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Read Me First



Introduction

This manual aims to provide all necessary information to anyone interested in the GS1 System, or who is involved in its implementation from whatever point of view, however, in particular:

- Companies requiring to know how to number and apply bar codes to items for the purpose of controlling the movement of goods and services world-wide
- Retailers requiring information about the various GS1 Identification Keys and bar coding options they may encounter or may use to meet their own needs
- Members of the various professions who take part in the bar coding process by providing supplies or services, for example, printers, graphic designers, film master suppliers, and manufacturers of scanning or marking equipment.

For further information in relation to the technical aspects of all the GS1 Symbologies and their production, please refer to the GS1 Australia User Manual – Symbology & Printing.

Note: Throughout this user manual you will notice references to new terminology, and updates to old terminology. This has occurred as a result of the global change to adopt the name GS1. For further information contact GS1 Australia or refer to our website www.gs1au.org



Navigator

This manual is divided into sections related to different aspects of the GS1 System with instructions on how to apply the system. To assist with navigation, the following explains the breakdown of each section as well as information contained in each.

1 Basics and Principles of the GS1 System

This section provides an introduction to the core components of the GS1 System.

2 Introduction to GS1 Identification Keys

This section provides information on the selection of the correct GS1 Identification Key and the basic rules associated with GS1 Membership and number allocation.

3 Numbering Trade Items

This section provides information on the basic numbering rules for trade items, which GTIN to use, and specific details on how to allocate the selected GTIN.

4 Numbering Trade Items for North America

This section provides information on the which GTIN is most appropriate for trade items intended for scanning in North America, and how to generate the selected GTIN.

5 Numbering and Bar Coding 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.

6 Numbering Locations

This section defines the international standard for the use of Global Location Numbers (GLNs) in the identification of physical or legal entities.



7 Numbering Assets

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

8 Application Identifiers

This section introduces Application Identifiers (AIs), which are used for encoding attribute data. All AIs, their uses, and any system considerations, are defined in this section.

9 Bar Code Symbol Printing Considerations

This section provides hints and tips on producing quality bar code symbols, aswell on guidance on which bar code symbology to use.

10 Bar Code Symbol Dimensions

This section provides details, including dimensions, for the bar code symbols that are endorsed for use within the GS1 System.

11 Bar Code Symbol Location

This section provides guidelines on symbol placement/location on packaging.

12 Bar Code Verification

This section provides information about the process of verifying bar code symbols, possible verification issues, and how to solve them.



Disclaimer

Every possible effort has been made to ensure that the information and specifications in this manual are correct, however GS1 Australia expressly disclaim liability for any errors. In addition, no warranty or representation is made that this manual will not require modification due to developments in technology or changes or additions to the GS1 System.

1 Basics and Principles of the GS1 System



1.1 Introduction

The GS1 System originated in the United States and was established in 1973 by the Uniform Code Council (UCC). The UCC adopted a twelve-digit identification number, and the first identification numbers and bar code symbols in open trade were being scanned in 1974. Following the success of this UCC System, the European Article Numbering Association, was established in 1977 to develop a compatible system for use outside North America. To date, EAN International, its member organisations (MOs) around the world, and the UCC have been working together in partnership, but never under a common name. In 2004 EAN International, the MOs, and the UCC merged to form a new organisation, GS1.

The GS1 System was designed as a superset of the UCC System and principally uses thirteen-digit numbers. As a consequence of using certain bar code symbols and data structures, the GS1 System has expanded. Today full global compatibility is achieved through the use of the GTIN Format, a fourteen-digit reference field in computer files that can store data structures to ensure a trade item identification number is unique worldwide.

Although North America set a sunrise date of January, 2005, for the global use of the GTIN-13 and GTIN-8, a GTIN-12 represented by a UPC-A or UPC-E Bar Code Symbol may still be required for items sold at retail Point-of-Sale (POS) in the United States and Canada. This is because many North American users cannot yet accommodate a GTIN-13 or GTIN-8 in their twelve-digit database files. If advised by North American distributors that your bar code symbols are unable to be scanned, please contact GS1 Australia regarding the allocation of a U.P.C. Company Prefix.

The GS1 System provides for the use of unambiguous numbers called GS1 Identification Keys to identify goods, services, assets locations and documents worldwide. These numbers can be represented in GS1 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 Keys are also used in Electronic Data Interchange (EDI) to improve the speed and accuracy of communications. This document only provides information about the numbering system, the bar code symbols, and the scanning system. For information about EDI, please refer to the GS1 EANCOM® guidelines available from GS1 Australia.

In addition to providing unique GS1 Identification Keys, the GS1 System provides a solution for capturing attribute 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 in the GS1 System, but with the newly emerged Radio Frequency Identification (RFID) Standard incorporated within the EPC network, RFID is a new data carrier that will become more common in the future.

The GS1 System is designed for use in any industry or trade sector, at all levels of manufacturing and distribution. In Australia major system adopters include the health, steel, hardware, electrical appliance, furniture, meat, and telecommunications industries. The GS1 System is even used for fire brigades and electricity generators.

Any changes to the system are introduced so as not to negatively affect current users.

GS1 Australia provides separate guidelines for implementation of the GS1 System for specific industries, such as the ones listed above. These guidelines are available from our website at www.gs1au.org, or on request from GS1 Australia.



1.2 Basics of the GS1 System

Different areas of application are covered by the GS1 System. These include trade items, logistic units, assets, and locations.

These applications rely on standard numbering structures by which all relevant items and their data can be identified. The numbers are the keys to access databases, and to unambiguously identify items handled in all messages of a transaction. Numbering is for identification only. All information that describes a product or a service and its characteristics are to be found in databases. They are communicated from a supplier to a user once before the transaction, either by using standard messages or by consultation of electronic catalogues.

There are three main elements of the GS1 System; **the GS1 Identification Key** or identification number, **the data carrier** (most commonly a bar code symbol), and **eMessaging**.

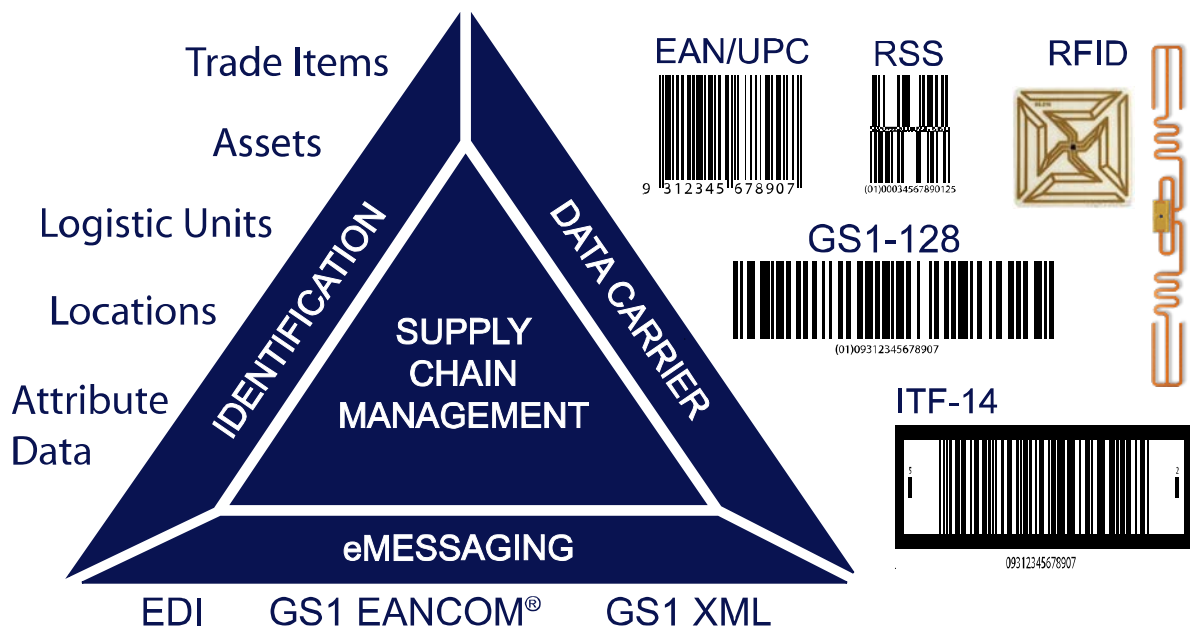


Figure 1 GS1 System Components



1.2.1 The GS1 Identification Key

The GS1 System provides ID Keys for different applications. The application will determine how the number is to be used. The data structure of the GS1 ID Keys guarantees worldwide uniqueness within the relevant area of application.

Trade Item Identification

A trade item is any item (product or service) upon which there is a need to retrieve pre-defined information that may be priced, ordered, or invoiced for trade between participants at any point in the supply chain. Global Trade Item Numbers (GTINs) are used for the unique identification of trade items worldwide.

The GTIN-13, GTIN-8, GTIN-12 and GTIN-14 are all used to provide unique identification of trade items.

Note: The GS1 System identification numbers were previously called EAN/UCC-13, EAN/UCC-8, UCC-12 and EAN/UCC-14 Identification Numbers.

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

Within the Australian retail industry trade item numbers have historically been referred to APNs and TUNs. Whilst this terminology may still occasionally be encountered, the correct term for both is Global Trade Item Number, or GTIN.

For detailed information on the allocation of GTINs refer to “Numbering Trade Items” on page 17.

Logistic Unit Identification

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. The Serial Shipping Container Code (SSCC) is a standard identification number used for the unique identification of logistic units.

Each individual logistic unit is allocated a unique serial number, the SSCC, which must be different for every logistic unit. Even if the logistic units contain identical trade items, they still require different SSCCs.

Scanning the SSCC marked on each logistic unit allows the physical movement of the unit to be individually tracked and traced by providing a link between 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, automated receiving, etc.

For detailed information on the identification of logistic units and the allocation and use of the SSCC refer to “Numbering and Bar Coding Logistic Units” on page 62.



Location Identification

Global Location Numbers (GLNs) are used to uniquely identify a physical or legal entity.

GLNs use the same structure as the GTIN-13 for trade items, but must be treated as a separate series of numbers.

The use of GLNs is a pre-requisite for efficient Electronic Data Interchange (EDI).

For detailed information on the allocation and use of GLNs refer to “Numbering Locations” on page 74

Asset Identification

The GS1 System provides a system for the identification of assets. The object of asset identification is to identify a physical entity as an inventory item. Asset identifiers should not be used for any other identification purpose.

There are two main types of Asset Identifiers;

- GS1 Global Returnable Asset Identifier (GRAI) – used to identify a reusable entity (e.g. a reusable beer keg) that is normally used for transport and storage of goods.
- GS1 Global Individual Asset Identifier (GIAI) – used to identify uniquely an entity that is part of the inventory of a given company (e.g. a personal computer).

For detailed information on the identification of assets refer to “Numbering Assets” on page 78.

Attribute Identification

Through the use of Application Identifiers (AIs) the GS1 System enables data over and above item identification, such as batch numbers or use by dates, to be encoded in a GS1-128 (previously UCC/EAN-128) Bar Code Symbol and unambiguously and securely interpreted when scanned. The use of Application Identifiers ensures that the information encoded by one company can also be scanned and interpreted by any other company in the supply chain.

For information on Application Identifiers refer to “Application Identifiers” on page 83.



1.2.2 Data Carriers

All of the identification numbers used in the GS1 System can be represented in data carriers. While, with improvements in the technology and new application requirements, new data carriers such as RSS, Data Matrix, and RFID have been introduced, bar code symbols are still the most common and widely used data carriers. Bar code symbols are a means of representing data in machine readable form, and allow automatic data capture at each point where an item leaves or enters premises.

Bar code symbols are usually included in the production process, at the producer site. They may be pre-printed with other information present on the packaging, a label can be affixed to the item at the production line, or they can be printed directly on to the packaging online.

The EAN/UPC Symbology (which includes the EAN-13, EAN-8, UPC-A and UPC-E Bar Code Symbols) is a bar code symbology family that can be read omnidirectionally. It must be used for all items that are scanned at retail POS and may be used on other trade items intended to be scanned in a General Distribution Scanning environment.

For detailed information on the following Data Carriers refer to “Bar Code Symbol Dimensions” on page 149.



Figure 2 EAN-13 Bar Code Symbol



Figure 3 EAN-8 Bar Code Symbol



Figure 4 UPC-A Bar Code Symbol



Figure 5 UPC-E Bar Code Symbol



The ITF-14 Bar Code Symbol (Interleaved 2-of-5) is restricted for use on trade items not passing through the retail POS. Because of the robust nature of this bar code symbology it is best suited for direct printing on to corrugate fibreboard.



09312345678907

Figure 6 ITF-14 Bar Code Symbol

GS1-128 (previously UCC/EAN-128) Bar Code Symbol is an extremely flexible symbology that, with the use of Application Identifiers, can encode not only the GTIN, but additional attribute data. The GS1-128 Bar Code Symbol is also used to encode the Serial Shipping Container Code (SSCC) on a logistics label. It is not intended to be read on items passing through POS.



(01)09312345678907

Figure 7 GS1-128 Bar Code Symbol





1.2.3 eMessaging

The identification numbers used with the GS1 System are also used in Electronic Data Interchange (EDI) messages, this allows unique trade item information associated with a transaction to be identified and exchanged between trading partners.

