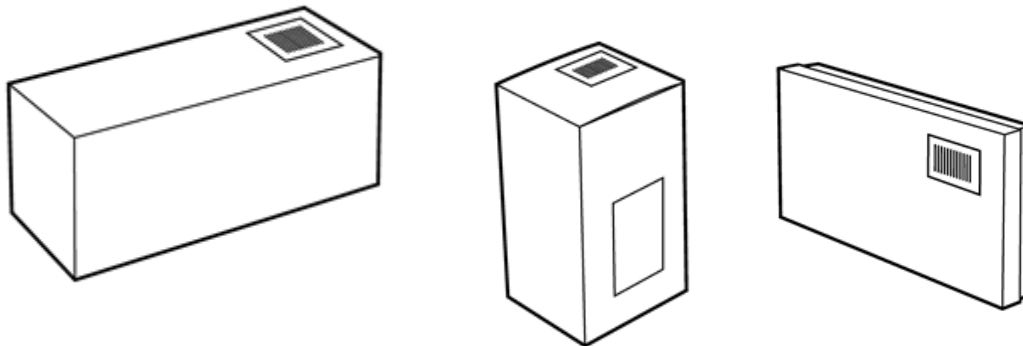




6.6. GENERAL FORMAT GUIDELINES FOR CLOTHING AND FASHION ACCESSORIES

Clothing is displayed in a variety of ways, such as loose (e.g., hanging garments), in boxes, or in bags. In many cases, a relatively small label must carry all the pertinent information relevant to the product. A retail label normally carries not only product-specific information important to the retailer (e.g., die lot, batch) and consumer related information (e.g., style, size, colour), but also the bar code symbol itself.

The correct general layout for a retail label is indicated below. Because there are many clothing types on



the retail market, detailed label formats are presented in [Section 6.6.2](#).

- Layout of label: The label should be divided into three portions:
 - Manufacturer/retailer information: The upper portion of the format is the preferred location for Human Readable Interpretation product identification. This information is important to manufacturers and retailers, but usually not to the consumer.
 - Bar code symbol: The centre portion of the format is the best location for the bar code symbol. Symbols in this location are the least likely to present obstructions to scanners because a natural boundary exists between the manufacturer/retailer information (upper portion) and the consumer information (lower portion).
 - Consumer information: The lower portion of the format is the preferred location for information that is provided for the consumer, such as price, size, and fabric content.
- Label placement on clothing and fashion accessories: To determine the placement of the printed label on clothing and fashion accessories, see [Section 6.5](#) for drawings that illustrate where to attach or place the label on each type of product.

6.6.1 Information Zones Concept

There are seven information zones that carry product information needed for the vendor, retailer, and consumer. Some information is optional based upon the type of label.

6.6.1.1.1 General Label Information Zones

Zones	Information Type	Description	Status: Required/Optional
Zone 1	Merchandise identification	This is the primary human readable merchandise identifier, usually the style number, although it may be pattern, model, or garment type. The merchandise identifier should be located in the upper left-hand portion of Zone 1.	Always required (see Note)
Zone 2	Vendor information	This includes optional vendor production information, such as vendor Stock Keeping Unit (SKU), cut number, dye lot, colour, and pattern. (Vendor information helps ensure that the correct bar code symbol is attached to the product.)	Optional
Zone 3	Data structure (EAN/UCC-13, UCC-12, EAN/UCC-8)	Bar code symbol	Always required
Zone 4	Consumer information	This includes optional product information for the consumer, such as fiber content, fire retardancy, and country of origin.	Optional
Zone 5	Size/dimension	Size/dimension is a key requirement for the consumer. Size information can be emphasised in large bold print and should be located in the right-hand portion of Zone 5. Vendors may optionally include a style name as a selection aid for the consumer.	Usually required unless defined by the product (e.g., towels)
Zone 6	Retail price	Allow space to print the price with minimum dimension characters of 25 mm (1 in.) x 32 mm (1.25 in.). For plastic packaged, boxed, and banded products, the required space for price can be provided by several methods: - For bar code symbol marking on an adhesive label, the space for price can be included as part of the label. - For bar code symbol marking designed into the packaging, the space for price can be included on the package artwork. - Providing package space adjacent to Zone 5 that is reserved for retail item pricing creates an implied space for price. Implied space replaces the requirement for actual space on labels or package artwork. If implied space for price is used, no information of importance should be printed in the area that might be covered by adhesive item price labels.	Usually required unless defined by the ticket format (e.g., sewn-in tickets)
Zone 7	Manufacturer's suggested retail price	This is for use only if merchandise is pre-priced or the suggested retail price is printed on the tag. If provided, the area must be perforated for optional removal.	Optional

Note: Size and colour are optional in Zone 1 if vendor usage requires this information to define the product.

6.6.1.2 General Label Format

See the Figures 6.6.1.2 – 1 and 6.6.1.2 – 2 for examples of how the zones appear in a typical vertical and horizontal label format.

Figure 6.6.1.2 – 1

Vertical Label Format

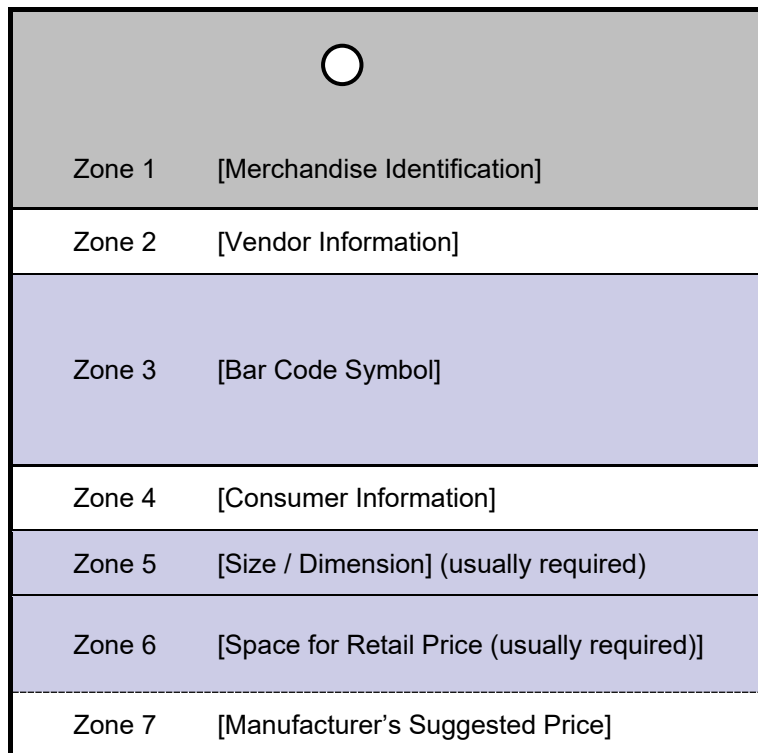
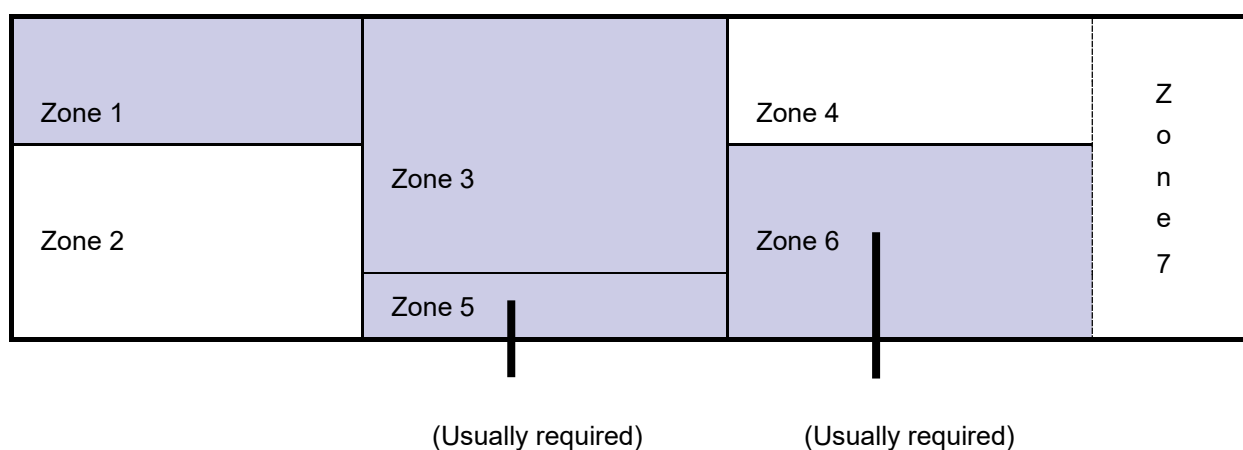


Figure 6.6.1.2 – 2

Horizontal Label Format



KEY

Required	Optional

6.6.2 Hangtag (Hanging Label) Format

Although hangtags (hanging labels) are primarily associated with hanging ready-to-wear apparel, a wide variety of products are identified with hangtags. Flat-folded apparel, jewelry, belts, handbags, lamps, and furniture are all identified by some form of hangtag. Therefore, the voluntary hangtag format guidelines outlined in this section provide for flexibility in hangtag design while maintaining the overall concept of the information zones.

Hangtags serve a dual purpose. First, they provide brand identification to the consumer. Second, as the back of a hangtag is frequently used for product information and product identification codes, it should carry the bar code symbol that identifies the product.

The typical hangtag layout features the vendor's logo on the front and product identification codes and the bar code symbol on the back. Vendors may optionally include an additional logo on the back of the hangtags. However, a logo should not appear at the bottom because a retail price label may obscure it or it could be torn off if a manufacturer's suggested retail price is removed. Background printing of logos should be avoided, as this may obscure required information or important consumer information. Logos must never obscure the bar code symbol.

6.6.2.1 Hangtag Label Information Zones

Zones	Information Type	Description	Status: Required/Optional
Zone 1	Merchandise identification	This is the primary human readable merchandise identifier, usually the style number, although it may be pattern, model, or garment type. The merchandise identifier should be located in the upper left-hand portion of Zone 1.	Always required (see Note)
Zone 2	Vendor information	This includes optional vendor production information, such as vendor Stock Keeping Unit (SKU), cut number, dye lot, colour, and pattern. (Vendor information helps ensure that the correct bar code symbol is attached to the product.)	Optional
Zone 3	Data structure (EAN/UCC-13, UCC-12, EAN/UCC-8)	Bar code symbol	Always required
Zone 4	Consumer information	This includes optional product information for the consumer, such as fiber content, fire retardancy, and country of origin.	Optional
Zone 5	Size/dimension	Size/dimension is a key requirement for the consumer. Size information can be emphasised in large bold print and should be located in the right-hand portion of Zone 5. Vendors may optionally include a style name as a selection aid for the consumer.	Usually required unless defined by the product (e.g., towels)
Zone 6	Retail price	Allow space to print the price with minimum dimension characters of 25 mm (1 in.) x 32 mm (1.25 in.).	Usually required unless defined by the ticket format (e.g., sewn-in tickets)
Zone 7	Manufacturer's suggested retail price	This is for use only if merchandise is pre-priced or the suggested retail price is printed on the tag. If provided, the area must be perforated for optional removal.	Optional

Note: Size and colour are optional in Zone 1 if vendor usage requires this information to define the product.

6.6.2.2 Hanging Tag Label Examples

Figure 6.6.2.2 – 1



6.6.3 Sewn-On (Joker) Label Format

Used almost exclusively for apparel merchandise, joker labels are similar in format to hangtags, but differ in one important respect: They are sewn directly onto the product instead of hung from the product. Because it is sewn on, only one side of the label is available for the vendor's logo, the bar code symbol, and merchandise identification information.

Inclusion of a vendor logo on the label is optional. If it is included, it should not appear at the bottom, because it may be obscured by a retail price label, or it could be torn off by the removal of a manufacturer's suggested retail price. Background printing of logos should be avoided, as this may obscure required information or important consumer information. Logos must never obscure the bar code symbol.

6.6.3.1 Sewn-On (Joker) Label Information Zones

Zones	Information Type	Description	Status: Required / Optional
Zone 1	Merchandise identification	This is the primary human readable merchandise identifier, usually the style number, although it may be pattern, model, or garment type. The merchandise identifier should be located in the upper left-hand portion of Zone 1.	Always required (see Note)
Zone 2	Vendor information	This includes optional vendor production information, such as vendor Stock Keeping Unit (SKU), cut number, dye lot, colour, and pattern. (Vendor information helps ensure that the correct bar code symbol is attached to the product.)	Optional
Zone 3	Data structure (EAN/UCC-13, UCC-12, EAN/UCC-8)	Bar code symbol	Always required
Zone 4	Consumer information	This includes optional product information for the consumer, such as fiber content, fire retardancy, and country of origin.	Optional
Zone 5	Size/dimension	Size/dimension is a key requirement for the consumer. Size information can be emphasised in large bold print and should be located in the right-hand portion of Zone 5. Vendors may optionally include a plain language style name on the size line as a selection aid for the consumer.	Usually required unless defined by the product (e.g., towels)
Zone 6	Retail price	Allow space to print the price with minimum dimension characters of 25 mm (1 in.) x 32 mm (1.25 in.).	Usually required unless defined by the ticket format (e.g., sewn-in tickets)
Zone 7	Manufacturer's suggested retail price	This is for use only if merchandise is pre-priced or the suggested retail price is printed on the tag. If provided, the area must be perforated for optional removal.	Optional

Note: Size and colour are optional in Zone 1 if vendor usage requires this information to define the product.

6.6.3.2 Sewn-On (Joker) Label Examples

Figure 6.6.3.2 – 1

Vertical Layout

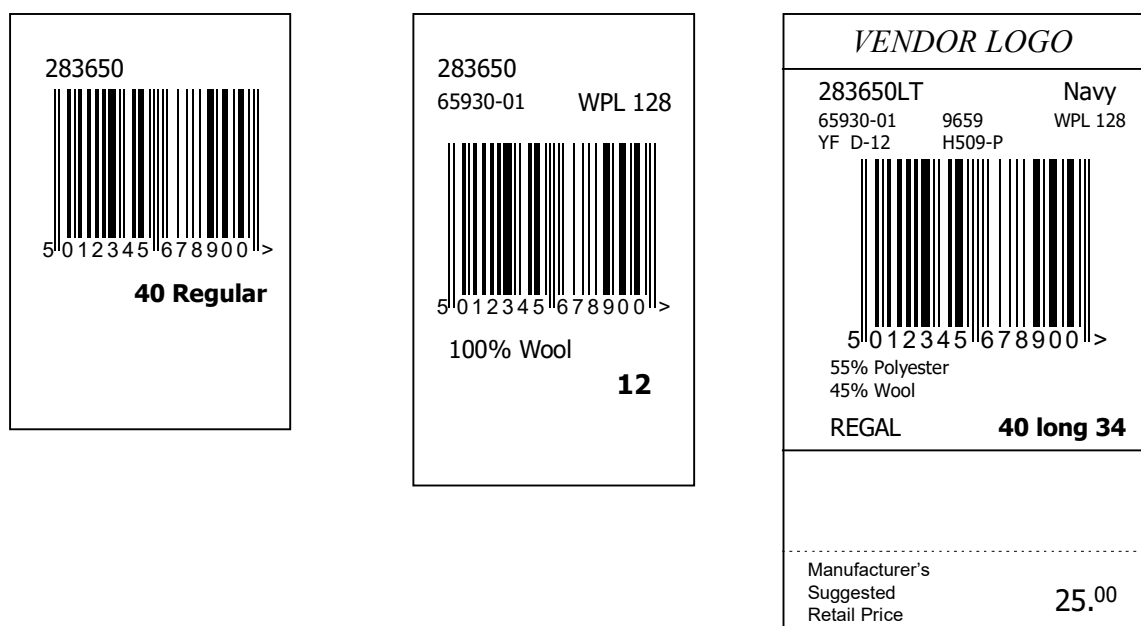
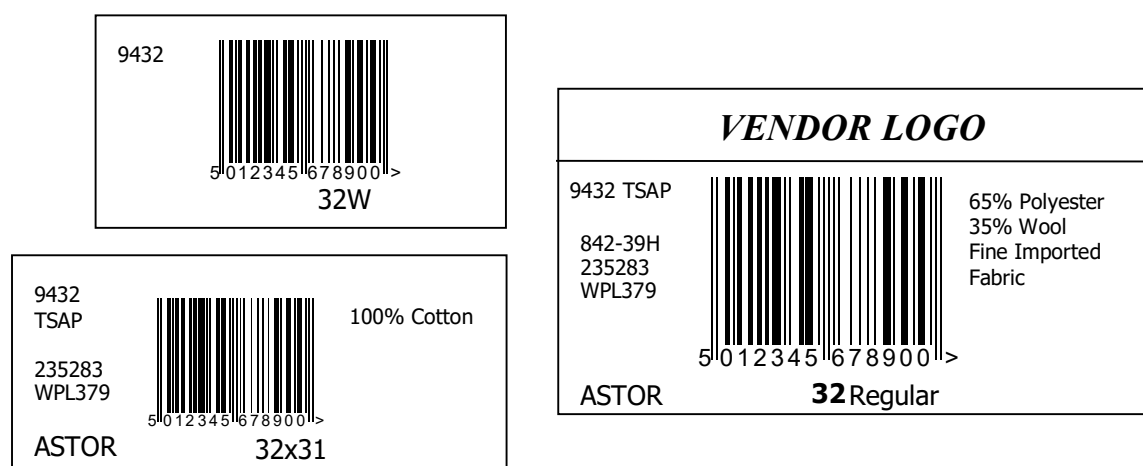


Figure 6.6.3.2 – 2

Horizontal Layout



6.6.4 Sewn-In Label Formats

Sewn-in labels are often used for towel products. Sewn-in labels may be paper based, for removal by the consumer, or cloth based and more permanent.

Because a portion of the sewn-in label is normally covered by a hem, the label should be designed with sufficient blank space on the end that will be attached to the product. Care must be taken to ensure that the product identification information on the label is not obscured by the hem, and that it does not interfere with the readability of the bar code symbol at the Point-of-Sale.

6.6.4.1 Sewn-In Label Information Zones

Zones	Information Type	Description	Status: Required/Optional
Zone 1	Merchandise identification	This is the primary human readable merchandise identifier, usually the style number, although it may be pattern, model, or garment type. The merchandise identifier should be located in the upper left-hand portion of Zone 1.	Always required (see note)
Zone 2	Vendor information	This includes optional vendor production information, such as vendor Stock Keeping Unit (SKU), cut number, dye lot, colour, and pattern. (Vendor information helps ensure that the correct bar code symbol is attached to the product.)	Optional
Zone 3	Data structure (EAN/UCC-13, UCC-12, EAN/UCC-8)	Bar code symbol	Always required
Zone 4	Consumer information	This includes optional product information for the consumer, such as fiber content, fire retardancy, and country of origin.	Optional
Zone 5	Size/dimension	Size or dimension is optional for sewn-in labels. Size or dimension may assist the consumer with product selection or may help the vendor ensure that the correct label and bar code symbol are attached to the product.	Usually required unless defined by the product (e.g., towels) and readily apparent to the consumer.
Zone 6	Retail price	Allow space to print the price with minimum dimension characters of 25 mm (1 in.) x 32 mm (1.25 in.).	Usually required unless defined by the ticket format (e.g., sewn-in tickets)
Zone 7	Manufacturer's suggested retail price	This is for use only if merchandise is pre-priced or the suggested retail price is printed on the tag. If provided, the area must be perforated for optional removal.	Optional

Note: Size and colour are optional in Zone 1 if vendor usage requires this information to define the product.

6.6.5 Plastic Packaged Products Label Location Guidelines

The plastic packaged category covers a wide assortment of merchandise including sheets, pillowcases, table linens, pantyhose, underwear, stationery supplies, pillows, bedspreads, and numerous types of flat-folded apparel that are plastic packaged.