Today, the majority of data in commercial paper documents is generated from existing computer applications. These paper documents are printed and copied before the information they contain is finally communicated by mail or fax. In turn, the business partner re-keys all this information into another computer application for further processing. This process is extremely slow, costly and unreliable. The need for a faster, cheaper and more accurate solution for exchanging business data is a priority for many companies and organisations.

In the traditional sense EDI can be conceptualised as paperless trading. A common and useful definition for EDI is the “transfer of structured data, by agreed message standards, from one computer application to another by electronic means and with a minimum of human intervention”.

The electronic exchange of data (or eMessaging) provides trading partners with an efficient business tool for the automatic transmission of business data. Companies do not need to worry about different and/or incompatible computer systems.

Through the use of GS1 Australia’s traditional eMessaging guidelines, GS1 EANCOM (subset of International UN/EDIFACT standard) and GS1’s Business Message Standards (XML syntax), data may be communicated quickly, efficiently and accurately, irrespective of a users internal hardware or software.

GS1 does not see XML replacing traditional EDI syntaxes such as UN/EDIFACT. At their lowest levels, XML and UN/EDIFACT are simply eMessaging syntaxes, both having different strengths and weaknesses.

For more information contact GS1 Australia.

2 Introduction to GS1 Identification Keys



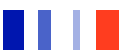
2.1 Introduction

There are seven GS1 Identification Keys that support the identification of items, services, locations, logistic units, returnable containers, etc. Each of the GS1 Identification Keys provides a link between the item (a physical product, place, thing or service) and information pertaining to the item.

The principles of GS1 Identification Key allocation ensure non-significant, secure and globally unique numbers that can be used by all trading partners, independent of industry sector or location, to improve supply and demand chain efficiency.

Companies wishing to allocate GS1 Identification Keys and/or bar code their products for open trade need to be a member of GS1 Australia or one of the other GS1 Member Organisations around the world. A GS1 Company Prefix will be assigned to a user company to allow that user company to create any of the GS1 identification keys, namely GTIN (Global Trade Item Number), GLN (Global Location Number), SSCC (Serial Shipping Container Code), GRAI (Global Returnable Asset Identifier), GIAI (Global Individual Asset Identifier), GSRN (Global Service Relation Number) and GDTI (Global Document Type Identifier).

For details on which Identification Key to use refer to 2.4 Selecting the Correct GS1 ID Key on Page 16.





2.2 GS1 Company Prefix

GS1 Australia assigns a GS1 Company Prefix to each of its members, which is then used to create GS1 Identification Keys. Currently GS1 Australia allocates seven- or nine-digit GS1 Company Prefixes to its membership, however GS1 Company Prefixes of other lengths may be allocated in the future to further conserve numbers. Please note that other GS1 Member Organisations may allocate GS1 Company Prefixes of different lengths.

The GS1 Company Prefix allows for the allocation of a range of numbers. To obtain an additional GS1 Company Prefix or increase your range of available numbers, members should contact GS1 Australia. Additional fees may apply.

The GS1 Company Prefix cannot be sold, leased or given, in whole or part, for use by any other company other than the company it was allocated to.

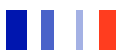
When a company changes legal status as a result of an acquisition, merger, partial purchase, split or “spin-off”, the following guidelines apply.

2.2.1 Acquisitions and Mergers

In the case of an acquisition or merger GS1 Australia must be notified in writing by both the “buying” and the “selling” companies. There are then two available options regarding the use of the GS1 Company Prefix and associated GS1 ID Keys:

- The “buying” company can adopt the “selling” company’s GS1 Company Prefix, keeping the GS1 ID Keys already allocated. If the “buying” company is already a member of GS1 Australia an additional fee will apply. However, if the “buying” company is not yet a member of GS1 Australia, they must first become a member.
- The “buying” company can phase in GS1 ID Keys carrying their own GS1 Company Prefix, for example when packaging is redesigned or reprinted

“Buying” companies need to be aware that if they decide to reallocate GS1 ID Keys using their own GS1 Company Prefix instead of acquiring the “selling” company’s GS1 Company Prefix, this may result in additional work and data file maintenance for customers.





2.2.2 Partial Purchase

When a company buys a division, brand name, or a range of items, there are then two available options regarding the use of the GS1 Company Prefix and associated GS1 ID Keys:

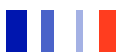
- The “selling” company may submit in writing to GS1 Australia that they have sold their brand/division/range of items, and they no longer require the GS1 Company Prefix used to identify these items, therefore authorising the transfer of their GS1 Company Prefix to the “buying” company
 - The “selling” company may provide written authorisation to GS1 Australia stating that the “buying” company will exhaust all existing stock carrying the “selling” company’s GS1 Company Prefix. At their earliest convenience the “buying” company must allocate new GTINs using their own GS1 Company Prefix to the items, for example when packaging is redesigned or reprinted. Trading partners must be notified of the changes to the GS1 ID Keys in advance
- “Buying” companies need to be aware that if they are not members of GS1 Australia, and decide to allocate new GS1 ID Keys instead of acquiring the “selling” company’s GS1 Company Prefix, they will first be required to become GS1 Australia members to acquire their own GS1 Company Prefix. This option of allocating new GS1 ID Keys to products may result in additional work and data file maintenance for customers.

2.2.3 Split or Spin-Off

When a company splits into two or more separate companies it is necessary for each GS1 Company Prefix assigned to the original company to be transferred to one, and only one, of the new companies. Any company left without a GS1 Company Prefix will need to apply to GS1 Australia to obtain one. A decision as to which of the new companies will take over which GS1 Company Prefixes should be made to minimise the number of changes to GS1 ID Keys that will be required. The decision should be part of the legal arrangements that set up the new companies.

It is not necessary for existing stock of items to be renumbered. However, when any of the split or spin-off companies are using GS1 ID Keys that are created using a GS1 Company Prefix that it no longer holds, then it should re-number those GS1 ID Keys using its own GS1 Company Prefix, for example when new labelling or packaging is produced. Customers should be notified well in advance of the changes.

Split or spin-off companies that retain a GS1 Company Prefix must keep a record of the GS1 ID Keys created from their prefix that have been allocated to items they no longer own. They must not re-use these GS1 ID Keys until an appropriate amount of time after the company that split away owning those items last supplied goods identified by those GS1 ID Keys (e.g. four years for items carrying GTINs). Therefore, the company that did not retain the GS1 Company Prefix has to keep the company that did maintain the prefix informed of the dates on which the goods were last supplied with the previous number, or to guarantee a date by which the number change will be made.





2.3 Uniqueness of GS1 ID Keys

All GS1 Identification Keys must be allocated uniquely. It is recommended that the numbers do not contain any intelligence or parsable strings. The embedding of internal codes is discouraged because it is often found that the rules for changing them differ from the rules for changing an identification number.

To ensure accuracy and prevent duplication it is good practice to assign the role of allocating GS1 ID Keys to a specific member of your organisation, and to keep records of all numbers allocated.

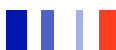


2.4 Selecting the Correct GS1 ID Key

Use the tables below as a guide for selecting the correct GS1 ID Key depending on the intended application.

GS1 ID Key	Acronym	Application	Page
Global Trade Item Number	GTIN	As the name implies, the GTIN helps automate the trading process – basically buying and selling. GTINs are therefore assigned to any item (product or service) that may be priced, or ordered, or invoiced at any point in any supply chain. The GTIN is then used to retrieve pre-defined information about the item.	17
Serial Shipping Container Code	SSCC	The SSCC is the GS1 Identification Key for an item of any composition established for transport and/or storage which needs to be managed through the supply chain. The SSCC is assigned for the life time of the transport item and is a mandatory element on the GS1 Logistic Label using Application Identifier (00)	62
Global Location Number	GLN	The GLN is the GS1 ID Key for Locations. The GLN can be used to identify physical locations and legal entities where is a need to retrieve pre-defined information to improve the efficiency of communication with the supply-chain. Global Location Numbers are a prerequisite for Electronic Data Interchange (EDI).	74
Global Individual Asset Identifier	GIAI	The GIAI is the GS1 Identification Key used in a diverse range of business applications ranging from tracking like recording the life-cycle history of aircraft parts. The GIAI is assigned by the owner of the asset and may be bar coded using Application Identifier (8004).	12
Global Returnable Asset Identifier	GRAI	The GRAI is the GS1 Identification Key for types of reusable package or transport equipment that are considered an asset. It is used to enable tracking as well as recording of all relevant data associated with the individual asset or asset type. The GRAI is assigned for the life time of the asset and may be bar coded using Application Identifier (8003).	78
Global Service Relation Number	GSRN	The GSRN is the GS1 Identification Key used to identify the recipient of services in the context of a service relationship. It is used to enable access to a database entry for recording recurring services. The GSRN is normally assigned by the service provider and may be bar coded using Application Identifier (8018).	106
Global Document Type Identifier	GDTI	The GDTI is the Identification Key for a document type combined with an optional serial number and used to access database information that is required for document control purposes. The GDTI is assigned for the life time of the document type and may be bar coded using Application Identifier (253).	137

TABLE 1 Selecting the Correct GS1 ID Key



3 Numbering Trade Items



3.1 Introduction

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, ordered, or invoiced at any point in any supply chain. This definition covers services and product, 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 (POS) (through Price Look Up (PLU) files), of goods receiving, inventory management, automatic re-ordering, sales analysis, and a wide range of other business applications.

Each trade item that is different from another in design and/or content is allocated a unique Global Trade Item Number (GTIN), which remains the same as long as it is traded. The same GTIN is given to all trade items sharing key characteristics.

The GTIN-13, GTIN-8, GTIN-12 and GTIN-14 are used to identify trade items.

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.

Note: If you are numbering trade items for export to North America refer to “Numbering Trade Items for North America” on page 53





3.2 Basic Numbering Rules

3.2.1 Branded Items

The brand owner, the organisation that owns the specifications of the trade item regardless of where and by whom it is manufactured, is normally responsible for the allocation of the GTIN.

The brand owner is the organisation that owns the trade item specification and may be:

The Manufacturer or Supplier

The company manufactures the trade item or has it manufactured, in any country, and sells it under its own brand name.

The Importer or Wholesaler

The importer or wholesaler has the trade item manufactured, in any country, and sells it under its own brand name or the importer or wholesaler changes the trade item (for example by modifying the packaging of the trade item).

The Retailer

The retailer has the trade item manufactured, in any country, and sells it under its own brand.





3.2.2 Non Branded Items and Exceptions

There are some exceptions as follows:

Non Branded Items

Items without a brand name and generic items – not private labels – are still assigned GTINs by their manufacturer. As different manufacturers may supply items that appear identical to the consumer, it is possible that items that are apparently the same have different GTINs. Companies that trade in these items need to organise their computer applications (replenishment programs for example) to cope with this eventuality. Examples of items that sometimes have no brand are apples, plasterboard, candles, drinking glasses etc.

Customer Specific Items

When a trade item is made specifically for one trade customer and is orderable only by this customer, it is permissible for a GTIN to be assigned by the customer. In this case the GTIN should be formed from the customer's GS1 Company Prefix.

Other Exceptions

If the brand owner does not assign a GTIN, the importer or another intermediary can assign an item a temporary GTIN. This may be used until a GTIN is assigned in the normal way. Alternatively a retail organisation can assign an internal number, for use within its own stores only, to an item that does not yet have a GTIN assigned to it.





3.2.3 Trade Items Requiring Separate Numbers

A separate unique GTIN is required for every different trade item, and for every different variant of an item whenever this variation is in any way apparent and significant to any partner in the supply chain, the final user, or to the retail customer.

Although this list is not exhaustive, the basic pre-defined characteristics of a trade item are:

- The product name, product brand, and product description
- The trade item type and variety
- The net quantity of a trade item (weight, volume, or other dimension impacting trade)
- If the trade item is a grouping – the number of items contained, their subdivision in sub-packaging units, and the nature of the grouping (carton, pallet, box-pallet, flat-pallet, etc.)

Where there is a difference to any of the basic elements that characterise a trade item, each variant should be allocated its own unique GTIN.

Note: Price is not a relevant criterion for changing a GTIN except when the price is printed directly on the trade item. If however, the price that the consumer will pay is marked on the item, the GTIN should be changed when the price marked on the item changes.

Typically the gross dimensions of a trade item communicated via the Item File that do not affect net trade item quantity or measure do not impact the GTIN assignment. However, as a general rule if any gross dimension (e.g. length, depth, weight, etc) changes by more than 20% a new GTIN is required. Changes below 20% may require a new GTIN at the discretion of the brand owner.

Note: For all declared changes to content, regardless of the amount, a new GTIN is required.

In all cases, if the GTIN for the trade item at the lowest level changes, GTINs for associated packaging at higher hierarchical levels must also change.

3.2.4 Promotional Variants

A promotion is a temporary change to a trade item, which modifies the presentation of the trade item. It usually coexists with the standard trade item.

- Promotional variants of trade items that affect the net weight or volume of the trade item must be allocated a separate unique GTIN. Examples: Attached free additional item, 10% extra free.
- Promotional variants of trade items may impact the logistic weight or dimension of the trade item by more than 20%. In this case, the promotional variants must be allocated a separate unique GTIN.
- Each seasonal promotion of a trade item should be allocated a separate unique GTIN. Example: Chocolate especially over-wrapped for Easter.
- Other promotional variants should **not** be allocated a separate unique GTIN. Examples: Money off coupon, free gift inside (unless this causes an increase in gross weight by more than 20%), “send for” offer, or competition offer.





3.2.5 When to Change a Global Trade Item Number (GTIN)

Trade item changes are any change or improvement during the life of a trade item. The “new” trade item replaces the old one. Should the brand owner decide to create a variant (e.g. with different ingredients) in parallel with the standard trade item, then a separate unique GTIN has to be allocated.

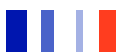
- Minor trade item changes or improvements do not require the allocation of a different GTIN. Examples: label artwork redesign, minor trade item description changes that do not impact the supply chain, gross dimension change in any axis of less than 20% with content quantity or measure unchanged.
- If a trade item’s quantity or measure changes, if the consumer will be expected to distinguish between an old and new brand name or product description, or if the change leads to a change in the shelf edge label (consumer declaration), then a new GTIN must be allocated.

Vintage Wines – When the year of production impacts pricing, invoicing, or ordering at any point in the supply chain, a new GTIN is required. If there is no impact on pricing, invoicing, or ordering then the same GTIN can be used regardless of year of production.

For further guidance on when to change GTINs refer to www.gs1.org/gtinrules/

3.2.6 Re-Using a GTIN

Do not re-use a deleted GTIN until four years after the date that you last issued the item. In the case of garments the minimum period is reduced to 30 months. Consideration for re-issue of GTINs should always be given for the product type and its possible life in the market place. For example, steel beams may be stored for many years before entering the supply chain. In some cases, such as pharmaceutical products, it may be appropriate not to re-use deleted GTINs at all.





3.3 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.

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 a GTIN and information about the variable data.

Retail or Non-Retail

Scanning at POS is a major application of the GS1 System, and trade items that are intended to cross POS are subject to specific rules that differ to the rules for items intended to be scanned in a warehouse or General Distribution Scanning environment.

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 grouping 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 GTIN. Standard groupings of identical or different units, each identified with a GTIN, are identified with a separate GTIN.

Open or Restricted Circulation

The main benefit of the GS1 System for trade items is that it provides a unique and unambiguous GTIN for every trade item, which is applicable worldwide in open environments. In addition, the GS1 System provides for other number series' that may be exclusively used for restricted environments (e.g. internal company use).





Books and Serial Publications

Published materials (newspapers, magazines, and books) require 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)

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 environments



3.4 Selecting the Correct GTIN

When selecting the correct/most appropriate GTIN, it is important to consider a number of factors including environment and the type of trade item you are identifying. Combine the information in Section 3.2 with the information in the table below to select the correct GTIN. Use the left most column to select the scanning environment/trade item type. Use the top row to select the GTIN type. The grid where the scanning environment/item type and GTIN type intersect will direct you to the details you will need to generate your chosen GTIN.

	GTIN-8	GTIN-13	GTIN-13 with filler 0	GTIN-14	VMN-13	RCN-13	RCN-8	Coupon-13
POS Fixed	27	26						
GD Fixed		44	45	46				
POS & GD		44						
GD Variable				47				
Book		30						
Serial		33						
POS Variable					29			
Restricted						39	42	
Coupon								43

Note: POS = Retail Point-of-Sale, GD = General Distribution Scanning, Fixed = Fixed Measure, Variable = Variable Measure, Restricted = Restricted Circulation

TABLE 2 Selecting the Correct GTIN





3.5 Retail POS - Fixed Measure

Any trade item that is to be sold to the final consumer through POS is more commonly known as a retail item or consumer unit. Fixed Measure Trade Items are those that are always produced in the same version and composition (e.g. type, size, weight, contents, design).

Any trade item that could be sold at POS as well as scanned in a General Distribution Scanning environment (such as a case of 24 beer cans), must be numbered according to the rules applicable to trade items sold at POS. However, the size and location of the bar code symbols on these trade items are determined by the rules applicable to trade items not sold at POS.

Although North America set a sunrise date of January, 2005, for the global use of the GTIN-13 and GTIN-8, a GTIN-12 represented by a UPC-A or UPC-E Bar Code Symbol may still be required for items sold at retail Point-of-Sale (POS) in the United States and Canada. This is because many North American users cannot yet accommodate a GTIN-13 or GTIN-8 in their twelve-digit database files. If advised by North American distributors that your bar code symbols are unable to be scanned, please contact GS1 Australia regarding the allocation of a U.P.C. Company Prefix.

For detailed information on the numbering and bar coding of items exported to North America, including Canada, please refer to "Numbering Trade Items for North America" on page 53.



3.5.1 GTIN-13

One of the most commonly used identification numbers in the GS1 System is the GTIN-13. A GTIN-13 is represented in an EAN-13 Bar Code Symbol. For details on the EAN-13 Bar Code Symbol, including dimensions, please refer to Section 10.2.1 EAN-13 Symbology Specifications on page 150.

The GTIN-13 is formed using a GS1 Company Prefix (allocated by GS1 Australia or one of the other GS1 Member Organisations), an Item Reference (allocated sequentially by the member company) and a Check Digit (which is mathematically calculated and ensures the whole number is correct).

How you allocate a GTIN-13 depends on the length of your assigned GS1 Company Prefix. For GS1 Australia members this depends on whether you joined GS1 Australia after May 1996 and were allocated a nine-digit GS1 Company Prefix, or if you joined prior to May 1996, in which case you were allocated with a seven-digit GS1 Company Prefix.

	GS1 Company Prefix	Item Reference	Check Digit
Nine-Digit GS1 Company Prefix	$n_1 n_2 n_3 n_4 n_5 n_6 n_7 n_8 n_9$	$n_{10} n_{11} n_{12}$	n_{13}
Seven-Digit GS1 Company Prefix	$n_1 n_2 n_3 n_4 n_5 n_6 n_7$	$n_8 n_9 n_{10} n_{11} n_{12}$	n_{13}

TABLE 3 GTIN-13 Structure

The GS1 Company Prefix is allocated to you as a member company.

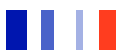
The Item Reference a non-significant number that is allocated by the member company. It is purely for identification purposes and the individual digits in the number do not relate to anything or convey any specific item information. It is recommended that the Item Reference is allocated sequentially and that each item is numbered to the lowest level of identification, for example: size, colour, model, finish, type, style.

The Check Digit is mathematically calculated to ensure that the whole number is correct. Correct calculation is essential for successful scanning of the bar code symbol.

A Check Digit Calculator Program which will automatically calculate the Check Digit can be obtained from the GS1 Australia web site at www.gs1au.org/Services/calculator/_calculator.asp

For instruction on manually calculating the Check Digit please refer to Appendix A on page 206.

For either method of calculating the Check Digit use the 13-Digit ID Key option.





3.5.2 GTIN-8

The allocation of a GTIN-8 is restricted to trade items that genuinely cannot accommodate a larger EAN-13 Bar Code Symbol. These can only be obtained directly from GS1 Australia and are represented in an EAN-8 Bar Code Symbol. For details regarding the EAN-8 Bar Code Symbol, including dimensions, please refer to Section 10.2.2 EAN-8 Symbology Specifications on page 152.

Before applying for a GTIN-8 you should consider, jointly with the printer, all available options for using an EAN-13 Bar Code Symbol. Every effort must first be made by the applying company to incorporate an EAN-13 Bar Code Symbol onto the packaging. This includes:

- Whether the label of artwork can reasonably be changed to enable the printers recommended size of an EAN-13 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).
- Reducing the magnification (size) of the bar code symbol. This must only be done if printing conditions allow. The magnification of the bar code symbol must always be within GS1 Standards.
- Printing the Human Readable Interpretation to the left of the bar code symbol.

When applying for a GTIN-8, it is necessary to provide GS1 Australia:

- A sample of each product, label or actual size artwork (unless many products share identical packaging, in which case one sample will suffice)
- A complete list of every product requiring a GTIN-8
- Written justification of why the package should be allocated a GTIN-8 and that all efforts have been made to accommodate an EAN-13 Bar Code Symbol

After discontinuing a product carrying a GTIN-8 please notify GS1 Australia. This number will then be withdrawn, making it available to be re-issued by GS1 Australia to another member/item in the future.

GS1 Prefix	Company / Item Reference	Check Digit
$n_1 n_2$	$n_3 n_4 n_5 n_6 n_7$	n_8

TABLE 4 GTIN-8 Structure

The GS1 Prefix identifies the GS1 Member Organisation issuing the number. In the case of GS1 Australia the GS1 Prefix is 93.

The Company/Item Reference is allocated by GS1 Australia to a specific item upon application.

The Check Digit is mathematically calculated to ensure that the whole number is correct. Correct calculation is essential for successful scanning of the bar code symbol.

A Check Digit Calculator Program which will automatically calculate the Check Digit can be obtained from the GS1 Australia web site at www.gs1au.org/Services/calculator/_calculator.asp

For instruction on manually calculating the Check Digit please refer to Appendix A on page 206.

For either method of calculating the Check Digit use the 8-Digit ID Key option.





3.6 Retail POS - Variable Measure

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.





3.6.1 VMN-13 - National Solution

Any company providing its own branded Variable Measure Trade Items to the Australian retail sector can adopt the following number series' for variable measure trade items numbered at source but sold to various Australian retail stores.

GS1 Australia has reserved prefixes 28, 29, 22 and 24 in the GTIN-13 series specifically for use in Variable Measure Numbers (VMNs). These numbers are represented in EAN-13 Bar Code Symbols. Equipment suppliers should ensure that POS equipment recognises the prefixes listed above as being variable measure with price and a significant Check Digit. For details on the EAN-13 Bar Code Symbol, including dimensions, please refer to Section 10.2.1 EAN-13 Symbology Specifications on page 150.

Manufacturers who wish to label and apply bar code symbols to Variable Measure Trade Items must apply to GS1 Australia for **standard variable measure company item numbers**. These numbers identify the items and the company they are allocated to, and are for use in conjunction with weighing machines and labelling at the point of packaging.

GS1 Australia will allocate a VMN-13 to each individual item as required by the company. The member company allocated these numbers is responsible for all communication in relation to the numbers.

GS1 Australia needs be notified when a VMN-13 has been deleted **as this number will then be withdrawn, making it available to be re-issued by GS1 Australia to another member/item in the future.**

GS1 Prefix	Company / Item Identification	Price Verifier	Price	Check Digit
28, 29, 22 or 24	n ₃ n ₄ n ₅ n ₆	n ₇	n ₈ n ₉ n ₁₀ n ₁₁ n ₁₂	n ₁₃

TABLE 5 VMN-13 Structure

The GS1 Prefix 28, 29, 22 or 24 identifies the VMN as a standard variable weight with price.

The Company and Item Identification digits identify the company/packer and the item that it is allocated to.

The Price Verifier Digit validates the accuracy of the following five digit price. To manually calculate the Price Verifier Digit refer to Appendix A on page 206.

The Price, the next five digits, represent the price of the individual variable weight item to two decimal places. Machines that print the bar code label will automatically calculate the price.

The Check Digit is mathematically calculated to ensure that the whole number is correct. Correct calculation is essential for successful scanning of the bar code symbol.

A Check Digit Calculator Program which will automatically calculate both the Price Verifier Digit and the Check Digit can be obtained from the GS1 Australia web site at www.gs1au.org/Services/calculator/_calculator.asp

For instruction on manually calculating both the Check Digit and the Price Verifier Digit please refer to Appendix A on page 206.

For either method of calculating the Check Digit use the 13-Digit ID Key option.





3.7 Books

The ISBN (International Standard Book Number) is a ten-digit number that uniquely identifies books and book-like products including all printed books, pamphlets, microfiche publications, and other specialised printed forms of publications published internationally. Each number identifies a unique edition of a publication, from one specific publisher. Each item should be allocated a separate, unique GTIN. An ISBN must never be re-used, even if issued in error.

An agreement between GS1 International and the International ISBN Agency (which administers ISBNs) allows the coordination of both systems. This enables the ISBN to be represented on books using an EAN/UPC Bar Code Symbol.

In Australia an ISBN can be obtained from:

The ISBN Agency
Thorpe-Bowker
Building C3, 85 Turner Street
Port Melbourne Vic 3207
Phone (03) 8645-0385
Fax (03) 8645-0393
Email: isbn@thorpe.com.au
Web: www.thorpe.com.au/isbn/

There are two options for allocating a GTIN to a book item. For both options the GTIN is represented in an EAN-13 Bar Code Symbol.

3.7.1 Option 1: Allocate a Unique GTIN-13

For this option, please refer to Section 3.5.1 GTIN-13 on page 26. Using this option it is recommended that the ISBN be printed above the EAN-13 Bar Code Symbol.





3.7.2 Option 2: Convert the ISBN into a GTIN-13

GS1 Prefix	ISBN (Without the Check Digit)	Check Digit
978	$n_4 n_5 n_6 n_7 n_8 n_9 n_{10} n_{11} n_{12}$	n_{13}

TABLE 6 Structure of a GTIN-13 Formed Using the ISBN

The GS1 Prefix 978 is assigned to ISBNs exclusively for bar coding books worldwide. In 2007 the method of ISBN allocation will change and a thirteen-digit ISBN with the prefix 979 will be allocated.