There are two methods of marking plastic packaged products with bar code symbols:

- Incorporate the bar code symbol and other merchandise identification information into the packaging's artwork.
- Print the bar code symbol and other merchandise identification information on an adhesive label that can be press-applied to the product.

Inclusion of a vendor logo on the label is optional. If it is included, the logo should not appear at the bottom, because it may be obscured by a retail price label, or it could be torn off by the removal of a manufacturer's suggested retail price. Background printing of logos should be avoided, as this may obscure required information or important consumer information. Logos must never obscure the bar code symbol.

6.6.5.1 Plastic Packaged Products Label Information Zones

Zones	Information Type	Description	Status: Required/ Optional
Zone 1	Merchandise identification	This is the primary human readable merchandise identifier, usually the style number, although it may be pattern, model, or garment type. The merchandise identifier should be located in the upper left-hand portion of Zone 1.	Always required (see Note 1)
Zone 2	Vendor information	This includes optional vendor production information, such as vendor Stock Keeping Unit (SKU), cut number, dye lot, colour, and pattern. (Vendor information helps to ensure that the appropriate bar code symbol is attached to the product.)	Optional
Zone 3	Data structure (EAN/UCC-13, UCC-12, EAN/UCC-8)	Bar code symbol	Always required
Zone 4	Consumer information	This includes optional product information for the consumer, such as fiber content, fire retardancy, and country of origin.	Optional (see Note 2)
Zone 5	Size/dimension	Size/dimension is a key requirement for the consumer. Size information can be emphasised in large bold print and should be located in the right-hand portion of Zone 5. Vendors may optionally include a style name as a selection aid for the consumer.	Usually required (see Note 3)
Zone 6	Retail price	Allow space to print the price with 25 mm (1 in.) x 32 mm (1.25 in.) minimum dimension characters. For plastic packaged products, this required space for price can be provided by several methods: • For bar code symbol marking on an adhesive label, the space for price can be included as part of the label. • For bar code symbol marking designed into the packaging, the space for price can be included on the package artwork. • Providing package space adjacent to Zone 5 that is reserved for retail item pricing creates an implied space for price. Implied space replaces the requirement for actual space on labels or package artwork. If implied space for price is used, no information of importance should be printed in the area that might be covered by adhesive item price labels.	Usually required
Zone 7	Manufacturer's suggested retail price	This is for use only if merchandise is pre-priced or the suggested retail price is printed on the tag. If provided, the area must be perforated for optional removal.	Optional

Note 1: Size and colour are optional in Zone 1 if vendor usage requires this information to define the product.

Note 2: Some jurisdictions require that certain products include a permanently affixed statement of information of this type in Zone 4 that may not be satisfied by inclusion on the package.

Note 3: Size may be omitted from Zone 5 if the size information is readily available on the product packaging.

6.6.5.2 Plastic Packaged Products Label Placement Guidelines

Consistent bar code symbol placement is required for successful scanning at the Point-of-Sale. The symbol placement guidelines for plastic packaged products have been designed with the flexibility to accommodate differences that may arise from industry to industry:

- On plastic packaged products, the front top right-hand corner is the preferred placement for the bar code symbol and other product identification information.
- The bar code symbol and other product identification information may be located on the front or back of plastic packaged products. However, all products within a particular merchandise category must have their bar code symbols placed on the same side of the package.

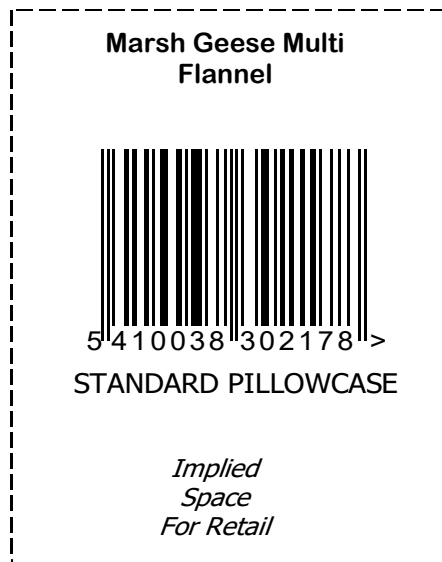
Caution: Placement of the bar code symbol on the back of a product may result in the presentation of the product on the display counter in a backside up orientation by some retailers so that the bar code symbol and retail price appear together in full view by the customer.

- The orientation of the bar code symbol and other product identification information should be consistent with any graphics or descriptive data on the plastic package.
- The symbol and other product identification information, whether built into the package artwork or an adhesive label, must not be closer than 8 mm (0.3 in.) or farther than 102 mm (4 in.) from any edge of the package. Experience has shown that the previously recommended minimum distance of 5 mm (0.2 in.) is inadequate. Also, cashiers often grab packages on the edge with their thumbs. Avoid placing the bar code symbol too close to the edge. Such placement reduces Point-of-Sale efficiency and may cause distortion of the symbol. (See [Section 6.3.3.3, Edge Rule](#).)
- The bar code symbol and other product identification information on plastic packaged products should normally be located on the front top right-hand corner. However, for very large, bulky, or unusually shaped products, this may be impractical or inappropriate. See [Section 6.4.9](#) for information on large, heavy, and bulky items.

Note: [Section 6.4](#) specifies the lower right quadrant of the back of the package or container as the recommended location for the bar code symbol. This recommendation remains in effect for plastic packaged products that are sold in a grocery store environment.

6.6.5.3 Plastic Packaged Products Label Example

Figure 6.6.5.3 – 1



6.6.6 Boxed Products Label Formats

Some boxed products may be sold in or out of the box. Other boxed products are actually sets that may also be sold as individual items. Some boxes carry significant amounts of design graphics, while others are simply cardboard boxes containing the product.

Box size can range from very small, as in jewelry or cosmetics, to very large, as in home furnishings. For extremely large boxed products, consider using a two-part tear-off bar code symbol label to facilitate scanning at the Point-of-Sale while leaving one label on the box.

There are two methods of marking boxed products with bar code symbols:

- Incorporate the bar code symbol and other merchandise identification information the box's artwork.
- Print the bar code symbol and other merchandise identification information on an adhesive label that can be affixed to the box.

Inclusion of a vendor logo in the box marking format is optional. If the logo is included, it should not appear at the bottom, because it may be obscured by a retail price label, or it could be torn off if a manufacturer's suggested retail price is removed. Background printing of logos should be avoided, as this may obscure required information or important consumer information.

6.6.6.1 Boxed Products Label Information Zones

Zones	Information Type	Description	Status: Required/Optional
Zone 1	Merchandise identification	This is the primary human readable merchandise identifier, usually the style number, although it may be pattern, model, or garment type. The merchandise identifier should be located in the upper left-hand portion of Zone 1.	Always required (see Note 1)
Zone 2	Vendor information	This includes optional vendor production information, such as vendor Stock Keeping Unit (SKU), cut number, dye lot, colour, and pattern. (Vendor information helps ensure that the correct bar code symbol is attached to the product.)	Optional
Zone 3	Data structure (EAN/UCC-13, UCC-12, EAN/UCC-8)	Bar code symbol	Always required
Zone 4	Consumer information	This includes optional product information for the consumer, such as fiber content, fire retardancy, and country of origin.	Optional (see Note 2)
Zone 5	Size/dimension	Size/dimension is a key requirement for the consumer. Size information can be emphasised in large bold print and should be located in the right-hand portion of Zone 5. Vendors may optionally include a style name as a selection aid for the consumer.	Usually required (see Note 3)
Zone 6	Retail price	Allow space to print the price with minimum dimension characters of 25 mm (1 in.) x 32 mm (1.25 in.). For boxed products, this required space for price can be provided by several methods: - For bar code symbol marking on an adhesive label, the space for price can be included as part of the label. - For bar code symbol marking designed into the packaging, the space for price can be included on the package artwork. - Providing package space adjacent to Zone 5 that is reserved for retail item pricing creates an implied space for price. Implied space replaces the requirement for actual space on labels or package artwork. If implied space for price is used, no information of importance should be printed in the area that might be covered by adhesive item price labels.	Usually required
Zone 7	Manufacturer's suggested retail price	For use only if merchandise is pre-priced or the suggested retail price is printed on the tag. If provided, the area must be perforated for optional removal.	Optional

Note 1: Size and colour are optional in Zone 1 if vendor usage requires this information to define the product.

Note 2: Some jurisdictions require that certain products include a permanently affixed statement of information of this type in Zone 4 that may not be satisfied by inclusion on the package.

Note 3: Size may be omitted from Zone 5 if the size information is readily available on the product packaging.

6.6.6.2 Box Marking Versus Item Marking

Certain boxed products may be sold out of the box as free standing items, or they may be sold in the box. This creates a dilemma for the manufacturer: to mark the item or mark the box?

One solution to this problem is the use of a special adhesive label known as a double stick label. It allows manufacturers to mark the box and leave the item-marking decision to the retailer. The double stick label has two layers of backing material. The first layer is peeled off when the label is applied to the box. At the retailer's option, the adhesive label may be peeled off a second time and applied directly to the product.

Another solution is to mark both the box and item with the same bar code symbol.

6.6.6.3 Boxed Products Label Placement Guidelines

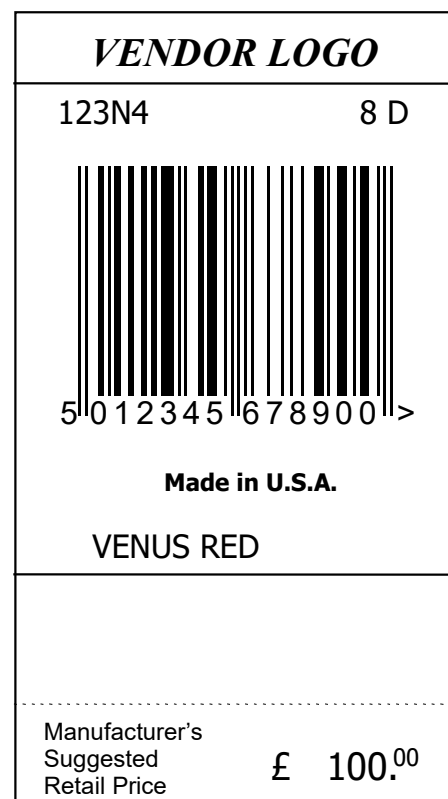
Consistent bar code symbol placement within an industry or product category is required if merchandise carrying a bar code symbol is to successfully scan at the Point-of-Sale. Since the category of boxed products includes a diverse merchandise group, location guidelines have been designed with considerable flexibility to accommodate differences that may arise from industry to industry:

- The exposed surface of the box is the preferred location for bar code symbols and other product identification information on boxed products sold primarily in the department or speciality store environment.
- The orientation of the bar code symbol and other product identification information should be consistent with any graphics or descriptive data on the box.
- The symbol and other product identification information, whether built into the package artwork or an adhesive label, must not be closer than 8 mm (0.3 in.) or farther than 102 mm (4 in.) from any edge of the package. Experience has shown that the previously recommended minimum distance of 5 mm (0.2 in.) is inadequate. Also, cashiers often grab packages on the edge with their thumbs. Avoid placing the bar code symbol too close to the edge. Such placement reduces Point-of-Sale efficiency and may cause distortion of the symbol. (See [Section 6.3.3.3, Edge Rule](#).)
- The bar code symbol and other product identification information on plastic packaged products should normally be located on the front top right-hand corner. However, for very large, bulky, or unusually shaped products, this may be impractical or inappropriate. See [Section 6.4.9](#) for information on large, heavy, and bulky items.

Note: [Section 6.4](#) specifies the lower right quadrant of the back of the package or container as the recommended location of the bar code symbol. This recommendation remains in effect for plastic packaged products that are sold in a grocery store environment.

6.6.6.4 Boxed Products Label Examples

Figure 6.6.6.4 – 1



6.6.7 Banded Products Label Formats

Banded packaging involves a specialised group of products. This type of packaging is most commonly associated with hosiery (socks) or yarn products.

There are the two methods of marking banded products with bar code symbols:

- Incorporate the bar code symbol and other merchandise identification information into the band's artwork.
- Print the bar code symbol and other merchandise identification information on an adhesive label that can be applied to the band.

The typical banded product label will feature the vendor's logo on the front while the back will contain product identification codes, consumer information, and the bar code symbol. The vendor's logo can also be printed on the back of the band as part of the band marking format. However, care should be taken to ensure that there is no obstruction of the bar code symbol or other important product identification information. Background printing of logos should also be avoided.

6.6.7.1 Banded Products Label Information Zones

Zones	Information Type	Description	Status: Required/Optional
Zone 1	Merchandise identification	This is the primary human readable merchandise identifier, usually the style number, although it may be pattern, model, or garment type. The merchandise identifier should be located in the upper left-hand portion of Zone 1.	Always required (see Note 1)
Zone 2	Vendor information	This includes optional vendor production information, such as vendor Stock Keeping Unit (SKU), cut number, dye lot, colour, and pattern. (Vendor information helps ensure that the correct bar code symbol is attached to the product.)	Optional
Zone 3	Data structure (EAN/UCC-13, UCC-12, EAN/UCC-8)	Bar code symbol	Always required
Zone 4	Consumer information	This includes optional product information for the consumer, such as fiber content, fire retardancy, and country of origin.	Optional (see Note 2)
Zone 5	Size/dimension	Size/dimension is a key requirement for the consumer. Size information can be emphasised in large bold print and should be located in the right-hand portion of Zone 5. Vendors may optionally include a style name as an aid to the consumer in selection.	Usually required (see Note 3)
Zone 6	Retail price	Allow space to print the price with minimum dimension characters of 25 mm (1 in.) x 32 mm (1.25 in.). For banded products, this required space for price can be provided by several methods: - For bar code symbol marking on an adhesive label, the space for price can be included as part of the label. - For bar code symbol marking designed into the packaging, the space for price can be included on the package artwork. - Providing package space adjacent to Zone 5 that is reserved for retail item pricing creates an implied space for price. Implied space replaces the requirement for actual space on labels or package artwork. If implied space for price is used, no information of importance should be printed in the area that might be covered by adhesive item price labels.	Usually required
Zone 7	Manufacturer's suggested retail price	This is for use only if merchandise is pre-priced or the suggested retail price is printed on the tag. If provided, the area must be perforated for optional removal.	Optional

Note 1: Size and colour are optional in Zone 1 if vendor usage requires this information to define the product.

Note 2: Some jurisdictions require that certain products include a permanently affixed statement of information of this type in Zone 4 that may not be satisfied by inclusion on the package.

Note 3: Size may be omitted from Zone 5, if the size information is readily available on the product packaging.

6.7. GENERAL PLACEMENT GUIDELINES FOR ITEMS USED IN DISTRIBUTION

Items packaged for transport include any item handled as a single unit in the transportation and distribution process. This covers a wide variety of package types, such as pallets, cartons, cases, bins, totes, and slipsheets. These items can be trade items or logistic units.

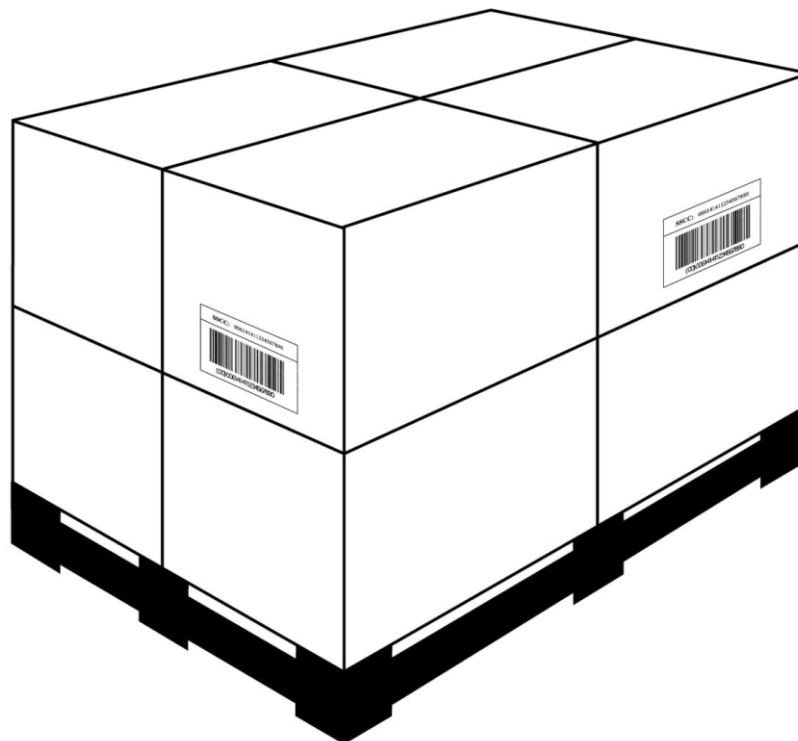
The symbols on these items can be scanned using diverse scanning techniques. During sortation processes at any point in the supply chain, fixed position scanners could be positioned on conveyor systems to identify and route items. Scanning might be done from forklifts during loading and unloading on transport vehicles. Hand held scanners might be used when items are selected for dispatch or when they are received. Symbol location is designed to accommodate all these possibilities.

6.7.1 Symbol Location

Each full unit, whether a trade item or a logistics unit, shall have at least one bar code symbol. The symbol should be a minimum of 50 mm (2") from any vertical edge. Two labels (or printed symbols) are strongly recommend and should be fixed to adjacent sides of items packaged for transport. The labelled sides are the short side and the long side to its right. In warehouse applications, this enables consistent turning to ensure a label is always visible.

Figure 6.7.1 – 1

Two labels on adjacent sides: one on the short side & one on the long side to its right



6.7.1.1 Units Less Than 1 Metre in Height

For cartons and other units less than 1 metre (39 in.) in height, pallets excluded, symbols should be placed so that the lowest edge of the bar code symbol is 32 mm (1.25 in.) from the base of the unit.

Including Quiet Zones, the symbol should be at least 19 mm (0.75 in.) from the vertical edge.

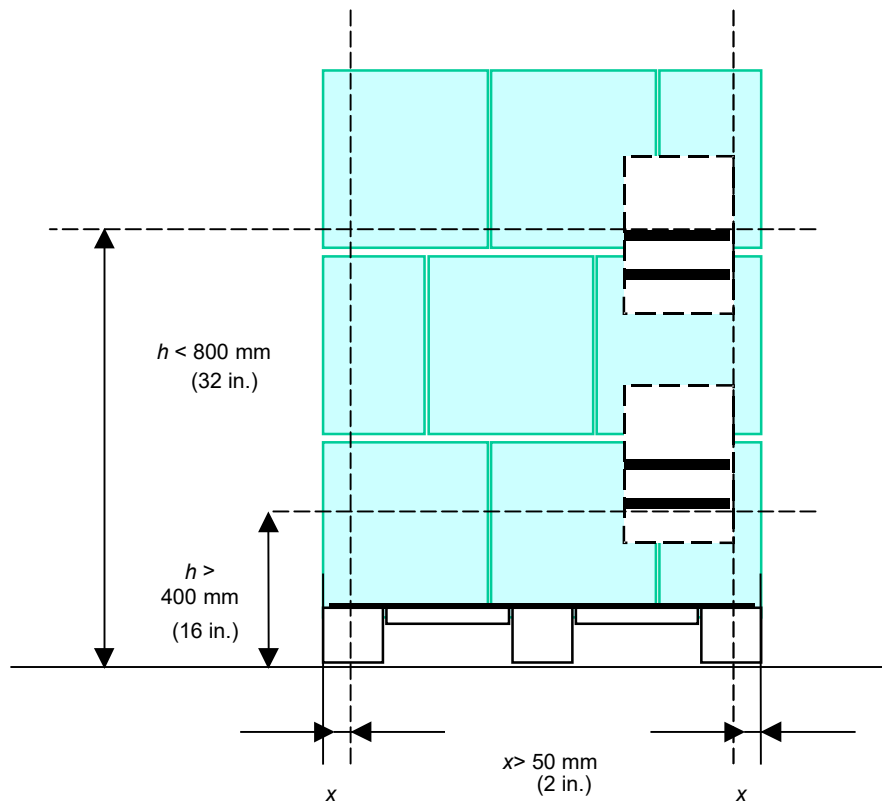
6.7.1.2 For Pallets Less Than 1 Metre in Height

For pallets less than 1 metre (39 in.) in height, symbols should be placed as high as possible but not more than 800 mm (32 in.) from the base of the unit.