The ISBN without the Check Digit is the next nine digits. It is also recommended that the ISBN be printed above the bar code symbol.

The Check Digit is mathematically calculated to ensure that the whole number is correct. Correct calculation is essential for successful scanning of the bar code symbol.

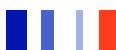
A Check Digit Calculator Program which will automatically calculate both of the Check Digits can be obtained from the GS1 Australia web site at www.gs1au.org/Services/calculator/_calculator.asp

For instruction on manually calculating the Check Digit please refer to Appendix A on page 206.

For either method of calculating the Check Digit use the 13-Digit ID Key option.



Figure 8 EAN-13 Bar Code Symbol Formed Using the ISBN





3.7.3 Five-Digit Add-On Symbols

Some publishers may wish to communicate information which is additional to the title in a bar code symbol in order to meet their internal requirements. Use them to encode information, which is additional to the title. For example, publishers may wish to include an edition variant (i.e. unchanged reprint or price increase) which is not distinguished by the GTIN. The GS1 System provides an additional five-digit symbol, called an Add-On Symbol, which can be used on the item just to the right of main bar code symbol.

Add-On Symbols involve the following constraints:

- The Add-On Symbol should not contain information that must appear in the item's GTIN-13
- The reading of the Add-On Symbol by the retailers' Point-of-Sale system is optional.
- The use of the Add-On Symbol is the responsibility of each publisher

The data encoded in the Add-On Symbol consists of numeric data of any structure and meaning. It is the publisher's responsibility to define the numbering scheme.



3.8 Serial Publications

The ISSN (International Standard Serial Number) is an eight-digit unique code for the identification of serial publications.

A serial is a publication made up of a number of parts issued in sequence and linked by a common title. Usually each part bears an issue number and/or date. Serials are intended to continue indefinitely, and include periodicals (e.g. Business Review Weekly), newspapers, newsletters, annual reports, yearbooks, directories, and journals.

Monographs in series are also a type of serial. These are books which have their own title as well as a collective or series title (e.g. Working Paper). Normally all books in the series will be issued by the same publisher in a uniform style and usually in a numerical sequence. The series title of the monographic series is eligible for an ISSN.

Serials can be published in printed form, or in a range of alternative formats including microfiche, microfilm, CD-ROM, and online. Serials in all formats are eligible for the allocation of an ISSN.

The ISSN system is in use throughout the world for numbering periodical publications. An agreement between GS1 International and the International Centre for the Registration of Serial Publications (which administers ISSNs) allows the coordination of both systems.

In Australia an ISSN application form is available by request or online from:

Australian ISSN Agency
National Library of Australia
Canberra ACT 2600
Phone: (02) 6262-1213
Fax: (02) 6273-4492
Email: issn@nla.gov.au
Web: <http://www.nla.gov.au/services/issn.html>

There are two options for allocating a GTIN to a serial publication, both of which are represented in an EAN-13 Bar Code Symbol.

3.8.1 Option 1: Allocate a Unique GTIN-13

For this option, please refer to Section 3.5.1 GTIN-13 on page 26. Using this method it is recommended that the ISSN be printed above the EAN-13 bar code symbol.





3.8.2 Option 2: Convert the ISSN into a GTIN-13

GS1 Prefix	ISSN (Without the Check Digit)	Variant	Check Digit
977	$n_4 n_5 n_6 n_7 n_8 n_9 n_{10}$	$n_{11} n_{12}$	n_{13}

TABLE 7 Structure of a GTIN-13 formed using the ISSN

The GS1 Prefix 977 is assigned for the encoding of the ISSN in a GTIN-13 format.

The ISSN without the Check Digit is the next seven digits. It is also recommended that the ISSN be printed above the bar code symbol.

The Variant (Previously known as Sequence Variant) may be used to identify variants of the same title for issues with a different price or to identify different issues of a daily issue within one week. Normal titles take the value 00.

The Check Digit is mathematically calculated to ensure that the whole number is correct. Correct calculation is essential for successful scanning of the bar code symbol.

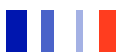
A Check Digit Calculator Program which will automatically calculate the Check Digit can be obtained from the GS1 Australia web site at www.gs1au.org/Services/calculator/_calculator.asp

For instruction on manually calculating the Check Digit please refer to Appendix A on page 206

For either method of calculating the Check Digit use the 13-Digit ID Key option.



Figure 9 EAN-13 Bar Code Symbol Formed Using the ISSN





3.8.3 Variant Overview

When there is no need to distinguish between different issues, fill the variant position in the GTIN that has been formed using your ISSN with 00.

When it is essential to distinguish between two successive issues of periodicals, and you use Option 2 to identify periodicals, scanning at title level is too imprecise. The variant caters for these situations while retaining the same ISSN. While a variant changes between different issues of a publication, the ISSN always remains the same.

For regular price changes use variant 01 for the initial cover price when the periodical first uses a bar code symbol. Increase the variant by one for each regular price change.

Recalculate the check digit each time the variant value changes.

For special issues use variant 99 the first time you sell a special issue with a different cover price from the preceding or following issue. If the situation occurs annually, you can re-use the same GTIN-13 every year.

For all other circumstances, or if you choose to apply a new variant for annually occurring special issues, decrease the variant by one, for example, 98, 97, 96, and so on.

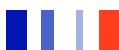
Recalculate the check digit each time the variant value changes.

Titles published daily or more than once a week are considered separate items. They require a different variant for each separate issue. While each Monday issue can carry the same variant as each other Monday issue, it must be different from the variants used for other days of the week.

If the item is published Monday through to Sunday, begin with variant 01 on Monday, then 02 on Tuesday, and so on. International standards treat Monday as the first day of the week.

3.8.3.1 Re-using variants

Eventually, many price changes will increase the variant number that starts at 01, and many special issues will decrease the variant number that starts at 99. Eventually the two numbers will be the same. To avoid this from happening, restart both variants when the difference is no less than five.





3.8.4 When to Change the GTIN

Change the GTIN for the serial publication for:

- A regular cover price change between two successive issues
- A special issue, for example a double issue at Christmas, being sold at a different cover price from the previous issue
- Titles published more than once a week

If you identify serials using Option 1 and you need to identify between two successive issues, allocate a different Item Reference to each issue of the periodical.

If you identify serials using Option 2 and you need to identify between two successive issues, allocate a different variant to each issue.



3.8.5 Two-Digit Add-On Symbol

A two-digit serial number may be encoded in a two-digit Add-On Symbol.

The following number assignment guidelines are recommended:

- 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 be used to represent the applicable week, which, together with the EAN/UCC-13 identification 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 (0 - 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

3.8.6 Five-Digit Add-On Symbol

Serial publications can also use a five-digit serial number carried by a five-digit Add-On Symbol that is placed to the right of the main bar code symbol. The reading of the Add-On Symbol at POS is optional. The Add-On Symbol must not be used to encode information that should be contained within the 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.





3.9 Retail POS - Restricted Circulation

The GS1 System includes a numbering series that enables companies to identify items for use in a restricted environment. Restricted Circulation Numbers (RCNs) should be used only within the boundaries of the company who originates the number.

The originators of the RCN are responsible for ensuring that the number is used for **internal purposes only**. They must ensure that items using an RCN cannot “escape” to cause ambiguity elsewhere.

The principal use of restricted circulation numbering is for encoding items in retail stores that are not numbered at source (source marked).

There are two number series available for internal numbering:

- RCN-13 represented in an EAN-13 Bar Code Symbol
- RCN-8 represented in an EAN-8 Bar Code Symbol



3.9.1 RCN-13

Within the GS1 System, prefixes **02, 20, 21, 23, 25, 26** and **27** are **reserved** for GS1 Australia members to use at their discretion for internal numbering purposes using an RCN-13 format.

The U.P.C. Prefix 2 is also available to be used in an RCN-12 structure. Refer to Section 4.4 Retail POS - Restricted Circulation on page 58 for more information.

These series' of numbers allows users to have maximum flexibility when working out any special numbering structures they require with their equipment suppliers.

In particular, these series' of numbers is useful for retail Variable Measure Trade Items, for example, fresh meat, fruit and vegetables, cheeses and delicatessen items. After the two-digit prefix you can structure the available ten digits in a variety of ways to represent the item type, the weight, or the calculated price.

The originators can use the digits following the prefixes at their discretion. However, GS1 Australia provides recommendations for using these numbers when identifying Variable Measure Trade Items to provide some degree of standardisation for equipment.

GS1 Prefix	Internal Number	Check Digit
02, 20, 21, 23, 25, 26 or 27	$n_3 n_4 n_5 n_6 n_7 n_8 n_9 n_{10} n_{11} n_{12}$	n_{13}

TABLE 8 RCN-13 Structure

The GS1 Prefix, the first two digits, identify the GTIN as an RCN-13. Begin every RCN-13 with a prefix from 02, 20, 21, 23, 25, 26, or 27.

The Internal Number, the next ten digits, is assigned at the discretion of the organisation allocating the RCN-13. Allocate a separate GTIN for each item.

The Check Digit is mathematically calculated to ensure that the whole number is correct. Correct calculation is essential for successful scanning of the bar code symbol.

A Check Digit Calculator Program which will automatically calculate both of the Check Digits can be obtained from the GS1 Australia web site at www.gs1au.org/Services/calculator/_calculator.asp

For instruction on manually calculating the Check Digit please refer to Appendix A on page 206.

For either method of calculating the Check Digit use the 13-Digit ID Key option.





3.9.2 Recommended RCN-13 Formats for Variable Measure Trade Items

Although you are free to develop your own internal numbering structure, GS1 Australia recommends that you:

- Position the price to the right of the internal number.
- If using a Price Verifier Digit, position the Price Verifier Digit to the left of the price and the Item Reference to the left of the Price Verifier Digit.

GS1 Australia does not make any recommendation for using a Price Verifier Digit.

Taking into account the above recommendations, there are four different formats available.

GS1 Prefix	Item Reference	Price Check	Price	Check Digit
20, 21, 23, 25, 26 or 27	n ₃ n ₄ n ₅ n ₆	n ₇	n ₈ n ₉ n ₁₀ n ₁₁ n ₁₂	n ₁₃

TABLE 9 Structure of RCN-13 - Five-Digit Price with Price Verifier Digit

GS1 Prefix	Item Reference	Price Verifier	Price	Check Digit
02*, 20, 21, 23, 25, 26 or 27	n ₃ n ₄ n ₅ n ₆ n ₇	n ₈	n ₉ n ₁₀ n ₁₁ n ₁₂	n ₁₃
* When prefix 02 is used to identify a retail Variable Measure Trade Item, GS1 Australia recommends that the Four-Digit Price with Price Verifier Digit format be used.				

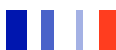
TABLE 10 Structure of RCN-13 - Four-Digit Price with Price Verifier Digit

GS1 Prefix	Item Reference	Price	Check Digit
20, 21, 23, 25, 26 or 27	n ₃ n ₄ n ₅ n ₆ n ₇ n ₈	n ₉ n ₁₀ n ₁₁ n ₁₂	n ₁₃

TABLE 11 Structure of RCN-13 - Four-Digit Price Without Price Verifier Digit

GS1 Prefix	Item Reference	Price	Check Digit
20, 21, 23, 25, 26 or 27	n ₃ n ₄ n ₅ n ₆ n ₇	n ₈ n ₉ n ₁₀ n ₁₁ n ₁₂	n ₁₃

TABLE 12 Structure of RCN-13 - Five-Digit Price Without Price Verifier Digit





The price digits may contain none, one, or two decimal places. The decimal point is not bar code symbol marked, but must be taken into account by the marking equipment when creating the label.

A Check Digit Calculator Program which will automatically calculate both the Price Verifier Digit and the Check Digit can be obtained from the GS1 Australia web site at www.gs1au.org/Services/calculator/_calculator.asp

For details on how to manually calculate a four-, or-digit Price Verifier Digit refer to Appendix A on page 206.

For either method of calculating the Check Digit use the 13-Digit ID Key option.



3.9.3 RCN-8

Within the GS1 System the prefix 2 is reserved for internal use in an RCN-8 structure. This gives a total of six digits available for structuring entirely at the discretion of the user.

GS1 Prefix	Internal Number	Check Digit
2	$n_2 n_3 n_4 n_5 n_6 n_7$	n_8

TABLE 13 RCN-8 Structure

The GS1 Prefix 2 identifies the GTIN as an RCN-8.

The Internal Number is six digits to be allocated at your own discretion.

The Check Digit is mathematically calculated to ensure that the whole number is correct. Correct calculation is essential for successful scanning of the bar code symbol.

A Check Digit Calculator Program which will automatically calculate both of the Check Digits can be obtained from the GS1 Australia web site at www.gs1au.org.

For instruction on manually calculating the Check Digit please refer to Appendix A on page 206.

For either method of calculating the Check Digit use the 8-Digit ID Key option.





3.10 Coupons

A coupon is a voucher that can be redeemed at POS for a cash value or a free item.

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

The GS1 System reserves the prefix **99** for numbering coupons using the Coupon-13 format.

Please contact GS1 Australia for further information about coupon numbering both locally and internationally.





3.11 Non-Retail - Fixed Measure

Non-retail items are trade items not intended for sale to consumers at the retail POS. They may be a standard and stable grouping or a series of single items. Such a unit may be presented in a wide variety of physical forms: a fibreboard carton, a covered or banded pallet, a film wrapped tray, a crate with bottles, etc. Non-retail trade items are often referred to as trade units.

If there is any possibility of a non-retail trade item being sold at retail POS, it must carry a GTIN-13 represented in an EAN-13 Bar Code Symbol.

Some examples of non-retail trade items are:

- an outer carton
- a pallet containing several cartons
- a display carton
- a piece of steel
- a reel of paper
- a pack of timber pieces

For non-retail trade items you can choose any one of the following three numbering options.

3.11.1 Option 1: Unique GTIN-13

If printing conditions permit the successful printing of an EAN-13 Bar Code Symbol, a GTIN-13 can be allocated. The method used to allocate this number is the same as for allocating a number to a retail trade item – refer to Section 3.5.1 GTIN-13 on page 26.

Ensure that the non-retail trade item is not allocated the same GTIN as an existing retail trade item.

While an item intended for both retail POS and General Distribution Scanning environments must carry a retail GTIN and bar code symbol, the size and location of the bar code symbols must adhere to the specifications for items not sold at POS.





3.11.2 Option 2: Unique GTIN-13 with a Filler Zero

Using this option a filler zero precedes a new and unique GTIN-13 allocated to a non-retail trade item. This GTIN-13 is allocated by the same method used for retail trade items. Please refer to Section 3.5.1 GTIN-13 on page 26.

For GS1 Australia members the method of allocating the GTIN-13 will depend on whether you joined GS1 Australia after May 1996 and were allocated a nine-digit GS1 Company Prefix, or if you joined prior to May 1996, in which case you were allocated with a seven-digit GS1 Company Prefix.

	Filler Zero	GS1 Company Prefix	Item Reference	Check Digit
Nine-Digit GS1 Company Prefix	0	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
Seven-Digit GS1 Company Prefix	0	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

TABLE 14 Structure of a GTIN-13 with a Filler Zero

The zero is a filler character used to convert the GTIN-13 to a GTIN-14, which can then be encoded in an ITF-14 or GS1-128 (previously UCC/EAN-128) Bar Code Symbol.

Note: The ITF-14 Bar Code Symbol is better suited for direct printing onto corrugated fibreboard.





3.11.3 Option 3: GTIN-14 - Indicator Method

This option is only available when the retail trade items within the non-retail item are carrying the same GTIN-13 or GTIN-8.

The GTIN-14 can be represented in either an ITF-14 or GS1-128 (previously UCC/EAN-128) Bar Code Symbol.

Note: The ITF-14 Bar Code Symbol is better suited to direct printing on to corrugated fibreboard.

Indicator	First Twelve Digits of GTIN-13	Check Digit
1-8	$n_2 n_3 n_4 n_5 n_6 n_7 n_8 n_9 n_{10} n_{11} n_{12} n_{13}$	n_{14}

TABLE 15 GTIN-14 Formed From a GTIN-13

Indicator	Filler Zeros	First Seven Digits of GTIN-8	Check Digit
1-8	0 0 0 0 0	$n_7 n_8 n_9 n_{10} n_{11} n_{12} n_{13}$	n_{14}

TABLE 16 GTIN-14 Formed From a GTIN-8

An indicator (a number from one to eight, previously known as a logistical variant) precedes either the first twelve digits of the GTIN-13, or five filler zeros and the first seven digits of the GTIN-8, of the lowest level of packaging within the non-retail trade item.

Indicators are chosen at the discretion of the company allocating the GTIN. They are used to create a unique GTIN-14, which distinguishes between different packaging levels of the same trade item.

For example: Indicator '1' may be allocated to the 6 pack and indicator '2' may be allocated to a carton containing four 6 packs, thus creating a unique GTIN-14 for every level of packaging, as shown below.

Shampoo 200ml	→	931234500001 2
Shampoo 6 x 200ml	→	1 931234500001 9
Shampoo 4 x 6 x 200ml	→	2 931234500001 6

Figure 10 Examples of GTINs for various packaging levels

The last digit is the Check Digit. The Check Digit must be recalculated every time the Indicator changes.

A Check Digit Calculator Program which will automatically calculate the Check Digit can be obtained from the GS1 Australia web site at www.gs1au.org.

For instruction on manually calculating the Check Digit please refer to Appendix A on page 206.

For either method of calculating the Check Digit use the 14-Digit ID Key option.





3.12 Non-Retail - Variable Measure

Trade items may be considered to be variable measure either because the production process does not guarantee consistency in weight, size or length (carcasses of meat, whole cheeses, etc.) or because the items are created to meet a special order which 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 here. Trade items which are sold in discrete and pre-defined units (e.g. as a nominal weight) are treated as Fixed Measure Trade Items.

A GTIN-14 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-14.

3.12.1 Types of Variable Measure Trade Items

On the following pages are examples of five common types of Variable Measure Trade Items.



3.12.1.1 Items Traded In Bulk

Neither portioned nor pre-packed for retail sale, ordered in any quantity and delivered as a non-standardised trade item. Examples: Fish, fruit, vegetables, cables, carpets, timber, fabrics.

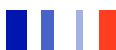
The GTIN identifies the product and that it is a bulk, non-fixed quantity and, if applicable, the form of packaging. Weight or dimensions are necessary to complete the identification of each individual unit.

The following example shows an order and delivery of an item traded in bulk, invoiced by weight.

- The supplier's catalogue contains an entry: cabbage unwrapped sold in bulk by kilogram
- The order is for 100kg. It is delivered in two cases. Each case is marked with the 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

Process	Description	Bar Code Symbol Marking of the Item
Supplier's catalogue	Cabbage unwrapped sold in bulk by kilogram	GTIN: 99312345000046
Order	100kg of cabbage	100kg x 99312345000046
Delivery	2 trade items Unit 1: Weight = 42.7kg Unit 2: Weight = 57.6kg	Unit 1: (01)99312345000046(3101)000427 Unit 2: (01)99312345000046(3101)000576
	If delivery is made on a pallet	Pallet: (00)393123450000010104 (02)99312345000046(3101)001003(37)02
Invoice	GTIN of the item and the total weight (100.30kg) + the price per kilogram	99312345000046; 100.30kg x price per kilogram

TABLE 17 Items Traded in Bulk





3.12.1.2 Trade Items Ordered and Delivered By Piece

Wrapped or unwrapped and invoiced by weight or measure because weight or measure vary due to the nature of the product or due to the manufacturing process. Examples: A whole cheese, a side of bacon, a beef carcass, a fish, a sausage, a ham, a chicken.

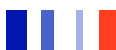
The GTIN identifies the product, that it is supplied and ordered by the piece and, if necessary, the form of packaging. Price, weight or dimensions complete the identification of the individual item.

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

- The supplier's catalogue contains an entry: one salami weighing 500g
- 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 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 total count of items contained within the pallet
- The invoice refers to the GTIN and the 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

Process	Description	Bar Code Symbol Marking of the Item
Supplier's catalogue	1 salami – approx. 500g	GTIN: 99312345000015
Order	100 salamis	100 x 99312345000015
Delivery	3 logistic units Unit 1: 33 salamis weight = 16.7kg Unit 2: 33 salamis weight = 16.9kg Unit 3: 34 salamis weight = 17.1kg	Unit 1: (00)393123450000010005 (02)99312345000015(3101)000167(37)33 Unit 2: (00)393123450000010012 (02)99312345000015(3101)000169(37)33 Unit 3: (00)393123450000010029 (02)99312345000015(3101)000171(37)34
	If delivery is made on a pallet	Pallet: (00)393123450000010036 (02)99312345000015(3101)000507(37)0100
Invoice	GTIN of the items and the total weight (50.70kg) + the price per kilogram	100 x 99312345000015; 50.70kg x price per kilogram

TABLE 18 Trade Items Ordered and Delivered by Piece





3.12.1.3 Standardised Trade Items with Selectable Dimensions

This refers to items where GS1 standard numbering does not make sense to cover the multiplicity of all variations. Examples: Wooden planks, carpets.

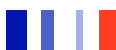
The GTIN denotes the pre-defined basic trade item. The applicable dimension(s) completes the identification of the individual unit.

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 an entry: cable T49 sold in any length in metres
- The order is for one length of cable of 150 metres. The delivered package is marked with the 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

Process	Description	Bar Code Symbol Marking of the Item
Supplier's catalogue	Cable T49 sold in any length in metres	GTIN: 99312345000060
Order	One trade item of 150 metres	99312345000060 x 150 metres
Delivery	One trade item of 150 metres	(01)99312345000060(3110)000150
Invoice	GTIN of the trade item and the total quantity	1 x 99312345000060; 150 x price per metre

TABLE 19 Standardised Trade Items with Selectable Dimensions





3.12.1.4 Standardised Composition of a Fixed Number of Trade Items Contained Within Each Unit

Example: Trade item which always contains 20 steaks. The weight of the items in each case varies. The customer is invoiced based on the price per kilogram.

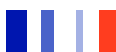
The GTIN identifies both the product and the number of items contained within each unit and, if applicable, its form of packaging. The total weight of all items contained completes the identification of the particular trade item.

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

- The supplier's catalogue contains on entry: One case of 20 steaks weighing approximately 200g each
- The order is for three cases. Each case delivered is marked with the GTIN of the single case followed by the actual weight of the items contained
- The three cases may be stored on a pallet that itself may 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 total 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 the quantity order

Process	Description	Bar Code Symbol Marking of the Item
Supplier's catalogue	eg. One case of 20 steaks ~ approx. 200g vacuum packed	GTIN: 99312345000008
Order	Three cases	3 x 99312345000008
Delivery	3 trade items Unit 1: Weight = 4.15kg Unit 2: Weight = 4.07kg Unit 3: Weight = 3,98kg	Unit 1: (01)99312345000008(3102)000415 Unit 2: (01)99312345000008(3102)000407 Unit 3: (01)99312345000008(3102)000398
	If delivery is made on a pallet	Pallet: (00)393123450000070009 (02)99312345000008(3102)001220(37)03
Invoice	GTIN of the items and the total weight (12.20kg) + the price per kilogram	3 x 99312345000008; 12.20kg x price per kg

TABLE 20 Standardised Composition of a Fixed Number of Trade Items Contained Within Each Unit





3.12.1.5 Standardised Composition of a Variable Quantity Trade Item

Examples: Trade item which contain approximately 10 cabbages. The count of items in each case varies. The customer is invoiced based on quantity delivered.

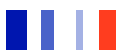
The GTIN identifies the product and, if applicable, its form of packaging. The count of all items contained completes the identification of the particular trade item.

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 on entry: One case of approximately 10 cabbages sold by piece
- The order is for two cases. Each case delivered is marked with the GTIN of the single case followed by the actual count of the items contained
- The two cases may be stored on a pallet that itself may 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 total count of cases contained within the pallet
- The invoice refers to the GTIN as ordered and delivered and the total count of items

Process	Description	Bar Code Symbol Marking of the Item
Supplier's catalogue	One case containing ~ approx. 10 cabbages sold by pieces	GTIN: 99312345000039
Order	Two cases	2 x 99312345000039
Delivery	2 trade items Unit 1: 11 pieces Unit 2: 12 pieces	Unit 1: (01)99312345000039(30)11 Unit 2: (01)99312345000039(30)12
	If delivery is made on a pallet	Pallet: (00)393123450000010098 (02)99312345000039(30)23(37)02
Invoice	GTIN of the trade item and the total quantity	2 x 99312345000039; 23 pieces x price per piece

TABLE 21 Standardised Composition of a Variable Quantity Trade Item



4 Numbering Trade Items for North America



4.1 Introduction

Although North America set a sunrise date of January, 2005, for the global use of the GTIN-13 and GTIN-8, a GTIN-12 represented by a UPC-A or UPC-E Bar Code Symbol may still be required for items sold at retail Point-of-Sale (POS) in the United States and Canada. This is because many North American users cannot yet accommodate a GTIN-13 or GTIN-8 in their twelve-digit database files. If advised by North American distributors that your bar code symbols are unable to be scanned, please contact GS1 Australia regarding the allocation of a U.P.C. Company Prefix.

Note: The compatibility issue is only a one way problem. While parts of the United States and Canada may be unable to manage a GTIN-13 or GTIN-8, all other countries will be able to manage a GTIN-12.





4.2 Selecting the Correct GTIN

When selecting the correct/most appropriate GTIN, it is important to consider a number of factors including environment and the type of trade item you are identifying. Combine the information in Section 3.2 with the information in the table below to select the correct GTIN. Use the left most column to select the scanning environment/trade item type. Use the top row to select the GTIN type. The grid where the scanning environment/item type and GTIN type intersect will direct you to the details you will need to generate your chosen GTIN.