6.7.1.3 Units Greater Than 1 Metre in Height

For pallets and other units greater than 1 metre (39 in.) in height, symbols should be placed so that all the bar code symbols are at a height between 400 mm (16 in.) and 800 mm (32 in.) from the base of the unit. Including Quiet Zones, the symbol should be no closer than 50 mm (2 in.) from the vertical edge.

Figure 6.7.1.3 – 1



6.7.2 Shallow Trays and Cases

If the height of a case or tray is less than the height of the symbol at the X-dimension required, or if the construction of the unit is such that the full symbol height cannot be accommodated, the following options should be considered in this order of preference:

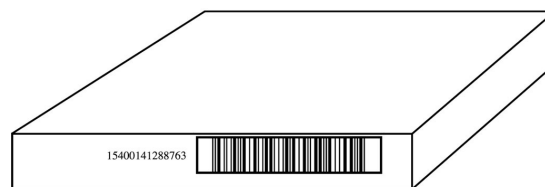
1. Print the symbol at full height with the top of the bars located at the top of the side (e.g., as close as possible to the recommended location).

Figure 6.7.2 – 1



2. When the height of the unit is less than the height of the symbol including the Human Readable Interpretation, the Human Readable Interpretation should be placed to the left of the symbol, respecting the compulsory Quiet Zones.

Figure 6.7.2 -- 2



3. When the height of the unit is less than the bar height, the bars should run from top to bottom of the unit's side, with the Human Readable Interpretation placed to the side (e.g., truncate the symbol by the minimum amount).

Figure 6.7.2 -- 3



4. If placing a bar code symbol on the side of the package is not possible due to insufficient package height, the symbol may be placed on the top of the package. The symbol should be placed with the bars perpendicular to the shortest side, no closer than 32 mm (1.25 in.) from any edge.

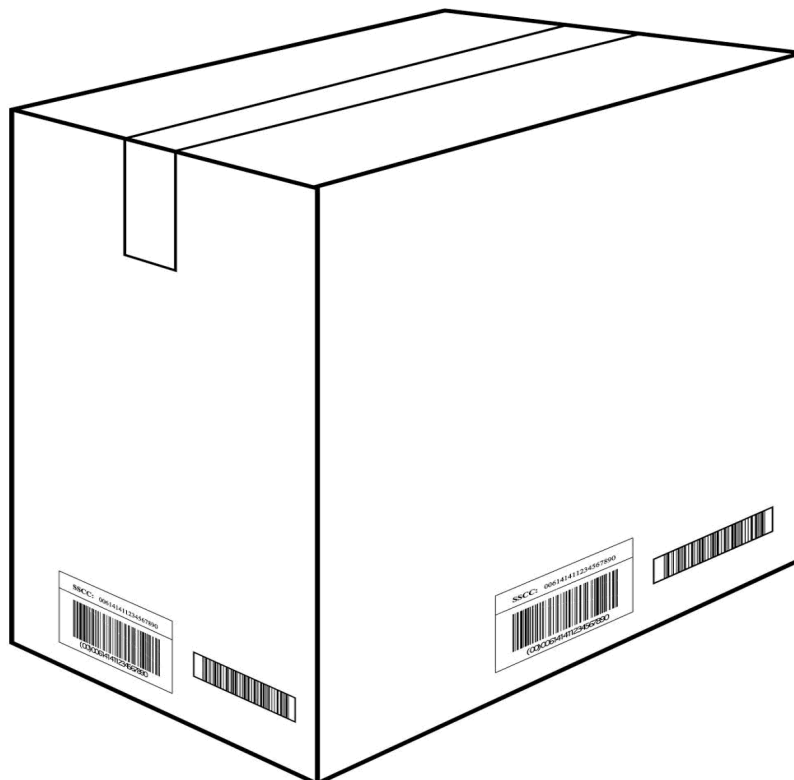
Sometimes two bar code symbols are used on variable measure units. If it is necessary to remove the Human Readable Interpretation from beneath the unit, the human readable characters of the main

symbols should be placed to the left of the bars of the main symbol. The Human Readable Interpretation of the Add-On Symbol should be placed to the right of the bars of the Add-On Symbol.

6.7.3 Add-On Symbols

If the unit is already marked with a symbol, any Add-On Symbol shall be placed so as not to obscure the primary bar code symbol. The preferred location for the symbol in this case is to the side of the primary code symbol, so that a consistent horizontal location is maintained. Maintain Quiet Zones for both symbols.

Figure 6.7.3 – 1



If there is the potential for both parts of the data content to be represented in a UCC/EAN-128 Bar Code Symbol, they should be concatenated and one symbol produced. Bar code symbols containing data essential for complete product identification (e.g., trade measurements) should always be aligned with and to the right of the bar code symbol containing the Global Trade Item Number™ (GTIN™) (the primary symbol).

6.A.1 APPENDIX 1: GENERAL RULES FOR CURVED SURFACES

6.7.4

If a bar code symbol is printed on a curved surface, it is preferable for the bars to be perpendicular to the generating lines of the surface of the container (so that a scan line can pass through the symbol on as near a flat plane as possible) (see Figure 6.A.1 – 1).

This preference may be subject to space considerations and to the direction of printing. Better printing quality is normally obtained when the bars are parallel to the direction of printing.

The text and orientation of the Ladder Orientation Bar Code Symbol can be read either from the top down or from the bottom up, whichever is consistent with other text and graphics on the container. Empirical data has demonstrated that it makes no difference one way or the other.

This preference for orientation on curved surfaces becomes a mandatory rule on curves with small radii. The angle between the tangent to the centre of the curved symbol and the tangent to the extremity of the curved symbol (outer edge of the guard bars for symbol in the EAN/UPC Symbology Family) must be less than 30 degrees. If this angle is more than 30 degrees, the symbol must be oriented such that the bars are perpendicular to the generating lines of surface of the item. This is diagrammed in Figure 6.A.1 – 2.

Figure 6.A.1 – 1

Bar Code Symbol Orientation on Curved Surfaces

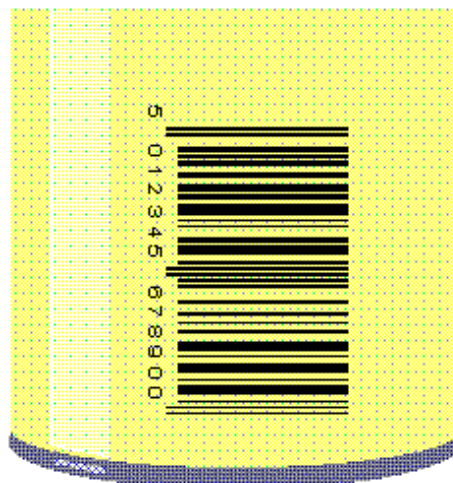
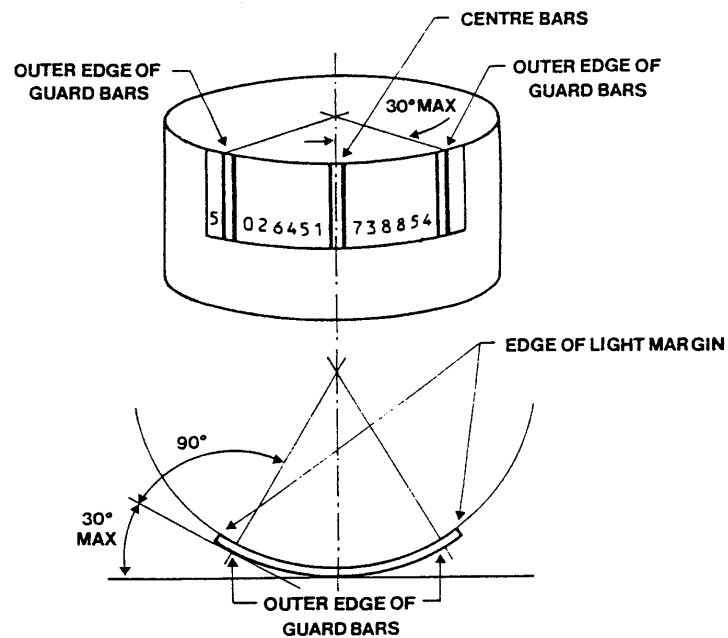


Figure 6.A.1 – 2

Relationship Between Symbol and Curvature



Figures 6.A.1 – 3, 6.A.1 – 4, and 6.A.1 – 5 show the relationship between acceptable X-dimensions for units of different diameters and the minimum diameters for different X-dimensions.

Figure 6.A.1 – 3

Relationship Between the Diameter and X-Dimension

Diameter of Container (cm)	Diameter of Container (in.)	Maximum Value of X-Dimension			
		EAN-13 or UPC-A Bar Code Symbol		EAN-8 Bar Code Symbol	
		X-Dimension		X-Dimension	
		mm	Thousandths of an Inch	mm	Thousandths of an Inch
3 cm or below	1.18	*	*	*	*
3.5	1.38	*	*	.274	12.0
4.0	1.57	*	*	.314	12.4
4.5	1.77	*	*	.353	13.9
5.0	1.97	.274	10.8	.389	15.3
5.5	2.16	.304	12.0	.429	16.9
6.0	2.36	.330	13.0	.469	18.5
6.5	2.56	.356	14.0	.508	20.0
7.0	2.75	.386	15.2	.549	21.6
7.5	2.95	.413	16.3	.587	23.2
8.0	3.25	.446	17.4	.627	24.7
8.5	3.35	.469	18.5	.660	26.0
9.0	3.54	.495	19.5	.660	26.0
9.5	3.74	.525	20.7	.660	26.0
10.0	3.94	.551	21.7	.660	26.0
10.5	4.13	.578	22.8	.660	26.0
11.0	4.33	.607	23.9	.660	26.0
11.5	4.53	.634	25.0	.660	26.0
12 cm or above	4.72	.660	26.0	.660	26.0

Note 1: The X-dimension necessary for the 30 degree constraint to be respected is smaller than acceptable standards permit (less than 0.8). Hence the symbol will have to be rotated through an angle of 90 degrees.

Note 2: An asterisk (*) indicates that the package diameter is too small to permit a Picket Fence Orientation Bar Code Symbol, and the symbol must be rotated 90 degrees to a Ladder Orientation.

Figure 6.A.1 – 4

Relationship Between the X-Dimension and Diameter

X-Dimension		Minimum Diameter of Container			
X-Dimension (Thousandths of an Inch)	X-Dimension (mm)	EAN-13 or UPC-A Bar Code Symbol (mm)	EAN-13 or UPC-A Bar Code Symbol (in.)	EAN-8 Bar Code Symbol (mm)	EAN-8 Bar Code Symbol (in.)
10.4	.264	4.8	1.89	3.4	1.34
11.7	.297	5.4	2.13	3.8	1.50
13.0	.330	6.0	2.36	4.3	1.69
14.3	.363	6.6	2.60	4.7	1.85
15.6	.396	7.3	2.87	5.1	2.01
16.7	.429	7.8	3.07	5.5	2.16
18.2	.462	8.4	3.31	5.9	2.32
19.5	.495	9.0	3.54	6.4	2.52
20.8	.528	9.6	3.78	6.8	2.68
22.1	.561	10.3	4.05	7.3	2.87
23.4	.594	10.8	4.25	7.6	2.99
24.7	.627	11.4	4.49	8.0	3.25
26.0	.660	12.0	4.72	8.5	3.35

Figure 6.A.1 – 5

Relationship Between the Diameter and X-Dimension

Diameter of Container (cm)	Diameter of Container (in.)	Maximum Value of X-Dimension					
		Global Trade Identification Number™ (GTIN™) in ITF-14 Bar Code Symbol		GTIN™ in UCC/EAN-128 Bar Code Symbol		SSCC in UCC/EAN-128 Bar Code Symbol	
		mm	Thousandths of an Inch	mm	Thousandths of an Inch	mm	Thousandths of an Inch
6.0	2.36	*	*	*	*	*	*
8.0	3.25	*	*	*	*	*	*
10.0	3.94	*	*	*	*	*	*
12.0	4.72	*	*	*	*	*	*
14.0	5.51	*	*	*	*	*	*
16.0	6.30	*	*	*	*	*	*
18.0	7.09	.254	10.0	*	*	*	*
20.0	7.87	.284	11.2	.257	10.1	*	*
22.0	8.66	.310	12.2	.284	11.2	*	*
24.0	9.45	.340	13.4	.310	12.2	*	*
26.0	10.24	.366	14.4	.337	13.3	*	*
28.0	11.02	.393	15.5	.360	14.2	*	*
30.0	11.81	.429	16.9	.386	15.2	*	*
32.0	12.60	.429	16.9	.429	16.9	*	*
34.0	13.38	.429	16.9	.429	16.9	*	*
≥ 36.0	≥ 14.17	.429	16.9	.429	16.9	*	*

Note: An asterisk (*) indicates that the package diameter is too small to permit a Picket Fence Orientation Bar Code Symbol, and the symbol must be rotated 90 degrees to a Ladder Orientation.

Section 7.0:

System Processing in EDP Applications

Table of Contents

7.1 Introduction.....	3
7.2 Synopsis of Message Processing.....	4
7.2.1 Analysis of the Data Carrier and Plausibility Tests for Element Strings..	5
7.2.1.1 Symbology Identification	6
7.2.1.2 Prefix in Internal Table.....	6
7.2.1.3 Item Identification	6
7.2.1.4 Application Identifier (AI) in Internal Table	6
7.2.1.5 Length of Data 14 Digits	6
7.2.1.6 Check Digit Calculation	6
7.2.1.7 Move Element String to Message Field.....	7
7.3 Validation of the Electronic Message Regarding System Consistency.....	8
7.4 Validation of the Electronic Message Regarding User Requirements	10
7.5 Conversion of Weights and Measures in User Applications.....	11
7.6 Linkage of GTINs™ in a Database	13
7.6.1 The Principle	13
7.6.2 Extended Example of a Trade Item Hierarchy	14
7.6.3 Linkage of GTINs™ in a Non-Relational Database by Trade Item Manufacturer.....	15
7.7 Element Strings Represented in Data Carriers.....	16
7.7.1 GTINs™ Represented in EAN.UCC System Data Carriers.....	17
7.7.2 Handling of Global Trade Item Numbers™ to Conform with the System	19

7.7.3 Element Strings Represented in UCC/EAN-128 Symbology	20
7.8 Secondary Data for Specific Health Industry Products	21
7.9 Processing of Data from UCC/EAN-128 Bar Code Symbols.....	23
7.9.1 General.....	24
Element Strings with Pre-Defined Lengths using Application Identifiers.....	24
7.9.3 The Function 1 Character (FNC1)	24

7.1 Introduction

The purpose of entering data transmitted from a reading device into a system is to record a transaction. In the EAN.UCC System, a transaction is an electronic message to be processed according to the meaning and content of the data fields contained in the message. This should be possible without requiring any human intervention to determine the data's meaning and content.

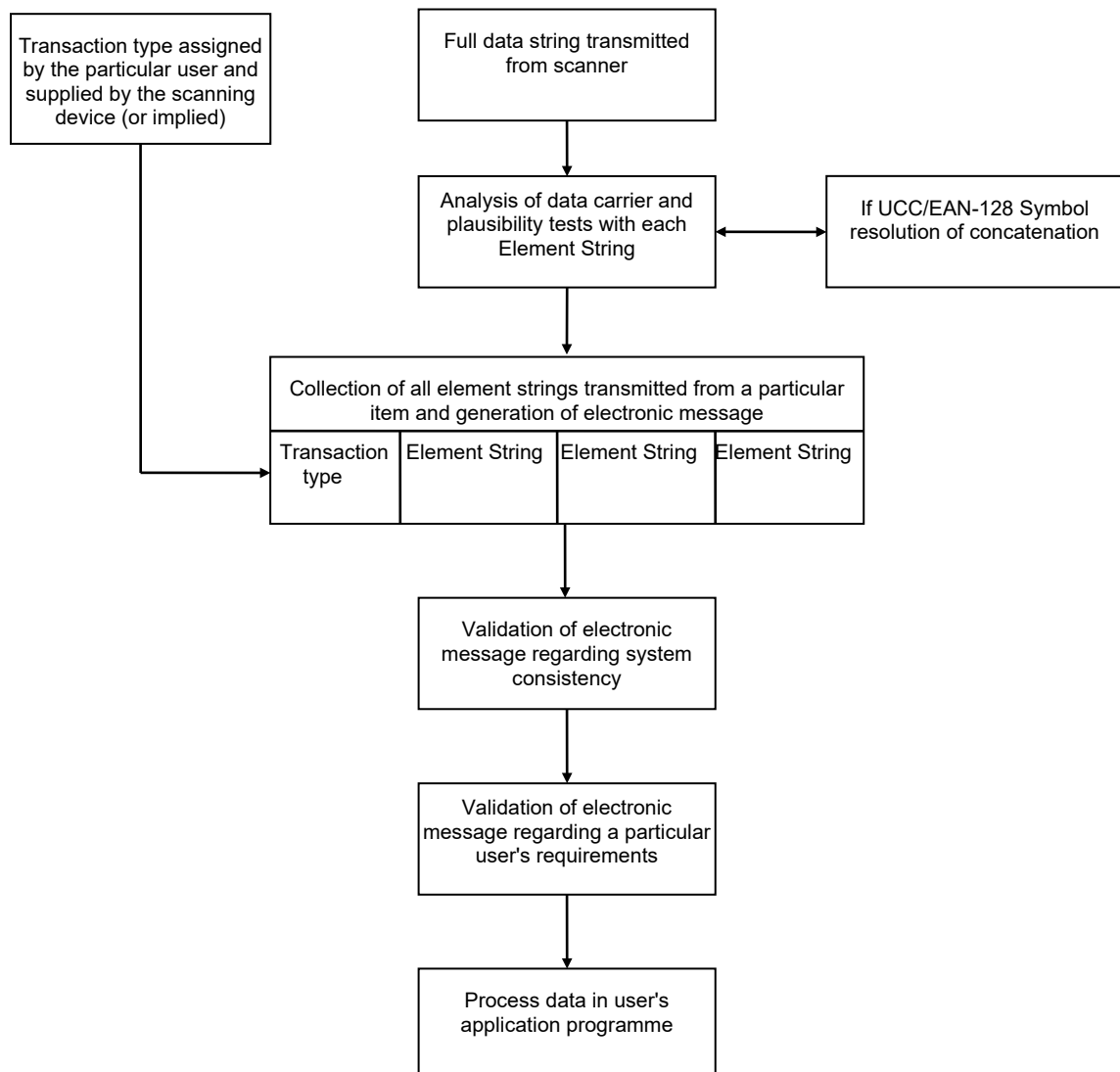
The standardised Element Strings of the EAN.UCC System are the basis for the identification of items of every kind. They identify a particular item in an unambiguous manner and supply relevant attribute information.

When these Element Strings are printed on items, the scanned and transmitted data refers to that item and identifies its physical presence at a given location. When the message read from the scanned data carrier is coupled with an internally assigned designation of the type of item movement (e.g., warehouse entry, stock taking, sales), it is possible to automatically record data related to each movement of items. This provides security in two ways. First, an item must be physically present in order to produce a bar code reader message about the item, and, second, only the data in the bar code on the item and, therefore, relevant to it, can be recorded. False notification of movements is thereby largely eliminated.

When Element Strings are used in administrative areas (e.g., in order entry) they also can be used for automatic, error-free data capture. Because of the considerable length of many EAN.UCC System ID numbers, automatic reading has great significance. By using a Check Digit, a digit that ensures the data has been correctly composed, the accuracy of the reading can be verified.