	Zero Suppressed GTIN-12	GTIN-12	GTIN-12 with two filler zeros	GTIN-14	RCN-12
POS Fixed	57	56			
GD Fixed		60	60	61	
POS & GD		60			
Restricted					58

Note: POS = Retail Point-of-Sale, GD = General Distribution Scanning, Fixed = Fixed Measure, Restricted = Restricted Circulation

TABLE 22 Selecting the Correct GTIN for North America





4.3 Retail POS - Fixed Measure

Any trade item that is to be sold to the final consumer through retail POS is more commonly known as a retail item or consumer unit. Fixed Measure Trade Items are those that are always produced in the same version and composition (eg. type, size, weight, contents, design).

Any trade item that could be sold at retail POS as well as scanned in a General Distribution Scanning environment must be numbered according to the rules applicable to trade item sold at POS. However, the size and location of the bar code symbols on these trade items are determined by the rules applicable to trade items not sold at POS.

There are two types of GTINs for trade items that can be scanned globally at POS.

- GTIN-12, which is represented in a UPC-A Bar Code Symbol
- Zero Suppressed GTIN-12, which is represented in a UPC-E Bar Code Symbol

Note: GS1 US have ceased allocation of Zero Suppressed GTIN-12s.



4.3.1 GTIN-12

A GTIN-12 is encoded in a UPC-A Bar Code Symbols and can be used for the identification of any retail trade item.

For details on the UPC-A Bar Code Symbol, including dimensions, please refer to Section 10.2.3 UPC-A Symbology Specifications on page 154.



TABLE 23 GTIN-12 Structure

The U.P.C. Company Prefix is allocated by GS1 US. The length of the U.P.C. Company Prefix is varying, and the numbering capacity you are allocated depends on the U.P.C. Company Prefix issued.

The Item Reference a non-significant number that is allocated by the member company. It is purely for identification purposes and the individual digits in the number do not relate to anything or convey any specific item information. It is recommended that the Item Reference is allocated sequentially and that each item is numbered to the lowest level of identification, for example: size, colour, model, finish, type, style. The length of the Item Reference will depend on the length of your U.P.C. Company Prefix.

The Check Digit is mathematically calculated to ensure that the whole number is correct. Correct calculation is essential for successful scanning of the bar code symbol.

A Check Digit Calculator Program which will automatically calculate the Check Digit can be obtained from the GS1 Australia web site at www.gs1au.org.

For instruction on manually calculating the Check Digit please refer to Appendix A on page 206.

For either method of calculating the Check Digit use the 12-digit ID Key option.





4.3.2 Zero Suppressed GTIN-12

Note: GS1 US Have ceased allocation of Zero Suppressed GTIN-12s.

If packaging is too small to accommodate a UPC-A Bar Code Symbol, then the alternative is a UPC-E Bar Code Symbol. Although only eight digits are directly encoded in the UPC-E Bar Code Symbol, the data contained is actually a GTIN-12 with the zeros suppressed. For application processing, the GTIN-12 must be transformed into its full length by the bar code reader software or by the application software. For details on the UPC-E Bar Code Symbol, including dimensions, please refer to Section 10.2.4 UPC-E Symbology Specifications on page 156

Note: You can only apply zero suppression to a GTIN-12 with a U.P.C. Company Prefix starting with zero.

For information on how to derive or decode a zero suppressed GTIN-12 please refer to Appendix B on page 210.



4.4 Retail POS - Restricted Circulation

The UCC System includes a numbering series which enables companies to identify items for internal use. The primary purpose of this structure is to deal with Variable Measure Trade Items, that is, items sold in random weights against a fixed price per unit weight; for example, fresh meat, fruit and vegetables, cheeses, and delicatessen goods.

The originators of the Restricted Circulation Number (RCN) are responsible for ensuring that the numbers are used for internal purposes only. They must ensure that items using the internal number series cannot “escape” to cause ambiguity elsewhere.

The principal use of restricted distribution numbering is for encoding in-store retail items that are not numbered at source (source marked).

In a twelve-digit format, the prefix 2 is reserved for restricted circulation numbering. This format is also available for retailers for restricted circulation use in GS1 member countries.

GS1 US have specific recommendations for the use of this prefix when used in the USA. Information on the options given by GS1 US is available from GS1 Australia.

GS1 Australia recommends the following structure for use by retailers in Australia.

U.P.C. Prefix	Item Reference	Price Verifier	Price	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

TABLE 24 RCN-12 Recommended Structure for RCN-12 use in Australia

This structure has been used as a standard for the commercial production of equipment designed to weigh items, calculate the item price from the unit price, and print a bar code label accordingly. POS scanning equipment can also be programmed to decode bar code symbols or identification numbers commencing with the U.P.C. Prefix 2. Members may use this as a basis for agreement with their equipment suppliers.

The same structure may also be used for internal purposes if desired for fixed weight, fixed price items. This gives the possibility of coding and labelling items internally with both item identity and selling price, for direct registration at POS, without requiring price look-up.

If used in conjunction with POS scanning equipment that is not programmed for the standard structure, numbers under U.P.C. Prefix 2 can be used internally in any other manner, as agreed with the equipment supplier.

The U.P.C. Prefix 2 identifies the number as an RCN-12.

The Item Reference, the next five digits, are allocated at the discretion of the organisation allocating the GTIN. Allocate a separate GTIN for each item.

The Price Verifier Digit validates the accuracy of the following five digit price. To manually calculate the Price Verifier Digit refer to Appendix A on page 206.

The Price, the next five digits, represent the price of the individual variable weight item to two decimal places. Machines that print the bar code label will automatically calculate the price.





The Check Digit is mathematically calculated to ensure that the whole number is correct. Correct calculation is essential for successful scanning of the bar code symbol.

A Check Digit Calculator Program which will automatically calculate both the Price Verifier Digit and the Check Digit can be obtained from the GS1 Australia web site at www.gs1au.org/Services/calculator/_calculator.asp

For instruction on manually calculating both the Check Digit and the Price Verifier Digit refer to Appendix A on page 206.

For either method of calculating the Check Digit use the 12-Digit ID Key option.



4.5 Non-Retail - Fixed Measure

If there is any possibility of a non-retail trade item being sold at retail level, it must carry a GTIN-12 represented by a UPC-A Bar Code Symbol.

There are three available options for generating a bar code symbol for a non-retail trade item if you are bar coding using a U.P.C. Company Prefix. Each of these options can be applied whether the non-retail trade item contains retail products carrying either UPC-A or UPC-E Bar Code Symbols.

4.5.1 Option 1: Unique GTIN-12

If printing conditions permit the successful printing of a UPC-A Bar Code Symbol a GTIN-12 can be allocated. The method used to allocate this number is the same as for allocating a number to a retail item – refer to Section 4.3.1 GTIN-12 on page 56.

Ensure that the non-retail trade item is not allocated the same GTIN-12 as an existing retail trade item.

While an item intended for both POS and General Distribution Scanning environments must carry a retail number and bar code symbol, the size and location of the bar code symbols must adhere to the specifications for items not sold at POS.

4.5.2 Option 2: Unique GTIN-12 with Two Filler Zeros

Two filler zero precede a new and unique GTIN-12 allocated to a non-retail trade item. This number is allocated by the same method used for retail trade items. Please refer to Section 4.3.1 GTIN-12 on page 56.

GS1 US allocates U.P.C. Company Prefixes of varying lengths, and the amount of numbers you are allocated depends on the U.P.C. Company Prefix issued.

Filler Zeros	U.P.C. Company Prefix	Item Reference	Check Digit
00	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 ₁₄

TABLE 25 Structure of a Unique GTIN-12 with Two Filler Zeros

The two zeros are filler characters used to convert the GTIN-12 to a GTIN-14, which can then be encoded in an ITF-14 or GS1-128 (previously UCC/EAN-128) Bar Code Symbol.

Note: The ITF-14 Bar Code Symbol is better suited for direct printing onto corrugated fibreboard.



4.5.3 Option 3: GTIN-14 - Indicator Method

This option is only available when the retail trade items within the non-retail item are carrying the same GTIN-12.

When the retail item contained within the non-retail unit carries a Zero Suppressed GTIN-12, the Zero Suppressed GTIN-12 must first be expanded into its full twelve-digit form. Please refer to Appendix B on page 210 for more information on how to decode a Zero Suppressed GTIN-12

The GTIN-14 can be represented in either an ITF-14 or GS1-128 (previously UCC/EAN-128) Bar Code Symbol.

Note: The ITF-14 Bar Code Symbol is better suited to direct printing onto corrugated fibreboard..

Indicator	Filler Zero	First 11 Digits of GTIN-12	Check Digit
1-8	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}

TABLE 26 GTIN-14 Structure - Indicator Method

An Indicator (a number from one to eight previously known as a logistical variant) precedes a filler zero and the first eleven digits of the GTIN-12 of the lowest level of packaging within the non-retail trade item. The filler zero is used to convert the GTIN-12 to a GTIN-14.

Indicators are chosen at the discretion of the company allocating the GTIN. They are used to create a unique GTIN-14 which distinguishes between different packaging levels of the same trade item.

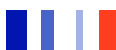
For example: Indicator '1' may be allocated to the 6 pack and Indicator '2' may be allocated to a carton containing four 6 packs, thus creating a unique GTIN-14 for every level of packaging, as shown in Figure 10 on page 46.

The last digit is the Check Digit. The Check Digit must be recalculated every time the Indicator changes.

A Check Digit Calculator Program which will automatically calculate the Check Digit can be obtained from the GS1 Australia web site at www.gs1.org.au.

For instruction on manually calculating the Check Digit please refer to Appendix A on page 206.

For either method of calculating the Check Digit use the 14-Digit ID Key option.



5 Numbering and Bar Coding Logistic Units



5.1 Introduction

A logistic unit is an item of any composition established for transport and/or storage which needs to be managed through the supply chain. Tracking and tracing logistic units in the supply chain is a major application of the GS1 System.

Each day, hundreds of thousands of companies sell millions of products. The products can be transported in a multitude of configurations and packaging types. Shipments may consist of single pieces, cases or cartons, part or whole pallets, containers, etc., and each packaging type itself may be composed of a homogeneous product or products, or may involve a non-standard mix of products picked to meet individual customer orders.

In addition, the goods may be transported by a number of different means, for example truck or rail, couriers, airlines or shipping lines, and through different modes, for example road, sea or air.

At various points in the supply chain, different parties will require information in order to receive, track, sort, store, pick or pack products before the goods are finally reshipped to another destination or consumed. This physical goods flow is therefore accompanied by a supporting information flow. As a result of increased global competition and prevailing lower margins, the organisational, data processing, and personnel costs, as well as the accuracy, reliability and speed with which this information is made available, has acquired an increasing importance.





5.2 Identification of Logistic Units using the Serial Shipping Container Code (SSCC)

Within the GS1 System the unique non-significant number which is used to identify logistic units is the Serial Shipping Container Code (SSCC). It provides the link between the physical logistic unit and information pertaining to the logistic unit that is communicated between trading partners using Electronic Data Interchange (EDI).

In principle, the SSCC provides a unique reference number that can be used as the key to access information regarding the logistic unit in computer files.

In an environment where EDI is used to transmit the detailed information pertaining to each logistic unit, or where the information is already within a database, the SSCC acts as the reference point to information.

For example, the sender communicates to the recipient, in advance via EDI, the SSCCs of each logistic unit and all the relevant shipment and container information. The shipment information will usually include shipment date and time, expected arrival date and time, carrier identification, references to a customer purchase order number or contract, etc. Container information will include the product or products and the relevant quantities contained in each shipping container identified by a SSCC, along with such additional information as a final delivery location(s), best before date, expiry date, batch number, etc. The recipient stores this information in a computer database. Upon receipt of a shipment the receiver scans the bar coded SSCC. All the relevant information stored on file for that particular shipping container is transmitted from the data base to the application for further processing.

When EDI is not available in all points in the supply chain, or when it is simply impossible to send an EDI despatch advice message due to extremely short delivery lead times, bar coding variable data on the shipping container itself may be appropriate.



5.3 Allocating An SSCC

The SSCC is a unique, non-significant, eighteen-digit number which is assigned by the company constructing the logistic unit. It remains the same for the life of the logistic unit. The SSCC is encoded in a GS1-128 (previously UCC/EAN-128) Bar Code Symbol and is represented by the Application Identifier (AI) 00. For more information on AI (00) refer to "AI (00) - Identification of a Logistic Unit" on page 96

When assigning an SSCC, an individual SSCC number must not be reallocated within one year of the shipment date from the SSCC assignor to a trading partner.

For GS1 Australia members the format used to allocate your SSCC depends on whether you joined GS1 Australia after May 1996 and were allocated a nine-digit GS1 Company Prefix, or if you joined prior to May 1996, in which case you were allocated with a seven-digit GS1 Company Prefix.

	AI	Ext. Digit	GS1 Company Prefix	Serial Reference	Check Digit
Nine-Digit GS1 Company Prefix	00	0-9	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 n ₁₅ n ₁₆ n ₁₇	n ₁₈
Seven-Digit GS1 Company Prefix	00	0-9	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 n ₁₅ n ₁₆ n ₁₇	n ₁₈

TABLE 27 Serial Shipping Container Code (SSCC) Structure

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 GS1 Company Prefix used should belong to the company originating the logistic unit, which is not always the brand owner. It makes the SSCC unique worldwide but does not identify the origin of the unit.

If you have obtained a prefix to allocate twelve-digit GTINs either directly from GS1 US or via GS1 Australia, you must add a filler zero to the front of the prefix, after the Extension Digit.

The Serial Reference is structured at the discretion of the company responsible for its assignment to uniquely identify each transport package. The method used to allocate the serial reference is at the discretion of the company bar coding the unit.

The Check Digit is mathematically calculated and ensures the whole number is correct. Correct calculation is essential for successful scanning of the bar code symbol.

A check digit calculator program which will automatically calculate the check digit can be obtained from the GS1 Australia web site at www.gs1au.org/services/calculator/_calculator.asp

For instruction on manually calculating the check digit please refer to Appendix A on page 206.

Note: The AI (00) is not part of the Check Digit Calculation.,

For either method of calculating the Check Digit use the 18-Digit ID Key option.





5.4 Labelling the Logistic Unit

The organisation responsible for the printing and application of the label determines content format and the dimensions of the label. However, the SSCC is the minimum requirement in the logistics label. Any other information over and above the SSCC should comply with the specification of this section and with the proper use of AIs.

5.4.1 Label Layout

The layout of the logistics label accounts for the supply chain process by grouping information into three logical sections for the supplier, customer and carrier, generally in this order. Each label section may be applied at a different point in time as relevant information becomes known. For example, the physical content of the unit is typically defined at finished goods distribution. At this point the identification of the logistic unit as an entity is possible. However, other elements of information, such as final destination or the composition of a mixed shipment are not typically known until further in the supply chain. In a trading relationship, different elements of information are generally known and applied by the supplier, carrier, and customer.

Supplier section

The supplier section contains information that is generally known at the time of packaging by the supplier. It is mandatory that the SSCC is applied at this point to identify the unit. If a GTIN is also used at this point it can be applied at the same time.

Other attribute information that may be required or useful by the supplier, customers, and carrier(s) can also 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.

Customer section

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

Carrier section

The carrier section contains information that is generally known at the time of shipment and is typically related to the transport of the goods. Information may include ship-to postal codes, consignment numbers and carrier specific routing and handling information.

For each label applied to the logistic unit, 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) and the lowest section contains the bar code symbols.





5.4.2 Label Dimensions

The physical dimensions of the label are determined by the company applying the label to the logistic unit. However, the size of the label should be consistent with the information required in all sections of the label. Factors affecting label dimensions include the amount of information required, content and magnification of the bar code symbols used, and the dimensions of the logistic unit itself.

The standard A6 format (105mm x 148mm) is sufficient for most requirements and is the predominant label size used. Other sizes are usually variations that result by other information requirements or the logistic unit size. A recommended guide is that the width of the label should remain constant at 105mm, while the height of the label varies depending on information requirements.



5.5 Bar Code Symbol Specifications

5.5.1 Bar Code Symbol

The GS1-128 (previously UCC/EAN-128) Bar Code Symbology is used for GS1 Logistics Labels. This symbology enables not only the GTIN to be encoded, but by using Application Identifiers (AIs) it also allows attribute data to be encoded. 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.

5.5.1.1 Concatenation

Concatenation (stringing data elements together) 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. However, concatenation shall not be used with the GS1-128 (previously UCC/EAN-128) Bar Code Symbol containing the SSCC on cartons or outer cases due to the scanning environment. To help maintain the required symbol height and magnification SSCC concatenation is not recommended on pallets when using the standard A6 format.

5.5.1.2 Magnification

The magnification range for the GS1-128 (previously UCC/EAN-128) Bar Code Symbol containing the SSCC is 48.7% to 92.5% (X-dimension 0.50mm – 0.94mm).

Selecting a magnification factor at the higher end of the specified range will always enhance the reliability of scanning. However, if the information required cannot be accommodated in the space available, a lower magnification factor may be used for other bar code symbols on the logistics label that do not contain the SSCC. In any case, the magnification factor shall not be lower than 25% (X-dimension 0.25mm). Quality of the printed bar code symbols should be carefully checked, especially at lower magnification factors. If a magnification factor of less than 48.7% (X-dimension 0.50mm) is used it is likely that the reading distance is reduced.

5.5.1.3 Height of Bars

The minimum bar height for the GS1-128 (UCC/EAN-128) Bar Code Symbol containing the SSCC is 32mm. For other bar code symbols on the logistics label, a minimum height of 27mm is acceptable based on historical specifications, but a migration to 32mm should be made.



5.5.1.4 Human Readable Interpretation

This is the Human Readable Interpretation of the information represented in the bar code symbol. This Human Readable Interpretation shall be no less than 3mm high, clearly legible, and preferably located below the bar code symbol. It includes AIs and data content, but no representation of special bar code symbol characters or Symbol Check Digits (but includes data Check Digits). It is used as a diagnostic check or, as a last resort, as back up in the event of the bar code symbol failing to scan.

To facilitate key entry AIs should be set apart from the data by the use of parenthesis (brackets).

5.5.1.5 Bar Code Symbol Orientation and Placement

Bar code symbols shall be in picket fence orientation on logistic units. The bars and spaces shall be perpendicular to the base on which the logistic unit stands. In all cases, the SSCC shall be placed in the lowest portion of the label.

5.5.1.6 Number of Bar Code Symbols on Unit

Whilst the absolute minimum requirement for pallets/logistic units is one bar code symbol, for efficiency of scanning it is strongly recommended that at least two sides of the item be bar coded with the same data.

5.5.2 Text

Text facilitates operations which do not make use of bar code symbol technology.

There are three types of text which can appear on a logistics label:

Plain text is text that has no bar code symbol equivalent but 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 3mm high.

Human translation is text designed to support manual operations and to facilitate key entry in menu driven systems. It is the equivalent of information represented in a bar code symbol, and is comprised of data titles and data content. Application Identifiers (AIs) are not included in human translation. Human translation should be at least 7mm in height.

Data titles are the standard abbreviated descriptions of data fields. They are used as prefixes in human translation 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 "From" adjacent to a sender's address.

A list of relevant data titles is provided in Table 30 on page 93 .





5.6 Label Location

5.6.1 Cartons and Outer Cases

For cartons and outer cases, logistics labels should be placed so that the lowest edge of the bars of the GS1-128 (previously UCC/EAN-128) Bar Code Symbol containing the SSCC is exactly 32mm from the base of the unit. Ensure that no part of the bar code symbol (including Quiet Zones (Light Margins)) is closer than 19mm from any vertical edge.

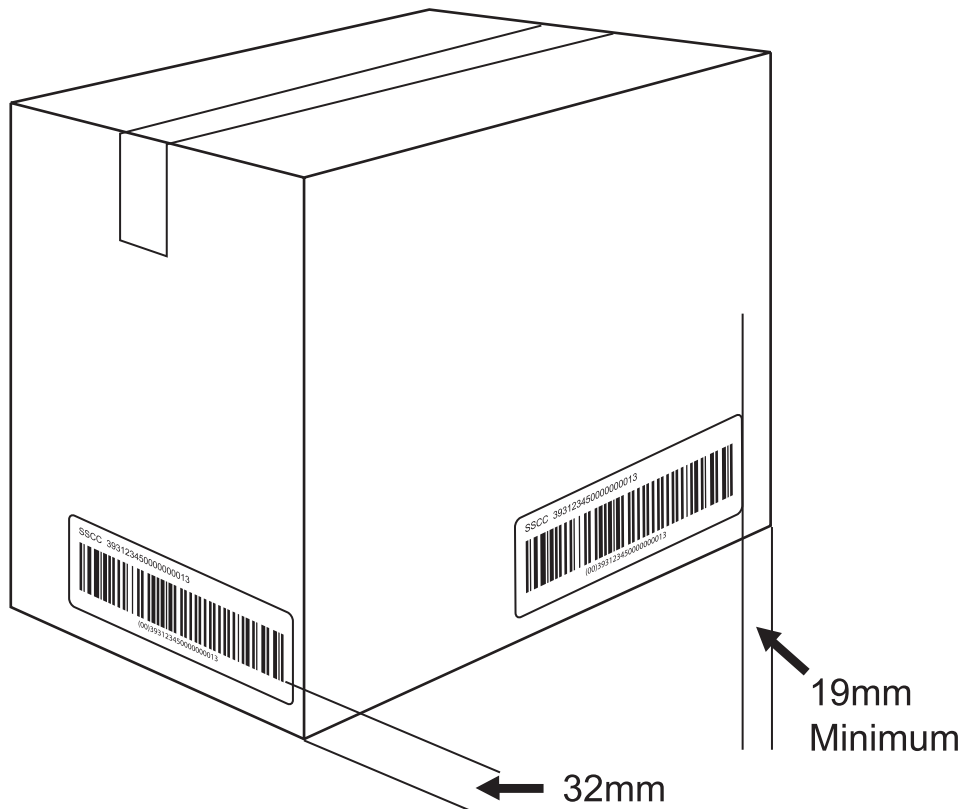


Figure 11 Logistics Label Location on Carton

If the unit is already marked with an EAN-13, UPC-A, ITF-14 or GS1-128 Bar Code Symbol for trade item identification purposes, the logistics label shall be placed so as not to obscure the pre-existing bar code symbol. The preferred location for the labels in this case is to the side of the pre-existing bar code symbol, so that a consistent horizontal location is maintained.



5.6.2 Pallets

For all types of pallets, including full pallets containing individual trade items and single trade items, (such as a fridge or washing machine), bar code symbols should be placed at a height between 400mm and 800mm from the base of the unit. Including Quiet Zones (Light Margins), the bar code symbols should be no closer than 50mm from any vertical edge to avoid damage.

For pallets less than 400mm high, the bar code symbols should be placed as high as possible while protecting the logistics label.

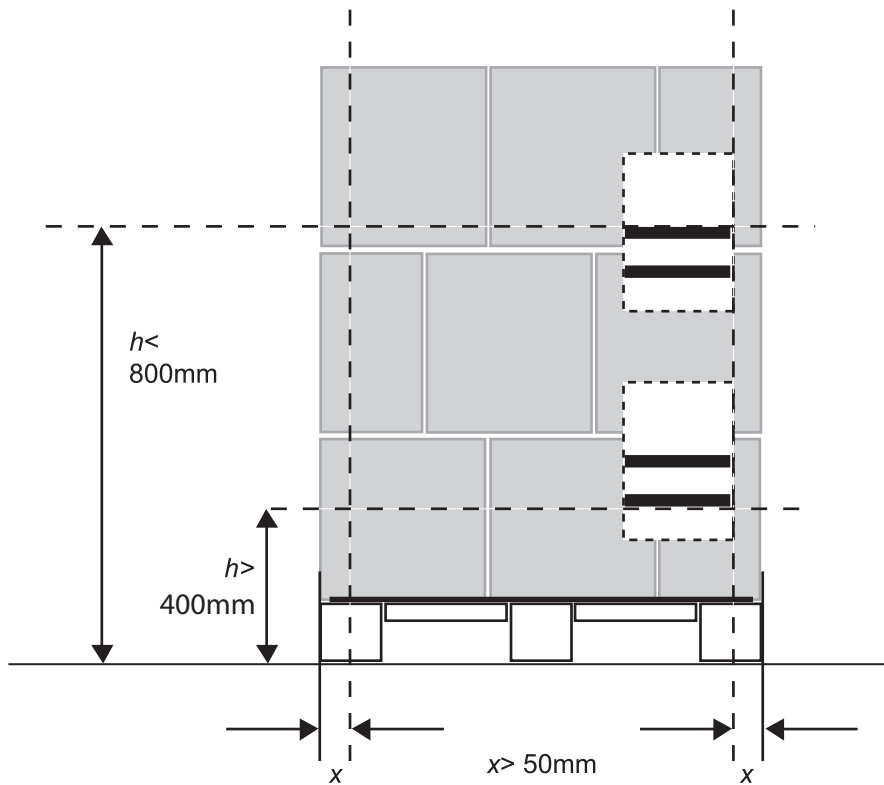


Figure 12 Logistics Label Location on a Pallet





5.7 GS1 Logistics Label Examples



Figure 13 The Basic Logistics Label : An SSCC



Figure 14 Logistics Label with Supplier and Carrier Section



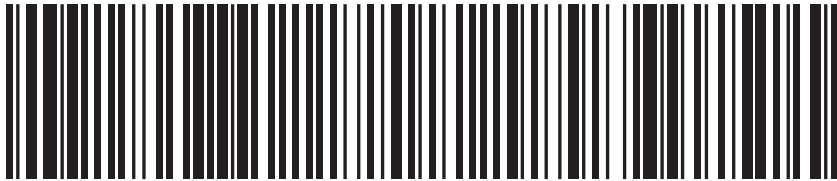

GS1 BEAN FACTORY	
SSCC 393123450000000037	
ITEM NO. 09312345000005	QUANTITY 20 Cases
USE BY (ddmmyy) 22/01/06	BATCH 2468
 (02)09312345000005(17)060122(10)2468(37)20	
 (00)393123450000000037	