7.2 Synopsis of Message Processing

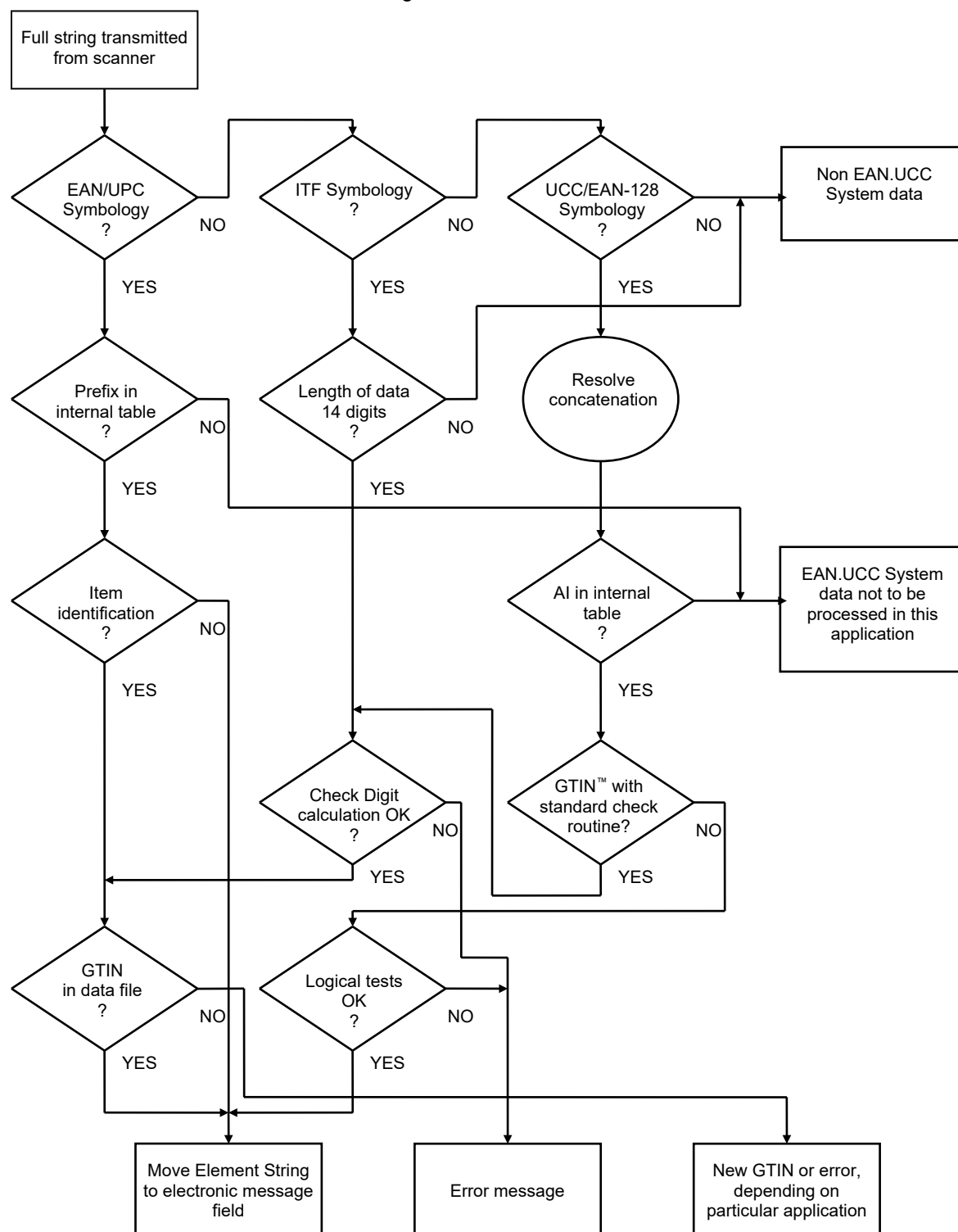
Figure 7.2 – 1



For details on any of the actions in Figure 7.2 – 1, see the following subsections.

7.2.1 Analysis of the Data Carrier and Plausibility Tests for Element Strings

Figure 7.2.1 – 1



For details on any of the actions in Figure 7.2.1 – 1, see the following subsections.

7.2.1.1 Symbology Identification

Each transmitted full string consists of a symbology identifier and one or more Element Strings (see [Section 3.0](#)). The identifiers of bar code symbologies are stated in [Section 5.0](#).

7.2.1.2 Prefix in Internal Table

System users may generate an internal table showing the EAN.UCC Prefixes of Element Strings they wish to process. This table also serves to sort out the Element Strings representing item identification numbers in order to check their presence in the data file. Details on the respective prefixes are stated in [Section 3.0](#).

7.2.1.3 Item Identification

The symbols in the EAN/UPC Symbology family contain identification data for trade items and special data structures (e.g., coupons). Whether an Element String contains the identification of a trade item is determined by the EAN.UCC Prefix. System users must determine the specific structure and meaning of prefixes 20 to 29 as defined by their EAN Member Organisation.

7.2.1.4 Application Identifier (AI) in Internal Table

The Element Strings using Application Identifiers cover a wide range of applications. In order to keep the amount of programming on a reasonable level, it is possible to ignore processing of unwanted Element Strings. This is achieved by establishing an internal table with only the Application Identifiers intended for processing.

7.2.1.5 Length of Data 14 Digits

ITF-14 Bar Code Symbols are used to represent trade item identification numbers. They have 14 Human Readable Interpretation characters, which can be printed above or below the symbol. In the EAN.UCC System, Global Trade Item Numbers™ (GTINs™) are stored in the GTIN Format, a 14-digit reference field in computer files that is used to ensure the uniqueness of the identification numbers.

7.2.1.6 Check Digit Calculation

In EAN/UPC Symbology, the Check Digit verifies reading and decoding of bar code symbols as well as Global Trade Item Numbers™ (GTINs™). This is performed automatically by the bar code reader.

Bar code readers processing ITF-14 Symbols may be programmed to verify the Check Digit as well. If this recommended verification has been performed, it is indicated by the symbology identifier] I 1 (see [Section 5.0](#)). Data transmitted from ITF-14 Symbols with symbology identifier] I 0 must be verified.

UCC/EAN-128 Bar Code Symbols have an integral Symbol Check Character that verifies correct decoding of scanned data. If an Element String encoded in UCC/EAN-128 includes a Check Digit, the Check Digit will not be verified by the bar code reader. While the data security provided by the UCC/EAN-128 Symbol Check Character guarantees proper decoding of the entire Element String, correctness of the contained identification number is achieved by having the application software verify the ID number's Check Digit. Logical Tests

Logical tests check for reasonable data content, such as verifying:

- Data field ranges (e.g., month < 13 and > 00)
- The maximum length of a variable length Element String
- Alphanumeric characters in numeric-only fields
- Correct EAN.UCC Prefixes in given applications

7.2.1.7 Move Element String to Message Field

Several Element Strings may be scanned in a single transaction. In order to verify the correctness and completeness of the transmitted data, each Element String is transferred to a message record. If an Element String does not include an Application Identifier, verification of the message is simplified if an Application Identifier is internally assigned. Global Trade Item Numbers™ (GTINs™) that are carried by EAN-13, UPC-A, UPC-E or ITF-14 bar code symbols may be denoted with an internally assigned AI (01). Other Element Strings may be assigned "ghost" Application Identifiers

7.3 Validation of the Electronic Message Regarding System Consistency

The EAN.UCC System enables system users to process scanned data without human intervention. This implies that the electronic message generated from data scanned and transmitted from data carriers needs to substitute all human activities during a particular transaction. In other words, the transmitted data must provide all information required for its correct processing.

The EAN.UCC System is designed to fulfil these requirements. Section 4.0 describes the association of Element Strings to form valid messages.

Validation of system consistency refers to the verification of the correct composition of the electronic message by a system processing the transaction messages. Whether the message is adequate in business application terms is dealt with by the application software.

Only messages containing a valid set of Element Strings defined in the EAN.UCC System can be unambiguously processed. The processing of invalid messages may lead to data file errors because the meaning and relationship of the Element Strings are not defined. This is illustrated in Figures 7.3 – 1 and 7.3 – 2.

Figure 7.3 – 1

Examples of Valid Messages			
Element Strings in Message			Comment
AI 00	AI 33nn		Identification of a logistic unit + logistic weight
AI 00	AI 01		Identification of an entity as a logistic unit and as a Fixed Measure Trade Item
AI 00	AI 01 '9'	AI 31nn	Identification of an entity as a logistic unit and as a Variable Measure Trade Item
AI 00	AI 02	AI 37	Identification of a logistic unit and its contained Fixed Measure Trade Items
AI 01	AI 10	AI 15	Identification of a trade item + lot number + minimum durability date
AI 00	AI 401		Identification of a logistic unit as part of a consignment
AI 01 '9'	AI 31nn	AI 33nn	Identification of a Variable Measure Trade Item + logistic weight
AI 00	AI 01	AI 33nn	Identification of an entity as a logistic unit and a Fixed Measure Trade Item; the logistic weight is associated with the identification number of the logistic unit

Figure 7.3 – 2

Examples of Invalid Messages			
Element Strings in Message			Comment
AI 00	AI 01	AI 37	Invalid identification of an entity as a logistic unit and as a Fixed Measure Trade Item; AI 37 (quantity of items contained) must be used with AI 02 only
AI 01	AI 10	AI 33nn	Invalid identification of a Fixed Measure Trade Item + lot number; AI 33nn is incorrect because logistic measures of a Fixed Measure Trade Item are fixed attributes stored in the data file
AI 01'9'	AI 33nn		Invalid identification of a Variable Measure Trade Item + logistic weight; the mandatory Element String with a trade measure is missing
AI 00	AI 11		Invalid identification of a logistic unit; AI 11 is incorrect because a production date must be associated with the identification number of a trade item
AI 00	AI 01	AI 02/37	Invalid identification of an entity as a logistic unit and as a Fixed Measure Trade Item; AI 02/37 must not be associated with AI 01
AI 01	AI 30		Invalid identification of a Fixed Measure Trade Item; AI 30 must only be associated with the identification number of a Variable Measure Trade Item
AI 02	AI 37		Invalid identification of the fixed measure trade units contained in an unidentified logistic unit; AI 00 is missing
AI 00	AI 02		Invalid identification of a logistic unit and of the contained Fixed Measure Trade Items; AI 02 requires the mandatory presence of AI 37 to complete the identification of the content

7.4 Validation of the Electronic Message Regarding User Requirements

Some industry groups and organisations specify the use of particular Element Strings for attributes and other information not directly identifying the item. Contrary to the validation of messages for system conformity, the Uniform Code Council (UCC™) and EAN International do not define the rules for the validation and application of these particular Element Strings. Validation of messages containing these Element Strings in these environments (e.g., trade item identification with best before date and batch number) is left to the discretion of the particular system user community.

Validation of the correctness of a message may be performed differently for each Global Trade Item Number™ (GTIN™), and instructions must be stored in the data file. System users should include the Application Identifiers and their specific application rules in the stored instructions.

Validation of the user requirements must be performed after validation of system consistency. Missing elements in consistent messages may be by-passed or completed in given instances. Inconsistent messages can never be processed properly.

7.5 Conversion of Weights and Measures in User Applications

All weights and measures that are encoded in the Element Strings with the Application Identifiers (31nn) to (36nn) are structured according to the same mathematical rules. The determination of basic units of measurement and the freedom to choose the number of decimal positions will lead to variations in data representation. Suppliers will choose the value that best suits the respective trade item in terms of weight/size and the degree of accuracy required (e.g., grams) for the representation of weights and measures in the six-position data field.

The recipient of such goods also may want to store these details in a standardised form in his data file. This requirement is easily fulfilled through programming with the conversion formula shown below.

As described in [Section 3.0](#), the Application Identifier in position A₄ denotes the position of the implied decimal point, called the Inverse Exponent.

The three-step formula to convert weights and measures is as follows:

1. Define the company's internal Inverse Exponent in accordance with the basic unit of measure of the company's internal field structure (e.g., for an AI expressing weight in kilograms, Inverse Exponent 0 could signify kilograms and Inverse Exponent 3 could signify grams).
2. Subtract the company's internal Inverse Exponent from the value of the position A₄ of the Application Identifier in the decoded Element String. Call the result X.
3. Divide the amount of the six-digit applicable value field from the decoded data string by 10^X . The result is the value required in the company's data structure.

In the examples in Figure 7.5 – 1, the company's system uses internal weight fields eight digits in length (format: nnnnnn.n) with a unit of measure equal to grams. Thus, the company uses the internal Inverse Exponent of 3.

Figure 7.5 – 1

Decoded Data String					Conversion	Internal Weight Field							
Application Identifier A ₁ A ₂ A ₃ A ₄				Weight		Eight-Digit Data Field Defined as Grams with One Decimal Position							
3	1	0	0	005097 (= 5097 kg)	Step 2: X = 0 minus 3 = -3 Step 3: 005097 divided by 10^{-3} (.001) =	5	0	9	7	0	0	0	
3	1	0	2	005097 (= 50.97 kg)	Step 2: X = 2 minus 3 = -1 Step 3: 005097 divided by 10^{-1} (.1) =	0	0	5	0	9	7	0	
3	1	0	3	045250 (= 45.250 kg)	Step 2: X = 3 minus 3 = 0 Step 3: 045250 divided by 10^0 (1) =	0	0	4	5	2	5	0	
3	1	0	4	012347 (= 1234.7 g)	Step 2: X = 4 minus 3 = 1 Step 3: 012347 divided by 10^1 (10) =	0	0	0	1	2	3	4	7

↑
Decimal point

In the examples in Figure 7.5 – 2, the company's system uses internal weight fields eight digits in length (format: nnnnnn.nnn) with a unit of measure equal to kilograms. Thus the company uses an internal Inverse Exponent of 0.

Figure 7.5 – 2

Decoded Data String					Conversion		Internal Weight Field							
Application Identifier A ₁ A ₂ A ₃ A ₄					Weight		Eight-Digit Data Field Defined as Kilograms with Three Decimal Position							
3	1	0	0		005097 (= 5097 kg)	Step 2: X = 0 minus 0 = 0 Step 3: 005097 divided by 10 ⁰ (1) =	0	5	0	9	7			
3	1	0	2		005097 (= 50.97 kg)	Step 2: X = 2 minus 0 = 2 Step 3: 005097 divided by 10 ² (100) =	0	0	0	5	0	9	7	
3	1	0	3		045250 (= 45.250 kg)	Step 2: X = 3 minus 0 = 3 Step 3: 045250 divided by 10 ³ (1000) =	0	0	0	4	5	2	5	
3	1	0	4		012347 (= 1234.7 g)	Step 2: X = 4 minus 0 = 4 Step 3: 012347 divided by 10 ⁴ (10000) =	0	0	0	0	1	2	3	5

↑

Decimal point

↑

Position rounded

7.6 Linkage of GTINs™ in a Database

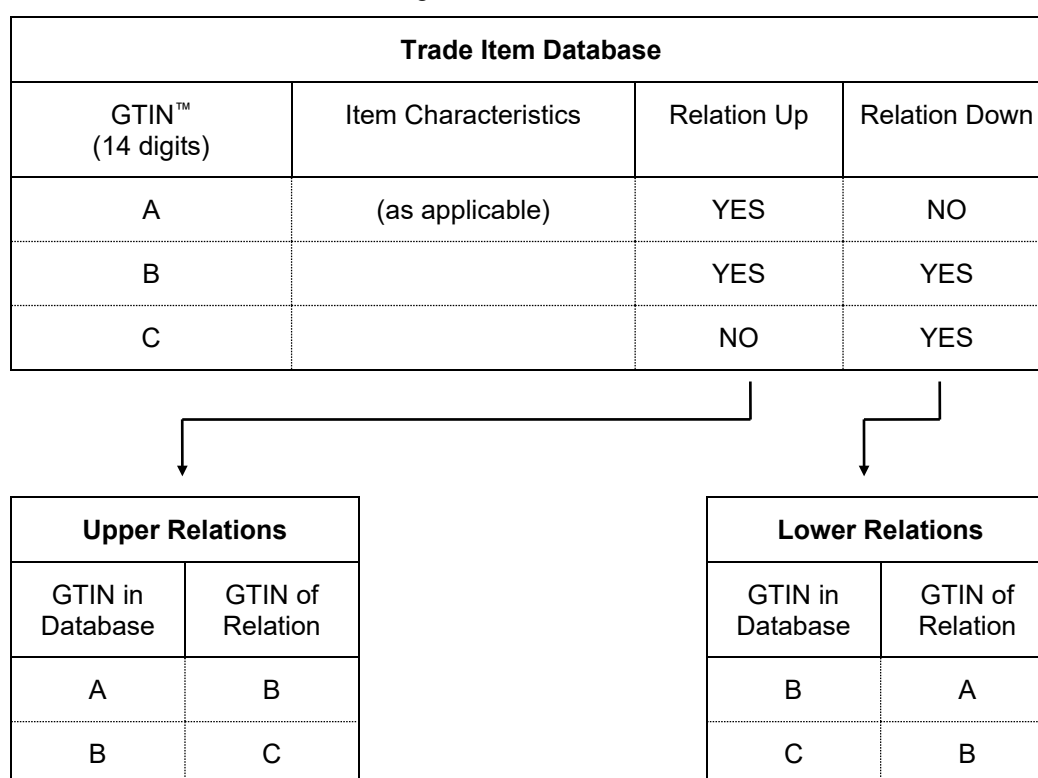
A trade item is any item (product or service) upon which there is a need to retrieve pre-defined information and that may be priced, or ordered, or invoiced at any point in any supply chain. Trade items may be a single item, part, unit, product, or service, or a pre-defined multiple or grouping or combination of such items. A separate Global Trade Item Number™ (GTIN™) identifies each of these items unambiguously, irrespective of the applied data structure. This also applies to identification numbers for restricted distribution in a closed environment.

Information about the hierarchical structure of trade items is an important issue in a business. [Section 7.6.1](#) illustrates an example of how the required links can be established by using a relational database.

7.6.1 The Principle

The hierarchy for the example in Figure 7.6.1 – 1 is basic product = A; 10 x A = product B; 5 x B = product C.

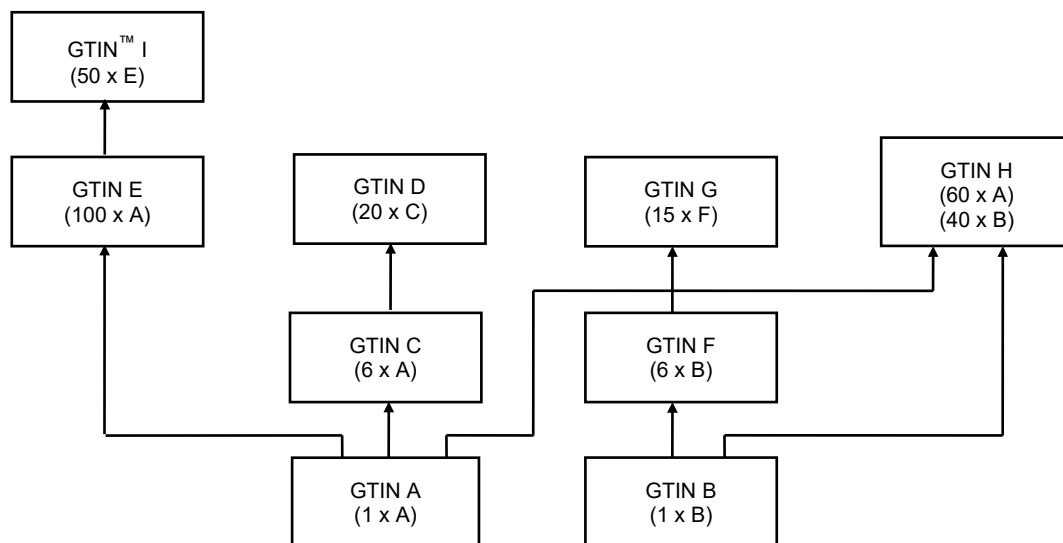
Figure 7.6.1 – 1



See [Figure 7.6.2 – 1](#) for the mechanism of linkage for the various types of trade items.

7.6.2 Extended Example of a Trade Item Hierarchy

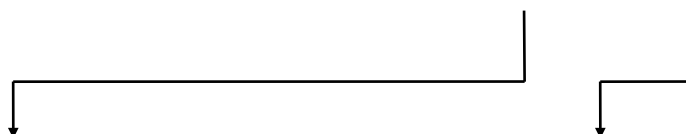
Figure 7.6.2 – 1



Note: For reasons of simplicity, Global Trade Item Numbers™ (GTINs) are expressed in letters in this example, signifying that they may be of any standardised structure.

Figure 7.6.2 – 2

Trade Item Database			
GTIN™ (14 digits)	Item Characteristics	Relation Up	Relation Down
A	(as applicable)	YES	NO
B		YES	NO
C		YES	YES
D		NO	YES
E		YES	YES
F		YES	YES
G		NO	YES
H		NO	YES
I		NO	YES





Upper Relations				Lower Relations			
GTIN in Database	GTIN of Relation	Quantity of Items Contained	Relation is Mixed Trade Item	GTIN in Database	GTIN of Relation	Quantity of Items Contained	Relation is Mixed Trade Item
A	C	6*	NO	C	A	6**	NO
A	E	100	NO	D	C	20	NO
A	H	60	YES	E	A	100	NO
B	F	6	NO	F	B	6	NO
B	H	40	YES	G	F	15	NO
C	D	20	NO	H	A	60	NO
E	I	50	NO	H	B	40	NO
F	G	15	NO	I	E	50	NO

*Quantity of items numbered A contained in item C

**Quantity of items numbered A contained in item C

Note: The columns "GTIN in Database" and "GTIN of Relation" are sufficient to establish the links between the different items. The column "Quantity of Items Contained" provides additional information, which may be useful in particular business applications. The column "Relation is Mixed Trade Item" provides the relations pointing to all trade items contained in a mixed trade item.

7.6.3 Linkage of GTINs™ in a Non-Relational Database by Trade Item Manufacturer

Many types of items are produced and distributed in fixed measure standard nested packaging configurations (e.g., consumer unit, carton, case, pallet) with fixed quantity relationships. The various packaging configurations are often broken into lower levels at various points in the supply chain, and, therefore, each level of the packaging may be a trade item. Computer systems must be capable of understanding the relationships of the units or trade items in the configuration and treating inventory of all levels of the configuration as one SKU (Stock Keeping Unit).

Use of the first digit Indicator (values 1 to 8) of the EAN/UCC-14 Data Structure can be used to identify levels of a standard packaging configuration. This allows digits 2 to 13 to remain constant for all levels of the standard packaging configurations for an item. If this method of numbering item configurations is used when necessary to support business processes or when driven by system constraints, the non-relational database construct defined below may be appropriate.

The item database is constructed with a base item record (table) and segments (tables) for each level of the item packaging configuration. Properly designed, this type of system can support pricing, ordering, and shipping of any level of the packaging configuration (trade item) with appropriate dimension and weight information. It enables inventories to be maintained by packaging level and in total for the base item. It also provides channel partners or customers the choice of ordering and invoicing units. Meeting these requirements often makes this approach a good business solution for manufacturers, because it meets the most critical needs in the supply chain and is practical to implement, particularly in distributed and small systems where performance is critical.

Using the EAN/UCC-14 Data Structure, the base item record contains the base EAN/UCC-8, UCC-12, or EAN/UCC-13 ID Number (digits 2 to 13) as a key, with all information relating to the base unit and the item in total (including total inventory balance). Each of the packaging segments contains information unique to the respective packaging configuration (e.g., Indicator, Check Digit, quantity relationship to next lower level of the configuration, dimensions, weight, prices). After accessing the item record using the GTIN of the base item (digits 2 to 13), the packaging segments are accessed using the Indicator (first digit).

This construct demands that:

- the trade item must be fixed in measure
- there must be a single Global Trade Item Number™ (GTIN™) for the base item of the related packaging configurations that is an EAN/UCC-8, UCC-12, or EAN/UCC-13 ID Number
- each related packaging configuration is limited to eight levels of packaging for the base item using Indicator values 1 to 8

When storing EAN/UCC-8, UCC-12, or EAN/UCC-13 ID Numbers in a 14-digit reference field or 14-digit data carrier, they must be stored based on rules that ensure their uniqueness. When a GTIN is stored in the GTIN Format, a 14-digit reference field represented in computer files, the uniqueness of the ID number is ensured.

The GTIN Format is intended to support the uniqueness management process for the construction of GTINs and not for the receiving process. Companies that receive trade items with GTINs must be able to process the complete GTIN without regard to how it was constructed.

7.7 Element Strings Represented in Data Carriers

Scanned Element Strings are decoded as a full string by the reading device and are then transmitted for processing in the application software. The full string is composed of a symbology identifier and one or more Element Strings. The meaning of an Element String is also determined by the data carrier in which it is represented.

A synopsis by data carrier of the Element Strings described in these specifications is shown in [Figure 7.7.1 – 1](#), which also provides an overview of the sequential number range of trade items by data carrier.

7.7.1 GTINs™ Represented in EAN.UCC System Data Carriers

Figure 7.7.1 – 1

ITF-14 or UCC/EAN-128 Bar Code Symbol													
EAN-13 Bar Code Symbol													
UPC-A or UPC-E Bar Code Symbol													
EAN-8 Bar Code Symbol													
2.	*	*	*	*	*	*	0	0	0	0	0	0	C
							0	9	9	9	9	9	C
1.	*	*	*	*	*	*	1	0	0	0	0	0	C
							1	3	9	9	9	9	C
2.	*	*	*	*	*	*	2	0	0	0	0	0	C
							2	9	9	9	9	9	C
1.	*	*	*	*	*	*	3	0	0	0	0	0	C
							9	6	9	9	9	9	C
1.	0	0	0	0	0	1	0	0	0	0	0	0	C
	0	0	0	0	0	9	9	9	9	9	9	9	C
2.	*	*	0	0	1	0	0	0	0	0	0	0	C
			0	0	7	9	9	9	9	9	9	9	C
1.	0	0	0	0	8	0	0	0	0	0	0	0	C
	0	0	1	9	9	9	9	9	9	9	9	9	C
4.	*	0	2	0	0	0	0	0	0	0	0	0	C
		0	2	9	9	9	9	9	9	9	9	9	C
1.	0	0	3	0	0	0	0	0	0	0	0	0	C
	0	0	3	9	9	9	9	9	9	9	9	9	C
2.	*	0	4	0	0	0	0	0	0	0	0	0	C
		0	4	9	9	9	9	9	9	9	9	9	C
5.	*	0	5	0	0	0	0	0	0	0	0	0	C
		0	5	9	9	9	9	9	9	9	9	9	C
1.	0	0	6	0	0	0	0	0	0	0	0	0	C
	0	0	9	9	9	9	9	9	9	9	9	9	C
1. 8.	0	1	0	0	0	0	0	0	0	0	0	0	C
	0	1	3	9	9	9	9	9	9	9	9	9	C
2. 4.	0	2	0	0	0	0	0	0	0	0	0	0	C
	0	2	9	9	9	9	9	9	9	9	9	9	C
1. 8.	0	3	0	0	0	0	0	0	0	0	0	0	C
	0	9	6	9	9	9	9	9	9	9	9	9	C
7.	*	9	7	7	0	0	0	0	0	0	0	0	C
		9	7	9	9	9	9	9	9	9	9	9	C
5. 6.	*	9	8	0	0	0	0	0	0	0	0	0	C
		9	8	2	9	9	9	9	9	9	9	9	C
5.	*	9	9	0	0	0	0	0	0	0	0	0	C
		9	9	9	9	9	9	9	9	9	9	9	C
1.	1	0	0	0	0	0	1	0	0	0	0	0	C
	8	0	0	0	0	0	1	3	9	9	9	9	C
1.	1	0	0	0	0	0	3	0	0	0	0	0	C
	8	0	0	0	0	0	9	6	9	9	9	9	C
1. 3.	1	0	0	0	0	1	0	0	0	0	0	0	C
	9	0	0	0	0	9	9	9	9	9	9	9	C
1. 3.	1	0	0	0	9	0	0	0	0	0	0	0	C
	9	0	1	9	9	9	9	9	9	9	9	9	C
1. 3.	1	0	3	0	0	0	0	0	0	0	0	0	C
	9	0	3	9	9	9	9	9	9	9	9	9	C
1. 3.	1	0	6	0	0	0	0	0	0	0	0	0	C
	9	0	9	9	9	9	9	9	9	9	9	9	C
1. 3.	1	1	0	0	0	0	0	0	0	0	0	0	C
	9	1	3	9	9	9	9	9	9	9	9	9	C
1. 3.	1	3	0	0	0	0	0	0	0	0	0	0	C
	9	9	6	9	9	9	9	9	9	9	9	9	C

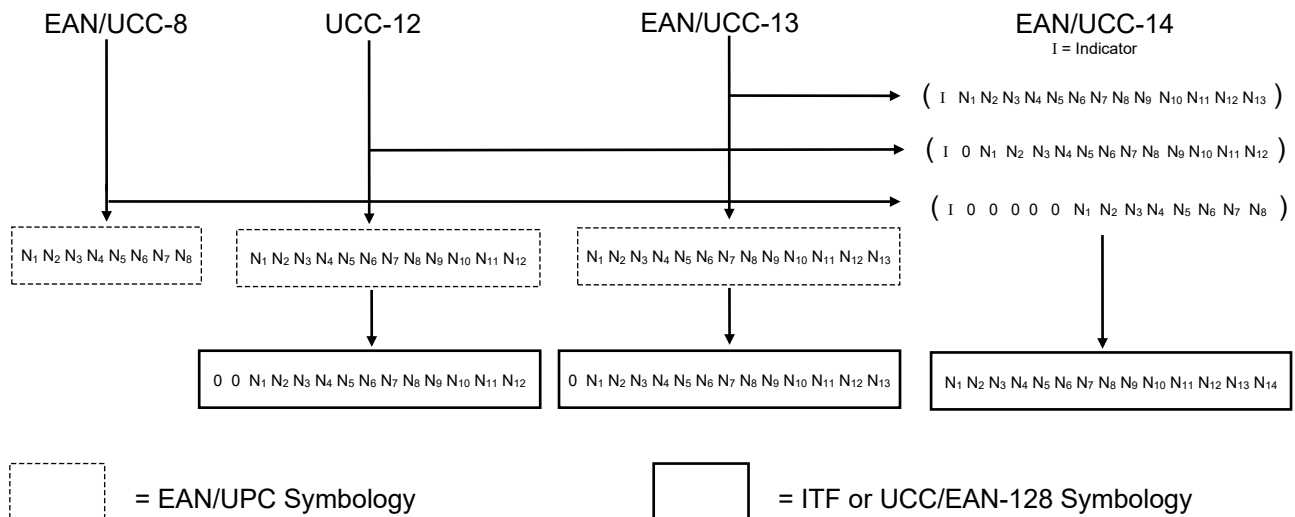
1. Fixed measure

2. Fixed measure restricted distribution
3. Variable measure
4. Variable measure restricted distribution
5. Coupons (not a GTIN)
6. Refund Receipts (not a GTIN)
7. ISBN, ISMN, and ISSN
8. GRAI

7.7.2 Handling of Global Trade Item Numbers™ to Conform with the System

Figure 7.7.2 – 1

GTINs™ in EAN.UCC System Bar Code Symbols



As shown in Figure 7.7.2 – 1, the EAN.UCC System uses Global Trade Item Numbers™ (GTINs™) that vary in length. To avoid duplication in the GTIN Format in a computer file, it is necessary to observe some rules regarding GTIN arrangement.

Currently, the longest identification number for Fixed Measure Trade Items consists of 14 digits, which necessitates the creation of a 14-digit field. Figure 7.7.2 – 2 shows how GTINs transmitted in Element Strings are positioned in the GTIN Format.

Figure 7.7.2 – 2

Data Structure	Positions in the GTIN Format													
	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆	T ₇	T ₈	T ₉	T ₁₀	T ₁₁	T ₁₂	T ₁₃	T ₁₄
EAN/UCC-8	0	0	0	0	0	0	N ₁	N ₂	N ₃	N ₄	N ₅	N ₆	N ₇	N ₈
UCC-12	0	0	N ₁	N ₂	N ₃	N ₄	N ₅	N ₆	N ₇	N ₈	N ₉	N ₁₀	N ₁₁	N ₁₂
EAN/UCC-13	0	N ₁	N ₂	N ₃	N ₄	N ₅	N ₆	N ₇	N ₈	N ₉	N ₁₀	N ₁₁	N ₁₂	N ₁₃
EAN/UCC-14	N ₁	N ₂	N ₃	N ₄	N ₅	N ₆	N ₇	N ₈	N ₉	N ₁₀	N ₁₁	N ₁₂	N ₁₃	N ₁₄

7.7.3 Element Strings Represented in UCC/EAN-128 Symbology

The Element Strings encoded in the UCC/EAN-128 Symbology are composed of an Application Identifier and one or several data fields. The Application Identifier denotes the contents and structure of the respective data fields. Full details are contained in Section 3.0.

7.8 Secondary Data for Specific Health Industry Products

Figures 7.8 – 1 and 7.8 – 2 show the correct data formats for secondary data for specific health industry products. If a column in Figure 7.8 – 3 is left blank, then that data format information is not used.

Figure 7.8 – 1

MM	two-digit expiration date month indicator (fixed length of two numeric digits)
YY	two-digit expiration date year indicator (fixed length of two numeric digits)
DD	two-digit expiration date day indicator (fixed length of two numeric digits)
HH	two-digit expiration date hour indicator (fixed length of two, G.M.T. format)
JJJ	three-digit expiration date Julian day indicator (fixed length of three numeric digits)
LOT	up to 13-digit alphanumeric lot number
L	1-digit link character (GTIN Check Digit)
QQ	two-digit quantity (fixed length of two numeric digits)
QQQQQ	five-digit quantity (fixed length of five numeric digits)

The data in Figure 7.8 - 2 is used in the example in Figure 7.8 - 3.

Figure 7.8 – 2

GTIN™	10312345678903
Lot number	3C001
Link character	3
Expiration date	September 28, 1995, at 10 p.m.
Two-digit quantity	24
Five-digit quantity	00100

Quantity represents the quantity of items contained within the trade item where the inside item is assigned the GTIN™ 00312345678906.

The data formats in Figure 7.8 – 3 show all combinations of the sub-fields possible within the Element String.

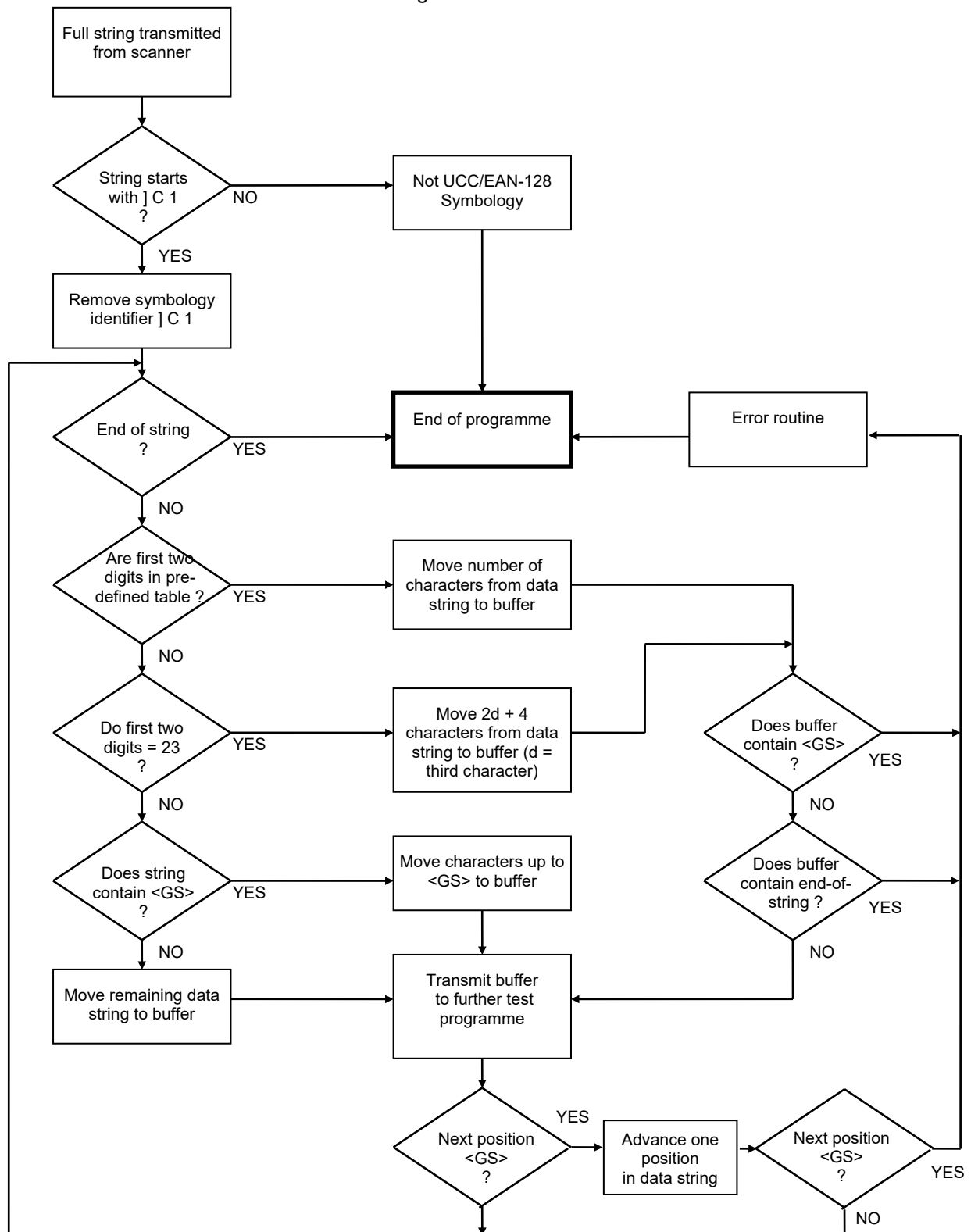
Figure 7.8 – 3

Row	Application Identifier	Quantity Format Digit	Quantity Format	Expiration Date Format Digit	Expiration Date Format	Lot Field	Link Digit	Example Data
1	22				MMYY	LOT	L	2209953C0013
2	22			2	MMDDYY	LOT	L	2220928953C0013
3	22			3	YYMMDD	LOT	L	2239509283C0013
4	22			4	YYMMDDHH	LOT	L	224950928223C0013
5	22			5	YYJJJ	LOT	L	225952713C0013
6	22			6	YYJJJHH	LOT	L	22695271223C0013
7	22			7		LOT	L	2273C0013
8	22	8	QQ		MMYY	LOT	L	2282409953C0013
9	22	8	QQ	2	MMDDYY	LOT	L	2282420928953C0013
10	22	8	QQ	3	YYMMDD	LOT	L	2282439509283C0013
11	22	8	QQ	4	YYMMDDHH	LOT	L	228244950928223C0013
12	22	8	QQ	5	YYJJJ	LOT	L	228245952713C0013
13	22	8	QQ	6	YYJJJHH	LOT	L	22824695271223C0013
14	22	8	QQ	7		LOT	L	2282473C0013
15	22	8	QQ			LOT	L	228243
16	22	9	QQQQQ		MMYY	LOT	L	2290010009953C0013
17	22	9	QQQQQ	2	MMDDYY	LOT	L	2290010020928953C0013
18	22	9	QQQQQ	3	YYMMDD	LOT	L	2290010039509283C0013
19	22	9	QQQQQ	4	YYMMDDHH	LOT	L	229001004950928223C0013
20	22	9	QQQQQ	5	YYJJJ	LOT	L	229001005952713C0013
21	22	9	QQQQQ	6	YYJJJHH	LOT	L	22900100695271223C0013
22	22	9	QQQQQ	7		LOT	L	2290010073C0013
23	22	9	QQQQQ			LOT	L	229001003

As an example, row 8 in Figure 7.8 – 3, using the required AI (01) and AI (22), would create the full string JC1 01 10312345678903 22 82409953C0013.

7.9 Processing of Data from UCC/EAN-128 Bar Code Symbols

Figure 7.9 – 1



7.9.1 General

UCC/EAN-128 Bar Code Symbols may represent several Element Strings in concatenated form (see [Section 5.0](#)). For processing as shown in [Figure 7.3 – 1](#), it is necessary to separate each Element String, which is performed by the processing routine illustrated in [Figure 7.9 – 1](#).

7.9.2 Element Strings with Pre-Defined Lengths using Application Identifiers

Representation of more than one Element String in a UCC/EAN-128 Bar Code Symbol requires the use of a separator character between the different Element Strings to mark their end. In UCC/EAN-128 Symbology, this is the Function 1 Character (FNC1). For details, see [Section 5.0](#).

However, in order to enable printing of shorter bar code symbols, some Element Strings have been pre-defined in length, so that their end may be determined, and the FNC1 is not needed. These Element Strings, are shown in [Figure 5.3.8.2.1](#)

7.9.3 The Function 1 Character (FNC1)

Only when used as a separator character is the Function 1 Character (FNC1) transmitted in the decoded data string as <GS> (ASCII character 29, seven-bit character set ISO 646). All Element Strings of variable length and those of fixed length not stated in [Figure 5.3.8.2.1 – 1](#) must be followed by an FNC1 when followed by another Element String in a single bar code symbol. An FNC1 is not required at the end of the last Element String represented in a bar code symbol.

Section 8.0:

Glossary of Terms

Add-On Symbol	A bar code symbol used to encode information supplementary to that in the main bar code symbol.
AI	Abbreviation for Application Identifier.
AIDC	Abbreviation for Automatic Identification and Data Capture.
alphanumeric (an)	Describes a character set that contains alphabetic characters (letters), numeric digits (numbers), and other characters, such as punctuation marks.
ANSI	Abbreviation for American National Standards Institute.
aperture	A physical opening that is part of the optical path in a device such as a scanner, photometer, or camera. Most apertures are circular, but they may be rectangular or elliptical.
Application Identifier	The field of two or more characters at the beginning of an Element String that uniquely defines its format and meaning.
ASC X12	Accredited Standards Committee X12. ASC X12 is responsible for developing American National Standards for Electronic Data Interchange (EDI).
Asset Type	A number assigned by the owner of an asset to uniquely identify a type of asset.
attribute	A piece of information reflecting a characteristic related to an identification number (e.g., Global Trade Item Number™ (GTIN™), SSCC).
autodiscrimination	The capability of a reader to automatically recognise and decode multiple bar code symbologies.
bar gain/loss	The increase/decrease in bar width due to effects of the reproduction and printing processes.
Bearer Bars	Bars surrounding a bar code symbol to prevent misreads or to improve print quality of the bar code symbol.
billing unit	An item that is priced and invoiced in trade between two parties at any point in the supply chain.
brand owner	The party that is responsible for allocating EAN.UCC System numbering and bar code symbols on a given trade item. The administrator of an EAN.UCC Company Prefix.
carrier	The party that provides freight transportation services. A physical or electronic mechanism that carries data.

Check Digit	A digit calculated from the other digits of an Element String, used to check that the data has been correctly composed. (See EAN.UCC Check Digit Calculation.)
Clear Area	See Quiet Zone.
Company Number	A component of the EAN.UCC Company Prefix. EAN Member Organisations and the Uniform Code Council (UCC™) assign EAN.UCC Company Prefixes to entities that administer the allocation of EAN.UCC System identification numbers. These entities may be, for example, commercial companies, not for profit organisations, governmental agencies, and business units within organisations. Criteria to qualify for the assignment of an EAN.UCC Company Prefix are set by the EAN Member Organisations and the UCC.
Composite Component™	This term is used to refer to either a linear or 2D symbol component within a composite symbol.
Composite Symbology™	An EAN.UCC System composite symbol consists of a linear component (encoding the item's primary identification) associated with an adjacent 2D Composite Component™ (encoding supplementary data, such as a batch number or expiration date). The composite symbol always includes a linear component so that the primary identification is readable by all scanning technologies, and so that 2D imager scanners can use the linear component as a finder pattern for the adjacent 2D Composite Component™. The composite symbol always includes one of three multi-row 2D Composite Component™ versions (e.g., CC-A, CC-B, CC-C) for compatibility with linear- and area-CCD scanners and with linear and rastering laser scanners.
concatenation	The representation of several Element Strings in one bar code symbol.
contrast	See Symbol Contrast.
coupon	A voucher that can be redeemed at the Point-of-Sale for a cash value or free item.
customer	The party that receives, buys, or consumes an item or service.
data carrier	A means to represent data in a machine readable form; used to enable automatic reading of the Element Strings.
data character	A letter, digit, or other symbol represented in the data field(s) of an Element String.
data field	The smallest part of the data part of an Element String that needs to be distinguished.
Data Standard	The entirety of all EAN.UCC System data standardised in meaning and structure.
data structure	The Uniform Code Council (UCC™) and EAN International data structures defined in the various lengths required for the different identification purposes, which all share a hierarchical composition. Their composition blends the needs of international control with the needs of the user.

data titles	A standard abbreviated description of a data field; used to denote the Human Readable Interpretation of encoded data.
direct print	A process in which the printing apparatus prints the symbol by making physical contact with a substrate (e.g., flexography).
DUN-14 (Despatch Unit Number)	See EAN/UCC-14 Identification Number.
EAN	Abbreviation of EAN International.
EAN International	EAN International, based in Brussels, Belgium, is an organisation of EAN Member Organisations that jointly manages the EAN.UCC System with the Uniform Code Council (UCC™).
EAN Member Organisation	A member of EAN International that is responsible for administering the EAN.UCC System in its country (or assigned area) and for managing the correct use of the EAN.UCC System by its member companies.
EAN.UCC Check Digit Calculation	An EAN.UCC System algorithm for the calculation of a Check Digit to verify accuracy of data decoded from a bar code symbol.
EAN.UCC Common Currency Coupon Code	An identification number for coupons issued in a common currency area (e.g., the euro currency) that uses the EAN/UCC-13 Data Structure.
EAN.UCC Company Prefix	Part of the international EAN.UCC System data structures consisting of an EAN.UCC Prefix and a Company Number, both of which are allocated by either the Uniform Code Council (UCC™) or an EAN International Member Organisation.
EAN.UCC Coupon Code	An identification number for coupons issued in a national currency that uses the EAN/UCC-13 Data Structure.
EAN.UCC Prefix	A number with two or more digits, co-administered by EAN International and the Uniform Code Council (UCC™), denoting the format and meaning of a particular Element String.
EAN.UCC System	The specifications, standards, and guidelines co-administered by EAN International and the Uniform Code Council (UCC™).
EAN/UCC-13 Data Structure	The 13-digit EAN.UCC System data structure composed of an EAN.UCC Company Prefix and Check Digit as well as an Item Reference, Location Reference, or Asset Type.
EAN/UCC-13 Identification Number	The EAN.UCC System identification number comprising 13 digits; used to identify trade items, locations, and special applications (e.g., coupons).
EAN/UCC-14 Data Structure	The 14-digit EAN.UCC System data structure composed of an Indicator, EAN.UCC Company Prefix, Item Reference, and a Check Digit.
EAN/UCC-14 Identification Number	The EAN.UCC System identification number comprising 14 digits; used to identify trade items.

EAN/UCC-8 Data Structure	The eight-digit EAN.UCC System data structure composed of an EAN/UCC-8 Prefix, Item Reference, and Check Digit.
EAN/UCC-8 Identification Number	The EAN.UCC System identification number comprising eight digits used to identify trade items and special applications.
EAN/UCC-8 Prefix	A one-, two-, or three-digit index number, co-administered by EAN International and the Uniform Code Council (UCC™), denoting the area of distribution of trade items identified by an EAN/UCC-8 Identification Number.
EAN/UPC Composite Symbology™ Family	A family of bar code symbols comprised of the UPC-A Composite Symbology™, UPC-E Composite Symbology™, EAN-8 Composite Symbology™, and EAN-13 Composite Symbology™.
EAN/UPC Symbology	A family of bar code symbols including EAN-8, EAN-13, UPC-A, and UPC-E Bar Code Symbols. Although UPC-E Bar Code Symbols do not have a separate Symbology Identifier, they act like a separate symbology through the scanning application software. See also EAN-8 Bar Code Symbol, EAN-13 Bar Code Symbol, UPC-A Bar Code Symbol, and UPC-E Bar Code Symbol.
EAN-13 Bar Code Symbol	A bar code symbol of the EAN/UPC Symbology that encodes EAN/UCC-13 Identification Numbers.
EAN-13 Composite Symbology™	The Composite Symbology™ that utilises an EAN-13 Bar Code Symbol as the linear component.
EAN-8 Bar Code Symbol	A bar code symbol of the EAN/UPC Symbology that encodes EAN/UCC-8 Identification Numbers.
EAN-8 Composite Symbology™	The Composite Symbology™ that utilises an EAN-8 Bar Code Symbol as the linear component.
EANCOM®	The international Electronic Data Interchange (EDI) standard provided by EAN International, conforming to the UN/EDIFACT standard.
EDI	Abbreviation for Electronic Data Interchange.
Electronic Commerce	The conduct of business communications and management through electronic methods, such as Electronic Data Interchange (EDI) and automated data collection systems.
Electronic Message	A composition of Element Strings from scanned data and transaction information assembled for data validation and unambiguous processing in a user application.
Element String	A piece of data defined in structure and meaning, comprising an identification part (prefix or Application Identifier) and a data part, represented in an EAN.UCC System endorsed data carrier.
even parity	A characteristic of the encodation of a symbol character whereby the symbol character contains an even number of dark modules.
Extension digit	A digit, allocated by the user, used to increase the capacity of the Serial Reference within the SSCC (Serial Shipping Container Code).

fixed length	Term used to describe a data field in an Element String with an established number of characters.
Fixed Measure Trade Item	An item always produced in the same pre-defined version (e.g., type, size, weight, contents, design) that may be sold at any point in the supply chain.
FNC1	Abbreviation for Function 1 Character.
Full String	The data transmitted by the bar code reader from reading a data carrier, including Symbology Identifier and Element String(s).
Function 1 Character (FNC1)	A symbology element used to form the double start pattern of a UCC/EAN-128 Bar Code Symbol. It is also used to separate certain concatenated Element Strings, dependent on their positioning in the bar code symbol.
General Distribution Scanning	Unattended, fixed mount scanning environments, where items are scanned automatically as they pass by on a conveyor.
GIAI	Abbreviation for the ~~EAN.UCC~~ Global Individual Asset Identifier.
GLN	Abbreviation for the ~~EAN.UCC~~ Global Location Number.
~~EAN.UCC~~ Global Location Number	A number that uses the EAN/UCC-13 Data Structure to identify physical, functional, or legal entities.
Global Trade Item Number™	A Global Trade Item Number™ may use the EAN/UCC-8, UCC-12, EAN/UCC-13, or EAN/UCC-14 Data Structure.
GRAI	Abbreviation for the ~~EAN.UCC~~ Global Returnable Asset Identifier.
GSRN	Abbreviation for the ~~EAN.UCC~~ Global Service Relation Number.
GTIN™	Abbreviation for the Global Trade Item Number™.
GTIN™ Format	The format in which Global Trade Item Numbers™ (GTINs™) must be represented in a 14-digit reference field (key) in computer files to ensure uniqueness of the identification numbers.
Guard Bar Pattern	An auxiliary pattern of bars/spaces corresponding to start or stop patterns in bar code symbologies, and serving to separate the two halves of EAN-8, EAN-13, and UPC-A Symbols.
House Way Bill Number	A freight forwarder's document used mainly as a control for the goods within the freight forwarder's own service system.
Human Readable Interpretation	Characters that can be read by persons, such as letters and numbers, as opposed to symbol characters within bar code symbols, which are read by machines.
human translation	Text designed to support manual operations and to facilitate key entry in menu driven systems. Data titles and data content are included.
Indicator	A digit to complete a particular identification number or to add some sort of significance to a particular Element String.

Individual Asset	An entity that is part of the inventory of a given company. (See also Returnable Asset.)
Interleaved 2 of 5	See ITF-14 Symbol.
Inverse Exponent	The Application Identifier digit that denotes the implied decimal point position in an Element String.
ISO	Abbreviation for International Organisation for Standardisation.
Item Number	See Item Reference.
Item Reference	The part of the data structure allocated by the user to identify a trade item for a given EAN.UCC Company Prefix.
Item Reference Number	See Item Reference.
ITF Symbolology	The Interleaved 2 of 5 Symbolology.
ITF-14 Bar Code Symbol	An ITF Symbol used by the EAN.UCC System to carry EAN/UCC-14 Identification Numbers.
LAC	Abbreviation for Local Assigned Code.
Light Margin	See Quiet Zone.
Light Margin Indicator	See Quiet Zone Indicator.
Local Assigned Code	A particular use of the UPC-E Bar Code Symbol for restricted distribution.
Location Number	See ~~EAN.UCC~~ Global Location Number.
Location Reference	A number within an ~~EAN.UCC~~ Global Location Number (GLN) assigned by various parties to identify a different entity.
logistic measures	Measures indicating the outside dimensions, total weight, or volume inclusive of packing material of a logistic unit. Also known as gross-measures.
logistic unit	An item of any composition established for transport and/or storage that needs to be managed through the supply chain.
magnification	Different sizes of bar code symbols based on a nominal size and a fixed aspect ratio; stated as a percent or decimal equivalent of a nominal size.
Manufacturer's ID	See EAN.UCC Company Prefix.
Manufacturer's Number	See EAN.UCC Company Prefix.
measure ~~verifier~~ check-digit	A digit calculated from the measure field of an Element String encoded using the EAN/UPC Symbolology. Used to check that the data has been correctly composed.

module	The narrowest nominal width unit of measure in a bar code symbol. In certain symbologies, element widths may be specified as multiples of one module. Equivalent to X-dimension.
modulo	An arithmetic scheme in which the result is the remainder after division.
Modulo 103 UCC/EAN-128 Symbol Check Character	A number that results from a modulo calculation that is encoded in the UCC/EAN-128 Bar Code Symbol as a self-checking symbol character. It is created automatically by software as a symbol overhead character and is not expressed in the Human Readable Interpretation.
Number System Character	See UCC Prefix.
Numbering Organisation (NO)	See EAN Member Organisation.
odd parity	A characteristic of the encodation of a symbol character whereby the symbol character contains an odd number of dark modules.
Packaging Indicator	See Indicator.
Packaging Type	See Extension digit.
payment slip	The end customer's notification of a demand for payment for a billable service (e.g., utility bill) comprising an amount payable and payment conditions.
Point-of-Sale (POS)	Refers to the retail type checkout where bar code symbols are normally scanned.
price ~~verifier~~ check- digit	A digit calculated from the price field of an Element String encoded using the EAN/UPC Symbology. Used to check that the data has been correctly composed.
Print Gain Gauge	A printed test pattern used to determine the print gain mean and the range of print gain (press variance) as it relates to bar widths. It may also be used throughout the print run to indicate whether the anticipated range of print gain is experienced.
print gain/loss	See bar gain/loss.
printability gauge	See Print Gain Gauge.
Quiet Zone	A clear space containing no machine readable marks, which precedes the Start Character of a bar code symbol and follows the Stop Character. Formerly referred to as "Clear Area" or "Light Margin."
Quiet Zone Indicator	A greater than (>) or less than (<) character, printed in the human readable field of the bar code symbol, with the tip aligned with the outer edge of the Quiet Zone.

Reduced Space Symbology® (RSS)	A family of bar code symbols, including RSS-14™, RSS Limited™, RSS Expanded™, and RSS-14™ Stacked. Any member of the RSS family can be printed as a stand-alone linear symbol or as a composite symbol with an accompanying 2D Composite Component™ printed directly above the RSS linear component.
Refund Receipt	A voucher produced by equipment handling empty containers (bottles and crates).
restricted distribution	Signifies that such system data may be applied on goods to be processed only in certain environments, defined by the Uniform Code Council (UCC™) or the appropriate EAN International Member Organisation (e.g., a country, company, industry).
Retailer Zero-Suppression Code	~~A group of 4,500 ID numbers (separate from Local Assigned Codes), that enable the use of UPC-E Bar Codes in a closed system environment (not for open supply chain applications). A particular use of the UPC-E Bar Code Symbol for restricted distribution.~~
Returnable Asset	A reusable entity owned by a company that is used for transport and storage of goods.
RSS Composite Symbology™ Family	A family of symbols comprised of the RSS-14™ Composite Symbology™, RSS-14™ Stacked Composite Symbology™, RSS Limited™ Composite Symbology™, and RSS Expanded™ Composite Symbology™.
RSS Expanded™ Bar Code Symbol	A bar code symbol that encodes an EAN/UCC-14 Identification Number plus supplementary AI Element Strings, such as weight and “best before” date, in a linear symbol that can be scanned omnidirectionally by suitably programmed Point-of-Sale scanners.
RSS Expanded™ Composite Symbology™	The RSS Composite Symbology™ that utilises an RSS Expanded™ Bar Code Symbol as the linear component.
RSS Expanded™ Stacked Bar Code Symbol	A bar code symbol that is a variation of the RSS Expanded™ Bar Code Symbol that is stacked in multiple rows and is used when the normal symbol would be too wide for the application.
RSS Expanded™ Stacked Composite Bar Code Symbol	The RSS Composite Symbology™ that utilises an RSS Expanded™ Stacked Bar Code Symbol as the linear component.
RSS Limited™ Bar Code Symbol	A bar code symbol that encodes an EAN/UCC-14 Identification Number with Indicators of zero or one in a linear symbol; for use on small items that will not be scanned at the Point-of-Sale.
RSS Limited™ Composite Symbology™	The RSS Composite Symbology™ that utilises an RSS Limited™ Bar Code Symbol as the linear component.
RSS-14™ Bar Code Symbol	A bar code symbol that encodes an EAN/UCC-14 Identification Number in a linear symbol that can be scanned omnidirectionally by suitably programmed Point-of-Sale scanners.

RSS-14™ Composite Symbology™	The RSS Composite Symbology™ that utilises an RSS-14™ Bar Code Symbol as the linear component.
RSS-14™ Stacked Bar Code Symbol	A bar code symbol that is a variation of the RSS-14™ Symbology that is stacked in two rows and is used when the normal symbol would be too wide for the application. It comes in two versions: a truncated version used for small item marking applications and a taller omnidirectional version that is designed to be read by omnidirectional scanners. RSS Expanded™ can also be printed in multiple rows as a stacked symbol.
RSS-14™ Stacked Composite Symbology™	The RSS Composite Symbology™ that utilises an RSS-14™ Stacked Bar Code Symbol as the linear component.
RZSC	Abbreviation for Retailer Zero-Suppression Code.
scanner	An electronic device to read bar code symbols and convert them into electrical signals understandable by a computer device.
Separator Character	Function 1 Character used to separate certain concatenated Element Strings, dependent on their positioning in the UCC/EAN-128 Bar Code Symbol.
Serial Reference	The part of the data structure allocated by the user that, in conjunction with the Extension digit, establishes a unique SSCC for a given EAN.UCC Company Prefix.
Serial Shipping Container Code	See SSCC.
SSCC	Term used for the Serial Shipping Container Code. The unique identification of a logistic unit using an 18-digit data structure.
SSCC Serial Number	See Serial Reference.
standard numbering structures	See data structure.
substrate	The material on which a bar code symbol is printed.
supplier	The party that produces, provides, or furnishes an item or service.
symbol	The combination of symbol characters and features required by a particular symbology, including Quiet Zone, Start and Stop Characters, data characters, and other auxiliary patterns, which together form a complete scannable entity; an instance of a symbology and a data structure.
symbol character	A group of bars and spaces in a symbol that is decoded as a single unit. It may represent an individual digit, letter, punctuation mark, control indicator, or multiple data characters.

Symbol Check Character	A symbol character or set of bar/space patterns included within a UCC/EAN-128 or RSS Symbol, the value of which is used by the bar code reader for the purpose of performing a mathematical check to ensure the accuracy of the scanned data. It is not shown in Human Readable Interpretation. It is not input to the bar code printer and is not transmitted by the bar code reader.
Symbol Contrast	An ISO 15416 parameter that measures the difference between the largest and smallest reflectance values in a Scan Reflectance Profile (SRP).
Symbol Control Character	See symbology element.
symbology	A defined method of representing numeric or alphabetic characters in a bar code; a type of bar code.
symbology element	A character or characters in a bar code symbol used to define the integrity and processing of the symbol itself (e.g., start and stop patterns). These elements are symbology overhead and are not part of the data conveyed by the bar code symbol.
Symbology identifier	A sequence of characters transmitted with the decoded data that identifies the data carrier from which the data has been decoded.
trade item	Any item (product or service) upon which there is a need to retrieve pre-defined information and that may be priced, or ordered, or invoiced at any point in any supply chain.
trade measures	Net measures of Variable Measure Trade Items as used for invoicing (billing) the trade item.
transaction type	Information (not part of the EAN.UCC System) denoting the particular operation in connection with which the scanned data has been captured.
truncation	Printing a symbol shorter than the symbology specification's minimum height recommendations. Truncation can make the symbol difficult for an operator to scan.
UCC Company Prefix	Part of the UCC-12 Data Structure consisting of a UCC Prefix and a Company Number allocated by the Uniform Code Council (UCC™).
UCC Coupon Code	An identification number for coupons issued in a national currency that uses the UCC-12 Data Structure.
UCC Prefix	A one-digit index number administered by the Uniform Code Council (UCC™), denoting the format and meaning of a particular Element String contained within the UCC-12 Data Structure.
UCC/EAN-128 Bar Code Symbol	A subset of the Code 128 that is utilised exclusively for UCC.EAN System data structures.
UCC/EAN-128 Composite Symbology™	A Composite Symbology™ that utilises a UCC/EAN-128 Bar Code Symbol as the linear component.

UCC/EAN-128 Coupon Extended Code	A supplemental bar code that can be printed on a coupon next to the primary UCC Coupon Code to provide additional information, such as Offer Codes, expiration dates, and household identification numbers.
UCC-12 Data Structure	The 12-digit EAN.UCC System data structure composed of a UCC Company Prefix, Item Reference, and Check Digit.
UCC-12 Identification Number	The EAN.UCC System identification number comprising 12 digits; used to identify trade items, locations, and special applications (e.g., coupons).
UCC™	Abbreviation for the Uniform Code Council.
Uniform Code Council, Inc.®	The Uniform Code Council (UCC™), based in the United States, is a membership organisation that jointly manages the EAN.UCC System with EAN International. The UCC also administers the EAN.UCC System in the United States and Canada.
unrestricted distribution	Signifies that such system data may be applied on goods to be processed anywhere in the world without restraint as to such things as country, company, and industry.
UPC-A Bar Code Symbol	A bar code symbol of the EAN/UPC Symbology that encodes UCC-12 Identification Numbers.
UPC-A Composite Symbology™	The EAN.UCC Composite Symbology™ that utilises a UPC-A Bar Code Symbol as the linear component.
UPC-E Bar Code Symbol	A bar code symbol of the EAN/UPC Symbology representing a UCC-12 Identification Number in six explicitly encoded digits using zero-suppression techniques.
UPC-E Composite Symbology™	The EAN.UCC Composite Symbology™ that utilises a UPC-E Bar Code Symbol as the linear component.
validation of data	Verification of scanned data to determine whether it meets the application rules for system logic and consistency and/or a particular user's requirements, prior to processing in EDP applications.
Variable Measure Trade Item	An item always produced in the same pre-defined version (e.g., type, design, packaging) that may be sold at any point in the supply chain, which either may vary in weight/size by its nature or which may be traded without a pre-defined weight/size/length.
wide-to-narrow ratio	The ratio between the wide elements and the narrow elements in a bar code symbology, such as ITF-14, which has two different element widths.
X-dimension	The specified width of the narrow element in a bar code symbol.

Chapter 2.6:

Numbering and Symbol Marking for Special Applications

Table of Contents

2.6.7 Very Small Healthcare Items.....	3
2.6.7.1 Introduction	3
2.6.7.2 Scope	3
2.6.7.2.1 Purpose.....	3
2.6.7.2.2 Applicability.....	3
2.6.7.2.3 Who Should Use These Guidelines	3
2.6.7.3 References.....	3
2.6.7.4 Definitions	4
2.6.7.5 Marking Requirements	4
2.6.7.5.1 Mandatory Data Elements	5
2.6.7.5.2 Optional Data Elements.....	5
2.6.7.6 Data Representation	6
2.6.7.6.1 Syntax	6
2.6.7.6.1.1 RSS Containing the Mandatory GTIN™	6
2.6.7.6.1.2 Composite Component™ Symbol Containing Optional Data	6
2.6.7.6.2 Symbol Metrics	7
2.6.7.6.2.1 RSS.....	7
2.6.7.6.2.1.1 X-Dimension (Module Size) and Symbol Height (Y Dimension)	7
2.6.7.6.2.1.2 Symbol Size	7
2.6.7.6.2.2 Composite Component™	7
2.6.7.6.3 Human Readable Interpretation	8
2.6.7.6.3.1 RSS.....	8
2.6.7.6.3.1.1 Location	8
2.6.7.6.3.1.2 Font.....	8
2.6.7.6.3.1.3 Format	8
2.6.7.6.3.1.4 Data Overflow	8
2.6.7.6.3.2 Composite Component™	8
2.6.7.6.3.2.1 Location	8
2.6.7.6.3.2.2 Font.....	9

2.6.7.6.3.2.3	Format	9
2.6.7.6.3.2.4	Data Overflow	9
2.6.7.7	Print Quality.....	10
2.6.7.8	Label Location.....	10

2.6.7 Very Small Healthcare Items

2.6.7.1 Introduction

The Reduced Space Symbolology® (RSS) and EAN.UCC Composite Symbolology™ (see Chapter 5.5) were specially developed for applications where traditional bar codes symbols were limited or not available. Very small healthcare items are an application for which there exists no encoding method today with traditional EAN.UCC bar code standards. Within the area of very small healthcare items, the unit-of-use items and unit dose items dispensed to the patient at the hospital bedside have a high importance for product identification. The lack of possibilities for automatic identification leads to high manual effort and errors during medication, documentation or at the stock control.

The following guidelines provide the current best practice for use and application of the Reduced Space and Composite Symbolologies in healthcare applications with reduced space marking requirements.

2.6.7.2 Scope

2.6.7.2.1 Purpose

These guidelines provide a foundation for the implementation of RSS-14™ Stacked, RSS Limited™, RSS-14™ Stacked Omnidirectional, and Composite Symbolologies in healthcare. They provide:

- Application requirements for RSS-14 Stacked, RSS Limited, RSS-14 Stacked Omnidirectional, and Composite Component Symbolologies.
- Methods for evaluating RSS-14 Stacked, RSS Limited, RSS-14 Stacked Omnidirectional, and Composite Component readability and scannability.

2.6.7.2.2 Applicability

These guidelines are only for healthcare items. They apply to the appropriate use of RSS-14 Stacked, RSS Limited, RSS-14 Stacked Omnidirectional and Composite Component on healthcare items that are too small for other EAN.UCC System linear symbolologies. The majority of uses for RSS will be on very small items, such as vials, ampoules, very small bottles, and blister packs.

2.6.7.2.3 Who Should Use These Guidelines

These guidelines are written for the entire healthcare supply chain, from the label printer to the healthcare provider and everyone in between. They provide sufficient information to implement this technology, assuming that the hardware and software being used supports the RSS and EAN.UCC Composite Symbolology according to *ITS/99-001:1999* and *ITS/99-002:1999*.

2.6.7.3 References

The standards listed below are referenced in these guidelines. The relevant provisions contained in the referenced specifications constitute provisions of these guidelines.

ITS/99-001:1999 International Symbolology Specification Reduced Space Symbolology® (RSS)

ITS/99-002:1999 International Symbolology Specification EAN.UCC Composite Symbolology™

ISO/IEC 15416	Information technology – Automatic identification and data capture techniques – Bar code print quality test specification – Linear symbols
ISO 1073-2	Alphanumeric character sets for optical recognition – Part 2: Character set OCR-B – Shapes and dimensions of the printed image

2.6.7.4 Definitions

Terms and definitions

The terms and definitions provided here and those from the Glossary (see Chapter 8) apply to these guidelines:

Bar height	The dimension of a bar (line) measured from its top to its bottom.
Bar width	The thickness of a bar (line) measured from one of its edges to the other.
Bar Width Reduction / Increase	The uniform reduction / increase of each bar code symbol in the film master or digital image file to correct for anticipated bar growth / shrinkage in the imaging or printing process.
Very Small Healthcare Items	All kinds of very small pharmaceutical and medical products, mainly unit-of-use items and unit dose items, but also very small packages.
Selective Bar Height Reduction	The uniform bar height reduction of a bar code symbol in the film master or digital bar code file to correct for anticipated bar growth in the imaging or printing process.

Abbreviations

2D	Two-dimensional
CC	Composite Component
RSS	Reduced Space Symbolology

2.6.7.5 Marking Requirements

RSS-14 Stacked, RSS Limited and RSS-14 Stacked Omnidirectional have been developed for small unit dosage/use healthcare packages and are designed to encode the GTIN. The optional Composite Component can contain additional data elements that refer to that particular item.

RSS-14 Stacked has the first priority to be used for identification of very small healthcare items. RSS Limited and RSS-14 Stacked Omnidirectional shall be used in exceptional cases for certain application requirements. The RSS Limited can be used if the item needs a relatively long but limited height symbol. RSS-14 Stacked Omnidirectional is designed for omnidirectional scanning environments.

In general, all participants of the healthcare supply chain shall be able to read and process all of these variants of RSS symbols.

2.6.7.5.1 Mandatory Data Elements

Item level marking shall contain the GTIN in the RSS-14 Stacked Symbol (or in the RSS Limited or RSS-14 Stacked Omnidirectional Symbol depending on the application requirements described above).

2.6.7.5.2 Optional Data Elements

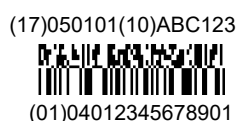
An item may also contain, if space allows, a Composite Component. At the discretion of the manufacturer, the Composite Component will contain additional information related to the product. It is recommended to use the Composite Component version A (CC-A) and to adopt the expiry date and the lot number, because they are legally required information, at least as human readable information on the item/package. Automatic handling of this data facilitates many maintenance and documentation duties. Within the Composite Component the secondary information is structured according to the rules of the UCC/EAN 128 Application Identifier Concept. Refer to the *General EAN.UCC Specifications* for complete Application Identifier information.

The Composite Component is not omnidirectionally scannable and, therefore, not suitable for omnidirectional scanning environments, particularly retail applications. Nevertheless, the automatic handling of secondary data offers several possibilities and benefits which may become important even in retail applications (e. g. scanning of best before or expiry dates, lot numbers in case of recalls, etc.).

Example¹: RSS-14 Stacked Composite Symbol, GTIN in RSS-14 Stacked, Application Identifiers (17) Expiry Date, and (10) Lot Number in Composite Component A



Example: RSS Limited Composite Symbol, GTIN in RSS Limited, Application Identifiers (17) Expiry Date, and (10) Lot Number in Composite Component A



Example: RSS-14 Stacked Omnidirectional Composite Symbol, GTIN in RSS-14 Stacked Omnidirectional, Application Identifiers (17) Expiry Date, and (10) Lot Number in Composite Component A



¹ Please note that all symbol examples shown in these guidelines are for illustration purposes and do not correspond to the metrics described in Chapter 2.6.7.6.2.1.1.

2.6.7.6 Data Representation

2.6.7.6.1 Syntax

2.6.7.6.1.1 RSS Containing the Mandatory GTIN™

The data syntax for the mandatory GTIN is:

- A two-digit Application Identifier (01) indicating a GTIN
- A 14 digit GTIN

As the RSS-14 Stacked, RSS Limited and RSS-14 Stacked Omnidirectional always exclusively contain a GTIN, the Application Identifier (01) indicating a GTIN is not encoded in these RSS symbols.

The 14-digit GTIN is structured as follows:

- A one-digit Indicator (value from 0 to 9). However, only 0 to 8 can be used as 9 is the variable measure prefix. The RSS Limited is restricted to the GTIN with Indicator value "0" or "1".
- The Company Prefix (designated by the responsible EAN Member Organisation or by the UCC)
- The Item Reference (designated by the holder of the Company Prefix)
- A Check Digit (calculated from the first 13 digits of the GTIN)

2.6.7.6.1.2 Composite Component™ Symbol Containing Optional Data

Any optional data shall be contained in the 2D Composite Component. The data syntax for each of the optional data fields is:

- A two- to four-digit Application Identifier to indicate data type and field size
- The data indicated by the Application Identifier. This may be a fixed or variable length field, depending upon the Application Identifier.

Multiple Application Identifier data elements may be concatenated in a single 2D Composite Component message. All Application Identifiers of pre-defined length² should precede the variable field Application Identifiers for the most efficient encoding in the 2D Composite Component. The FNC1 (Function Code 1) separator character shall separate variable length Application Identifier fields. Refer to the General EAN.UCC Specifications for guidelines on concatenation and for a complete list of EAN.UCC Application Identifiers.

In healthcare applications the following Application Identifier elements should be used as this data is legally required information and implies certain liabilities:

Expiry (Expiration) Date:

The data syntax for the expiry date is n2 + n6:

- A two-digit Application Identifier (17) indicating the maximum durability date
- A fixed length field of six digits indicating expiry date as YYMMDD

Lot / Batch Number:

The data syntax for the lot number is n2 + an..20:

- A two digit Application Identifier (10) indicating lot number
- A variable length field of up to twenty alphanumeric characters of lot number data

² See Chapter 7.9.2

2.6.7.6.2 Symbol Metrics

2.6.7.6.2.1 RSS

2.6.7.6.2.1.1 X-Dimension (Module Size) and Symbol Height (Y Dimension)

RSS Symbol	X-Dimension			Minimum Symbol Height			Quiet Zone
	Minimum	Nominal	Maximum	Minimum X	Nominal X	Maximum X	
RSS-14™ Stacked	0,17 mm (0,0067")	0,20 mm (0,008")	0,41 mm (0,016")	2,21 mm (0,087")	2,64 mm (0,104")	5,28 mm (0,208")	N. A.
RSS Limited™	0,17 mm (0,0067")	0,20 mm (0,008")	0,41 mm (0,016")	1,70 mm (0,067")	2,03 mm (0,080")	4,07 mm (0,160")	N. A.
RSS-14™ Stacked Omnidirectional	0,17 mm (0,0067")	0,20 mm (0,008")	0,41 mm (0,016")	11,73 mm (0,4623")	13,8 mm (0,552")	28,51 mm (1,104")	N. A.

2.6.7.6.2.1.2 Symbol Size

2.6.7.6.2.1.2.1 RSS-14™ Stacked

This symbol is, at minimum, 50X (50 modules) wide by 13X (13 modules) high. The top row is 5X (5 modules) high and the bottom row is 7X (7 modules) high. The separator pattern between rows is, at minimum, 1X (1 module) high. No Quiet Zones are required. The adjacent background colour can be the same as the guard bar, light on the left and dark on the right side of the symbol respectively.

2.6.7.6.2.1.2.2 RSS Limited™

This symbol is 74X (74 modules) wide by a minimum of 10X (10 modules) high. No Quiet Zones are required. The adjacent background colour can be the same as the guard bar, light on the left and dark on the right side of the symbol respectively.

2.6.7.6.2.1.2.3 RSS-14™ Stacked Omnidirectional

This symbol is, at minimum, 50X (50 modules) wide by 69X (69 modules) high. Each is 33X (33 modules) high minimum, with a 3X (3 modules) high separator pattern between the two rows. No Quiet Zones are required. The adjacent background colour can be the same as the guard bar, light on the left and dark on the right side of the symbol respectively.

2.6.7.6.2.2 Composite Component™

The X-dimension shall be nominally the same as the X-dimension of the associated primary RSS linear symbol. The overall dimensions of the Composite Component depend upon the data content. See *International Symbolology Specification EAN.UCC Composite Symbolology™* for details on calculating the dimension of a specific Composite Component Symbol and the allowed tolerances between the linear and the composite component.

2.6.7.6.3 Human Readable Interpretation

2.6.7.6.3.1 RSS

2.6.7.6.3.1.1 Location

The GTIN shall be printed in human-readable form underneath the symbol.

Example: RSS-14 Stacked Symbol containing the GTIN

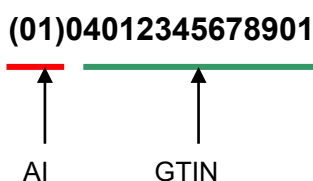


2.6.7.6.3.1.2 Font

A clearly legible font shall be used for the human-readable digits, e. g. OCR-B as defined in *ISO 1073-2*. Reasonable alternative type fonts and character sizes are acceptable provided the interpretation is clearly legible. The font should be one that is considered as suitable and compatible with other printed materials. When necessary, the font used shall be in accordance with applicable government laws and regulations.

2.6.7.6.3.1.3 Format

The GTIN shall be printed as a single 14-digit number preceded by the corresponding Application Identifier (01) enclosed in a parenthesis. Although the Application Identifier (01) is not encoded in the RSS it shall be printed to ensure the consistent and unambiguous interpretation of data in the case of a Composite Symbol. The parentheses are not part of the data and are not encoded in the bar code symbol.



2.6.7.6.3.1.4 Data Overflow

There will be instances where there is insufficient space on the very small healthcare item for the RSS Symbol and the human readable GTIN. When this situation occurs and this information is already printed on the label because of government mandates or by trade practice, then, at the supplier's discretion, the identification number's Human Readable Interpretation requirement can be waived.

For a consistent representation of the GTIN printed independently from the symbology, the EAN.UCC data title should be used:

AI	Full Title	Data Title
01	Global Trade Item Number	GTIN

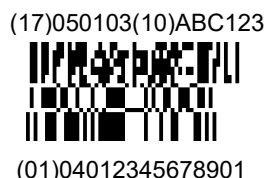
2.6.7.6.3.2 Composite Component™

2.6.7.6.3.2.1 Location

If there is sufficient space to print the human readable interpretation of the composite component, it shall be printed above the symbol in proper sequence of the Application Identifiers (the RSS Human

Readable Interpretation is printed below). The data shall be printed from top to bottom and left to right. A single Application Identifier with accompanying data shall be displayed on one line and not broken into two lines.

Example: RSS-14 Stacked Composite Symbol - GTIN printed below RSS-14 Stacked, Application Identifiers (17) Expiry Date and (10) Lot Number printed above the Composite Component in one single line.



Example: RSS-14 Stacked Composite Symbol – GTIN printed below RSS-14 Stacked, Application Identifiers (17) Expiry Date and (10) Lot Number printed above the Composite Component from top to bottom and left to right.



2.6.7.6.3.2.2 Font

The font should be one that is considered as suitable and compatible with other printed materials and the RSS Human Readable Interpretation. The font size should be scaled for easy legibility. The font used shall be in accordance with applicable government laws and regulations.

2.6.7.6.3.2.3 Format

The data should be printed with the proceeding AIs enclosed in parenthesis. The order of the data should be the same as encoded in the Composite Component according to the rules in the *General EAN.UCC Specifications*. The parentheses are not part of the data and are not encoded in the bar code symbol, though the AIs are.



2.6.7.6.3.2.4 Data Overflow

On many packages there will be insufficient space to print both the Human Readable Interpretation for RSS (GTIN) and the Composite Component information. Printing the RSS (GTIN) information shall take precedence over the Human Readable Interpretation for the Composite Component.

The GTIN, expiry date and lot number are already routinely printed on the label because of government mandates or by trade practice. In the case that there is no space for printing the encoded data above or below the symbol, the data not belonging directly to the symbology should be consistently represented using the EAN.UCC data titles:

AI	Full Title	Data Title
01	Global Trade Item Number	GTIN
17	Maximum Durability Date	USE BY or EXPIRY
10	Batch or Lot Number	BATCH/LOT

Note: If the RSS Composite Symbol fails to scan, manual input of the data is necessary. As expiry date and lot number should always be part of the information stored in the Composite Symbol and as this information is already printed on the label because of legal requirements, a software solution can be implemented to prompt the user for this data after keying in the GTIN.

2.6.7.7 Print Quality

The minimum print quality grade for RSS-14 Stacked, RSS Limited and RSS-14 Stacked Omnidirectional Symbols in healthcare applications shall be a 1,5/6/660 overall symbol grade when measured in accordance with *ISO/IEC 15416*. The measurement of the quality parameters shall be made by a verifier conforming with *ISO/IEC 15416*, using a 0,15 mm (0,006 in.) aperture at a nominal illumination wavelength of 660 ± 10 nanometers. According to this standard an overall grade is shown in the form:

1,5 / 6 / 660

where 1,5 is the overall symbol quality grade
 6 is the measuring aperture reference number (corresponding to an 0,15 mm or 0,006 in. diameter aperture)
 660 is the peak response wavelength in nanometers.

For the 2D Composite Component, ink spread in the direction of the bar y-axis (perpendicular to the bar width or x direction) requires a compensating Bar Width Reduction in the y direction.

2.6.7.8 Label Location

General principles on placement of bar code labels are described in Chapter 6 and apply to the label location of RSS/Composite Symbols.

The majority of uses for RSS will be on very small items with curved surfaces such as vials, ampoules, and very small bottles. For guidance in locating the RSS/Composite Symbol on curved surfaces, refer to Chapter 6.2.3.2.

Examples of RSS Symbols Applied to Curved Surface



Chapter 2.7:

Numbering and Symbol Marking for Very Small Healthcare Items

Table of Contents

2.6.7 Very Small Healthcare Items.....	3
2.6.7.1 Introduction	3
2.6.7.2 Scope	3
2.6.7.2.1 Purpose.....	3
2.6.7.2.2 Applicability.....	3
2.6.7.2.3 Who Should Use These Guidelines	3
2.6.7.3 References.....	3
2.6.7.4 Definitions	4
2.6.7.5 Marking Requirements	4
2.6.7.5.1 Mandatory Data Elements	5
2.6.7.5.2 Optional Data Elements.....	5
2.6.7.6 Data Representation	6
2.6.7.6.1 Syntax	6
2.6.7.6.1.1 RSS Containing the Mandatory GTIN™	6
2.6.7.6.1.2 Composite Component™ Symbol Containing Optional Data	6
2.6.7.6.2 Symbol Metrics	7
2.6.7.6.2.1 RSS.....	7
2.6.7.6.2.1.1 X-Dimension (Module Size) and Symbol Height (Y Dimension)	7
2.6.7.6.2.1.2 Symbol Size	7
2.6.7.6.2.2 Composite Component™	7
2.6.7.6.3 Human Readable Interpretation	8
2.6.7.6.3.1 RSS.....	8
2.6.7.6.3.1.1 Location	8
2.6.7.6.3.1.2 Font.....	8
2.6.7.6.3.1.3 Format	8
2.6.7.6.3.1.4 Data Overflow	8
2.6.7.6.3.2 Composite Component™	8
2.6.7.6.3.2.1 Location	8
2.6.7.6.3.2.2 Font.....	9

2.6.7.6.3.2.3	Format	9
2.6.7.6.3.2.4	Data Overflow	9
2.6.7.7	Print Quality.....	10
2.6.7.8	Label Location.....	10

2.7 Very Small Healthcare Items

2.7.1 Introduction

The Reduced Space Symbolology® (RSS) and EAN.UCC Composite Symbolology™ (see Chapter 5.5) were specially developed for applications where traditional bar codes symbols were limited or not available. Very small healthcare items are an application for which there exists no encoding method today with traditional EAN.UCC bar code standards. Within the area of very small healthcare items, the unit-of-use items and unit dose items dispensed to the patient at the hospital bedside have a high importance for product identification. The lack of possibilities for automatic identification leads to high manual effort and errors during medication, documentation or at the stock control.

The following guidelines provide the current best practice for use and application of the Reduced Space and Composite Symbolologies in healthcare applications with reduced space marking requirements.

2.7.2 Scope

2.7.2.1 Purpose

These guidelines provide a foundation for the implementation of RSS-14™ Stacked, RSS Limited™, RSS-14™ Stacked Omnidirectional, and Composite Symbolologies in healthcare. They provide:

- Application requirements for RSS-14 Stacked, RSS Limited, RSS-14 Stacked Omnidirectional, and Composite Component Symbolologies.
- Methods for evaluating RSS-14 Stacked, RSS Limited, RSS-14 Stacked Omnidirectional, and Composite Component readability and scannability.

2.7.2.2 Applicability

These guidelines are only for healthcare items. They apply to the appropriate use of RSS-14 Stacked, RSS Limited, RSS-14 Stacked Omnidirectional and Composite Component on healthcare items that are too small for other EAN.UCC System linear symbolologies. The majority of uses for RSS will be on very small items, such as vials, ampoules, very small bottles, and blister packs.

2.7.2.3 Who Should Use These Guidelines

These guidelines are written for the entire healthcare supply chain, from the label printer to the healthcare provider and everyone in between. They provide sufficient information to implement this technology, assuming that the hardware and software being used supports the RSS and EAN.UCC Composite Symbolology according to *ITS/99-001:1999* and *ITS/99-002:1999*.

2.7.3 References

The standards listed below are referenced in these guidelines. The relevant provisions contained in the referenced specifications constitute provisions of these guidelines.

ITS/99-001:1999 International Symbolology Specification Reduced Space Symbolology® (RSS)

ITS/99-002:1999 International Symbolology Specification EAN.UCC Composite Symbolology™

ISO/IEC 15416	Information technology – Automatic identification and data capture techniques – Bar code print quality test specification – Linear symbols
ISO 1073-2	Alphanumeric character sets for optical recognition – Part 2: Character set OCR-B – Shapes and dimensions of the printed image

2.7.4 Definitions

Terms and definitions

The terms and definitions provided here and those from the Glossary (see Chapter 8) apply to these guidelines:

Bar height	The dimension of a bar (line) measured from its top to its bottom.
Bar width	The thickness of a bar (line) measured from one of its edges to the other.
Bar Width Reduction / Increase	The uniform reduction / increase of each bar code symbol in the film master or digital image file to correct for anticipated bar growth / shrinkage in the imaging or printing process.
Very Small Healthcare Items	All kinds of very small pharmaceutical and medical products, mainly unit-of-use items and unit dose items, but also very small packages.
Selective Bar Height Reduction	The uniform bar height reduction of a bar code symbol in the film master or digital bar code file to correct for anticipated bar growth in the imaging or printing process.

Abbreviations

2D	Two-dimensional
CC	Composite Component
RSS	Reduced Space Symbology

2.7.5 Marking Requirements

RSS-14 Stacked, RSS Limited and RSS-14 Stacked Omnidirectional have been developed for small unit dosage/use healthcare packages and are designed to encode the GTIN. The optional Composite Component can contain additional data elements that refer to that particular item.

RSS-14 Stacked has the first priority to be used for identification of very small healthcare items. RSS Limited and RSS-14 Stacked Omnidirectional shall be used in exceptional cases for certain application requirements. The RSS Limited can be used if the item needs a relatively long but limited height symbol. RSS-14 Stacked Omnidirectional is designed for omnidirectional scanning environments.

In general, all participants of the healthcare supply chain shall be able to read and process all of these variants of RSS symbols.

2.7.5.1 Mandatory Data Elements

Item level marking shall contain the GTIN in the RSS-14 Stacked Symbol (or in the RSS Limited or RSS-14 Stacked Omnidirectional Symbol depending on the application requirements described above).

2.7.5.2 Optional Data Elements

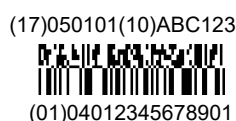
An item may also contain, if space allows, a Composite Component. At the discretion of the manufacturer, the Composite Component will contain additional information related to the product. It is recommended to use the Composite Component version A (CC-A) and to adopt the expiry date and the lot number, because they are legally required information, at least as human readable information on the item/package. Automatic handling of this data facilitates many maintenance and documentation duties. Within the Composite Component the secondary information is structured according to the rules of the UCC/EAN 128 Application Identifier Concept. Refer to the *General EAN.UCC Specifications* for complete Application Identifier information.

The Composite Component is not omnidirectionally scannable and, therefore, not suitable for omnidirectional scanning environments, particularly retail applications. Nevertheless, the automatic handling of secondary data offers several possibilities and benefits which may become important even in retail applications (e. g. scanning of best before or expiry dates, lot numbers in case of recalls, etc.).

Example¹: RSS-14 Stacked Composite Symbol, GTIN in RSS-14 Stacked, Application Identifiers (17) Expiry Date, and (10) Lot Number in Composite Component A



Example: RSS Limited Composite Symbol, GTIN in RSS Limited, Application Identifiers (17) Expiry Date, and (10) Lot Number in Composite Component A



Example: RSS-14 Stacked Omnidirectional Composite Symbol, GTIN in RSS-14 Stacked Omnidirectional, Application Identifiers (17) Expiry Date, and (10) Lot Number in Composite Component A



¹ Please note that all symbol examples shown in these guidelines are for illustration purposes and do not correspond to the metrics described in Chapter 2.6.7.6.2.1.1.

2.7.6 Data Representation

2.7.6.1 Syntax

2.7.6.1.1 RSS Containing the Mandatory GTIN™

The data syntax for the mandatory GTIN is:

- A two-digit Application Identifier (01) indicating a GTIN
- A 14 digit GTIN

As the RSS-14 Stacked, RSS Limited and RSS-14 Stacked Omnidirectional always exclusively contain a GTIN, the Application Identifier (01) indicating a GTIN is not encoded in these RSS symbols.

The 14-digit GTIN is structured as follows:

- A one-digit Indicator (value from 0 to 9). However, only 0 to 8 can be used as 9 is the variable measure prefix. The RSS Limited is restricted to the GTIN with Indicator value "0" or "1".
- The Company Prefix (designated by the responsible EAN Member Organisation or by the UCC)
- The Item Reference (designated by the holder of the Company Prefix)
- A Check Digit (calculated from the first 13 digits of the GTIN)

2.7.6.1.2 Composite Component™ Symbol Containing Optional Data

Any optional data shall be contained in the 2D Composite Component. The data syntax for each of the optional data fields is:

- A two- to four-digit Application Identifier to indicate data type and field size
- The data indicated by the Application Identifier. This may be a fixed or variable length field, depending upon the Application Identifier.

Multiple Application Identifier data elements may be concatenated in a single 2D Composite Component message. All Application Identifiers of pre-defined length² should precede the variable field Application Identifiers for the most efficient encoding in the 2D Composite Component. The FNC1 (Function Code 1) separator character shall separate variable length Application Identifier fields. Refer to the General EAN.UCC Specifications for guidelines on concatenation and for a complete list of EAN.UCC Application Identifiers.

In healthcare applications the following Application Identifier elements should be used as this data is legally required information and implies certain liabilities:

Expiry (Expiration) Date:

The data syntax for the expiry date is n2 + n6:

- A two-digit Application Identifier (17) indicating the maximum durability date
- A fixed length field of six digits indicating expiry date as YYMMDD

Lot / Batch Number:

The data syntax for the lot number is n2 + an..20:

- A two digit Application Identifier (10) indicating lot number
- A variable length field of up to twenty alphanumeric characters of lot number data

² See Chapter 7.9.2

2.7.6.2 Symbol Metrics

2.7.6.2.1 RSS

2.7.6.2.1.1 X-Dimension (Module Size) and Symbol Height (Y Dimension)

RSS Symbol	X-Dimension			Minimum Symbol Height			Quiet Zone
	Minimum	Nominal	Maximum	Minimum X	Nominal X	Maximum X	
RSS-14™ Stacked	0,17 mm (0,0067")	0,20 mm (0,008")	0,41 mm (0,016")	2,21 mm (0,087")	2,64 mm (0,104")	5,28 mm (0,208")	N. A.
RSS Limited™	0,17 mm (0,0067")	0,20 mm (0,008")	0,41 mm (0,016")	1,70 mm (0,067")	2,03 mm (0,080")	4,07 mm (0,160")	N. A.
RSS-14™ Stacked Omnidirectional	0,17 mm (0,0067")	0,20 mm (0,008")	0,41 mm (0,016")	11,73 mm (0,4623")	13,8 mm (0,552")	28,51 mm (1,104")	N. A.

2.7.6.2.1.2 Symbol Size

2.7.6.2.1.2.1 RSS-14™ Stacked

This symbol is, at minimum, 50X (50 modules) wide by 13X (13 modules) high. The top row is 5X (5 modules) high and the bottom row is 7X (7 modules) high. The separator pattern between rows is, at minimum, 1X (1 module) high. No Quiet Zones are required. The adjacent background colour can be the same as the guard bar, light on the left and dark on the right side of the symbol respectively.

2.7.6.2.1.2.2 RSS Limited™

This symbol is 74X (74 modules) wide by a minimum of 10X (10 modules) high. No Quiet Zones are required. The adjacent background colour can be the same as the guard bar, light on the left and dark on the right side of the symbol respectively.

2.7.6.2.1.2.3 RSS-14™ Stacked Omnidirectional

This symbol is, at minimum, 50X (50 modules) wide by 69X (69 modules) high. Each is 33X (33 modules) high minimum, with a 3X (3 modules) high separator pattern between the two rows. No Quiet Zones are required. The adjacent background colour can be the same as the guard bar, light on the left and dark on the right side of the symbol respectively.

2.7.6.2.2 Composite Component™

The X-dimension shall be nominally the same as the X-dimension of the associated primary RSS linear symbol. The overall dimensions of the Composite Component depend upon the data content. See *International Symbolology Specification EAN.UCC Composite Symbolology™* for details on calculating the dimension of a specific Composite Component Symbol and the allowed tolerances between the linear and the composite component.

2.7.6.3 Human Readable Interpretation

2.7.6.3.1 RSS

2.7.6.3.1.1 Location

The GTIN shall be printed in human-readable form underneath the symbol.

Example: RSS-14 Stacked Symbol containing the GTIN

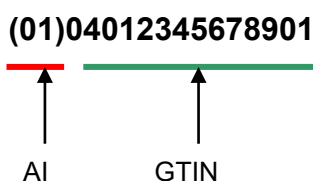


2.7.6.3.1.2 Font

A clearly legible font shall be used for the human-readable digits, e. g. OCR-B as defined in *ISO 1073-2*. Reasonable alternative type fonts and character sizes are acceptable provided the interpretation is clearly legible. The font should be one that is considered as suitable and compatible with other printed materials. When necessary, the font used shall be in accordance with applicable government laws and regulations.

2.7.6.3.1.3 Format

The GTIN shall be printed as a single 14-digit number preceded by the corresponding Application Identifier (01) enclosed in a parenthesis. Although the Application Identifier (01) is not encoded in the RSS it shall be printed to ensure the consistent and unambiguous interpretation of data in the case of a Composite Symbol. The parentheses are not part of the data and are not encoded in the bar code symbol.



2.7.6.3.1.4 Data Overflow

There will be instances where there is insufficient space on the very small healthcare item for the RSS Symbol and the human readable GTIN. When this situation occurs and this information is already printed on the label because of government mandates or by trade practice, then, at the supplier's discretion, the identification number's Human Readable Interpretation requirement can be waived.

For a consistent representation of the GTIN printed independently from the symbology, the EAN.UCC data title should be used:

AI	Full Title	Data Title
01	Global Trade Item Number	GTIN

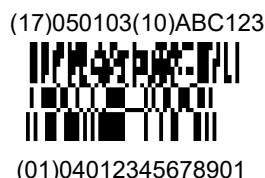
2.7.6.3.2 Composite Component™

2.7.6.3.2.1 Location

If there is sufficient space to print the human readable interpretation of the composite component, it shall be printed above the symbol in proper sequence of the Application Identifiers (the RSS Human

Readable Interpretation is printed below). The data shall be printed from top to bottom and left to right. A single Application Identifier with accompanying data shall be displayed on one line and not broken into two lines.

Example: RSS-14 Stacked Composite Symbol - GTIN printed below RSS-14 Stacked, Application Identifiers (17) Expiry Date and (10) Lot Number printed above the Composite Component in one single line.



Example: RSS-14 Stacked Composite Symbol – GTIN printed below RSS-14 Stacked, Application Identifiers (17) Expiry Date and (10) Lot Number printed above the Composite Component from top to bottom and left to right.

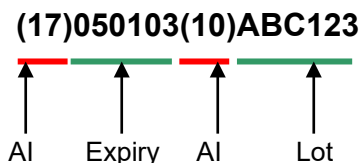


2.7.6.3.2.2 Font

The font should be one that is considered as suitable and compatible with other printed materials and the RSS Human Readable Interpretation. The font size should be scaled for easy legibility. The font used shall be in accordance with applicable government laws and regulations.

2.7.6.3.2.3 Format

The data should be printed with the proceeding AIs enclosed in parenthesis. The order of the data should be the same as encoded in the Composite Component according to the rules in the *General EAN.UCC Specifications*. The parentheses are not part of the data and are not encoded in the bar code symbol, though the AIs are.



2.7.6.3.2.4 Data Overflow

On many packages there will be insufficient space to print both the Human Readable Interpretation for RSS (GTIN) and the Composite Component information. Printing the RSS (GTIN) information shall take precedence over the Human Readable Interpretation for the Composite Component.

The GTIN, expiry date and lot number are already routinely printed on the label because of government mandates or by trade practice. In the case that there is no space for printing the encoded data above or below the symbol, the data not belonging directly to the symbology should be consistently represented using the EAN.UCC data titles:

AI	Full Title	Data Title
01	Global Trade Item Number	GTIN
17	Maximum Durability Date	USE BY or EXPIRY
10	Batch or Lot Number	BATCH/LOT

Note: If the RSS Composite Symbol fails to scan, manual input of the data is necessary. As expiry date and lot number should always be part of the information stored in the Composite Symbol and as this information is already printed on the label because of legal requirements, a software solution can be implemented to prompt the user for this data after keying in the GTIN.

2.7.7 Print Quality

The minimum print quality grade for RSS-14 Stacked, RSS Limited and RSS-14 Stacked Omnidirectional Symbols in healthcare applications shall be a 1,5/6/660 overall symbol grade when measured in accordance with *ISO/IEC 15416*. The measurement of the quality parameters shall be made by a verifier conforming with *ISO/IEC 15416*, using a 0,15 mm (0,006 in.) aperture at a nominal illumination wavelength of 660 ± 10 nanometers. According to this standard an overall grade is shown in the form:

1,5 / 6 / 660

where 1,5 is the overall symbol quality grade
 6 is the measuring aperture reference number (corresponding to an 0,15 mm or 0,006 in. diameter aperture)
 660 is the peak response wavelength in nanometers.

For the 2D Composite Component, ink spread in the direction of the bar y-axis (perpendicular to the bar width or x direction) requires a compensating Bar Width Reduction in the y direction.

2.7.8 Label Location

General principles on placement of bar code labels are described in Chapter 6 and apply to the label location of RSS/Composite Symbols.

The majority of uses for RSS will be on very small items with curved surfaces such as vials, ampoules, and very small bottles. For guidance in locating the RSS/Composite Symbol on curved surfaces, refer to Chapter 6.2.3.2.

Examples of RSS Symbols Applied to Curved Surface