Figure 15 Logistics Label with Supplier Section



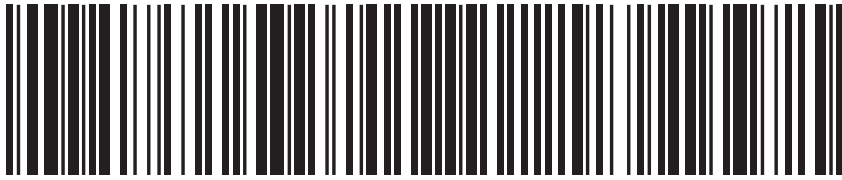
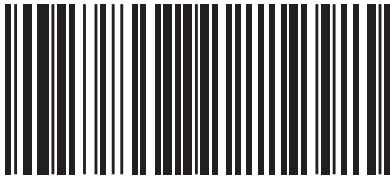
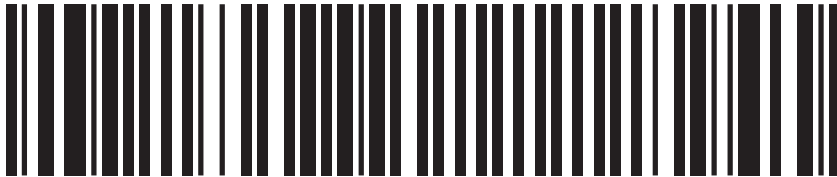
<p>FROM GS1 Global Office Blue Tower Avenue Louise 326, Bte 10 B1050 Brussels, Belgium</p>	<p>TO GS1 Australia Axxess Corporate Park Bldg 4B, 2-4 Lord Street Botany, NSW, 2019</p>
<p>SHIP TO POST 0363149 B/L 853930 CONSIGNMENT 931234500002468135790</p>	
 <p>(421)0363149(401)931234500002468135790</p>	
<p>PO: 345-896779-0 Zone: 4</p>	<p>DWCP: 9684584-23 STORE #49</p>
 <p>(410)9312345000258</p>	<p>SHIP TO LOC 9312345000258</p>
<p>SSCC 393123450000000044</p>	
 <p>(00)393123450000000044</p>	

Figure 16 Logistics Label with Supplier, Customer and Carrier Sections

6 Numbering Locations



6.1 Introduction

On a daily basis information related to parties and locations is generated and communicated throughout the business world in vast quantities. Names and addresses are put on envelopes for the mail, the point to which a delivery is made is put on transport documentation, Electronic Data Interchange (EDI) network addresses are provided in EDI messages, etc. These are just a few examples of the many applications in existence today, which identify parties or locations in trade or other communications.

With the advent of electronic communication, and particularly EDI, the need for the identification of parties and locations has become acute. The use of numeric identification instead of full alphanumeric names and addresses is the key to the successful implementation of an EDI project.

The Global Location Number (GLN) makes possible the unique and unambiguous identification of:

- legal entities, such as registered companies
- physical entities, such as a door of a warehouse or a particular room in a building

Each company or organisation holding a GS1 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.

Companies that are not members of GS1 Australia, who require a GLN, should contact GS1 Australia for further information.





6.2 Allocating GLNs

A GLN is a non-significant thirteen-digit number which is automatically assigned by GS1 Australia to the company when they join as a member. If the member company requires subsequent GLNs then they can create one using their own GS1 Company Prefix from their pool of numbers in the same way GTINs are allocated to retail trade items. For more information refer to “Numbering Trade Items” on page 17.

Note: If using a U.P.C. Company Prefix please refer to “Numbering Trade Items for North America” on page 53. Ensure that you add a filler zero to increase the twelve-digit identification number to the required thirteen digits.

GLNs can be used to identify anything that can be addressed. Examples include companies, departments, rooms, factories, shelves, delivery points and EDI network addresses, etc. Once assigned at source - generally by the party owning the location - a GLN becomes a unique and universal reference, which can be used by all.

The exact method used to allocate a GLN is at the discretion of the issuing organisation. The GLN must be unique for each individual location being identified. Although there is no restriction on the allocation of the same GTIN-13 to a trade item and to a location, it is not recommended to do so. If choosing to allocate the same GTIN to a location as to a trade item, care must be taken to ensure there is no confusion.





6.3 When to Change a GLN

From time to time the details related to a GLN may change. The address identified by the GLN may change ownership or the address may close and the business carried out at that address may be transferred to a new address. The following are general cases on the use (and re-use) of GLNs due to a change in the circumstances in which the number was originally set up.

- If a company sells (possibly because of liquidation) a location to another party who may or may not be using GLNs, the GLN for the address which 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 needs to be assigned.
- If a company closes one address and opens up 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 because the owner wants to maintain records on his computer files which 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 party responsible for the location number on the related computer file record should change the details associated with the GLN.

A GLN which is no longer being used should not be re-allocated for at least three years. The delay must allow time for reference of the old GLN to be removed from trading partners' files. When the GLN is re-used, the details relating to the new party and/or location must be retransmitted (e.g. using an EDI message).

For further information regarding GLN allocation and when to change a GLN please refer to www.gs1.org/glnrules/





6.4 GLNs and EDI

The use of GLNs is a pre-requisite for efficient EDI.

In any EDI Message Interchange Header segment, there is a need to identify the sender and receiver of the EDI message. The GLN is an ideal way to identify parties at this level. The UN/EDIFACT Interchange Header segment (UNB) is where this identification is required.

The identification of parties and locations within EDI messages is the primary application for GLNs. Within EANCOM®, the GS1 International UN/EDIFACT implementation guideline, a message and some segments exist for the purpose of identifying parties.

At the beginning of a commercial relationship, when using EDI, trading partners would advise each other of their GLNs. The information is used to associate GLNs with location information and the related operational, administrative, commercial and financial data of the trading partner (such as name, address, contact person, financial accounts, etc.). These details would be entered in the trading partners' computer systems in readiness to send and receive EDI messages.

6.1 Bar Code Symbol

The only bar code symbol used to represent the GLN is the GS1-128 (previously UCC/EAN-128) Bar Code Symbol. When encoding the GLN, GS1-128 Bar Code Symbols should be printed within the magnification range of 25% - 100% (X-dimension 0.25mm – 1.02mm). However, if the GLN is carried by a bar code symbol on a logistics label please refer to "Numbering and Bar Coding Logistic Units" on page 62.

7 Numbering Assets



7.1 Introduction

The GS1 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 a GS1 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 GS1 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.

GS1 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 Global Returnable Asset Identifier (GRAI), AI (8003), or 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.





7.2 Global Returnable Asset Identifier (GRAI): AI (8003)

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 GS1 System identification of a returnable asset, the Global Returnable Asset Identifier (GRAI), enables tracking as well as recording of all relevant data.

A typical application using a GRAI 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: A GRAI 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.



7.2.1 Allocating a Global Returnable Asset Identifier (GRAI)

The structure of the data for a GRAI can include two parts: the mandatory GRAI and an optional serial number. The GRAI is composed of the GS1 Company Prefix of the company assigning the asset identifier, and the asset type. The latter is assigned to uniquely identify, together with the GS1 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. 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.

For GS1 Australia members the format used to allocate your GRAI depends on whether you joined GS1 Australia after May 1996 and were allocated a nine-digit GS1 Company Prefix, or if you joined prior to May 1996, in which case you were allocated with a seven-digit GS1 Company Prefix.

	AI	Filler Zero	GS1 Company Prefix	Asset Type	Check Digit	Serial Number (Optional)
Nine-Digit GS1 Company Prefix	8003	0	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	an ₁ -var.-an ₁₆
Seven-Digit GS1 Company Prefix	8003	0	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	an ₁ -var.-an ₁₆

TABLE 28 Global Returnable Asset Identifier (GRAI) Structure

The filler zero in the leftmost position is added to generate the required fourteen digits.

The GS1 Company Prefix is the one allocated to the owner of the asset.

If you have obtained a prefix to allocate twelve-digit GTINs either directly from GS1 US or via GS1 Australia, you must add a filler zero to the front of the prefix, after the Extension Digit.

The Asset Type is a number assigned by the owner of the asset to uniquely identify each type of asset.

The Check Digit is mathematically calculated and ensures the whole number is correct. Correct calculation is essential for successful scanning of the bar code symbol.

A Check Digit Calculator Program which will automatically calculate the Check Digit can be obtained from the GS1 Australia web site at www.gs1au.org.

For instruction on manually calculating the Check Digit please refer to Appendix A on page 206.

Note: The AI (8003) is not part of the Check Digit calculation.

For either method of calculating the Check Digit use the 14-Digit ID Key option.

The Serial Number (optional) is assigned by the owner of the asset. It identifies an individual asset within a given asset type. The field is alphanumeric and variable in length up to 16 characters.

When it is not possible to assign an asset type (e.g. for museum exhibit), 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 AI (8004) - Global Individual Asset Identifier (GIAI), should be used.





7.3 Global Individual Asset Identifier (GIAI) - AI (8004)

In the GS1 System, an individual asset is considered a physical entity made up of any characteristics.

The Global Individual Asset Identifier (GIAI) 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 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.

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

7.3.1 Allocating a Global Individual Asset Identifier (GIAI)

For GS1 Australia members the format used to allocate your GRAI depends on whether you joined GS1 Australia after May 1996 and were allocated a nine-digit GS1 Company Prefix, or if you joined prior to May 1996, in which case you were allocated with a seven-digit GS1 Company Prefix.

	AI	GS1 Company Prefix	Individual Asset Reference
Nine-Digit GS1 Company Prefix	8004	n ₁ n ₂ n ₃ n ₄ n ₅ n ₆ n ₇ n ₈ n ₉	an ₁ – variable – an ₂₁
Seven-Digit GS1 Company Prefix	8004	n ₁ n ₂ n ₃ n ₄ n ₅ n ₆ n ₇	an ₁ – variable – an ₂₃

TABLE 29 Global Individual Asset Identifier (GIAI) Structure

The GS1 Company Prefix is the one allocated to the company assigning the individual asset reference.

If you have obtained a prefix to allocate twelve-digit GTINs either directly from GS1 US or via GS1 Australia, you must add a filler zero to the front of the prefix, after the Extension Digit.

The Individual Asset Reference is allocated and structured at the discretion of the holder of the GS1 Company Prefix. The data can be alphanumeric, and is of variable length, ensuring that the entire GIAI is not longer than 30 characters.

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 GS1 System recommends that GIAIs be allocated sequentially and not contain classifying elements.





7.4 Change of Asset Ownership

GS1 Asset Identification Numbers are used in a diverse range of business applications ranging from tracking the movements of re-usable packaging trays to recording the life-cycle history of aircraft parts. If a company sells an asset to another company then the asset identifier should ideally be replaced by another GIAI or GRAI or be removed. It is permissible for the asset identifier to remain on the item when the ownership changes if the new owner takes responsibility for the GS1 Company Prefix associated with the asset identifier.



8 Application Identifiers



8.1 Introduction

Some GS1 Data Carriers (e.g. GS1-128 (previously UCC/EAN-128), RSS Expanded, and Data Matrix) allow information over and above item identification to be represented in bar coded form. Application Identifiers (AIs) effectively act as prefixes for this information and define the meaning and structure of the embedded data which follows.

AIs allow you to represent attribute information such as batch numbers, serial numbers, durability dates, and measurements, as well as item identification, locations, assets, and shipments in a standard format. This ensures that the attribute information encoded by one company can also be scanned and interpreted by any other company in the supply chain.

AIs and their associated data can be represented in a GS1-128 Bar Code Symbol, RSS Expanded and Data Matrix. These symbologies enables not only the GTIN to be encoded, but, by using AIs, they also allow attribute data over and above the item identity to be encoded. Each AI is a two-, three-, or four-digit prefix that defines the meaning and format 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.

The data following the AI may comprise of alphabetic and/or numeric characters, of any length up to thirty characters. The data fields are either fixed or variable length, depending on the AI. Individual AI structures are given in Table 30 on page 93.

If an AI appears on the same item more than once (e.g. if two labels are applied to the same item) the AI must be followed by the same information on each label.





8.2 Choosing the Correct AI

At present there are over 100 different AIs available to identify both identification and attribute data. To assist with selection of the appropriate AI we have grouped them below.

Identification of Trade Items

The following AIs identify different types of trade items.

- AI (01) - Global Trade Item Number (GTIN)
- AI (02) - GTIN of trade items contained in a logistic unit
- AI (20) - Product variant
- AI (8006) - Identification of the components of a trade item

Traceability

The following AIs are used for tracking and traceability of items.

- AI (00) - Serial Shipping Container Code (SSCC)
- AI (10) - Batch or lot number
- AI (21) - Serial Number
- AI (240) - Additional product identification assigned by the manufacturer
- AI (241) - Customer part number
- AI (250) - Secondary serial number
- AI (251) - Reference to source entity
- AI (422) - Country of origin of a trade item
- AI (423) - Country of initial processing (ISO country code)
- AI (424) - Country of processing
- AI (425) - Country of disassembly
- AI (426) - Country covering full process chain





Date/Time Identification

When used on non-retail trade items, the dates refer to the trade items contained inside the non-retail trade items. The following AIs identify different types of dates.

- AI (11) - Production date
- AI (12) - Due date
- AI (13) - Packaging date
- AI (15) - Best before date
- AI (17) - Expiration date
- AI (8008) - Date and time of production

The standard length of a date is six digits, in the format year, month, day (YYMMDD).

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 not necessary to specify the day, the field must be filled with two zeros.

Since the data field "year" consists of two positions, the century is established by the following procedure:

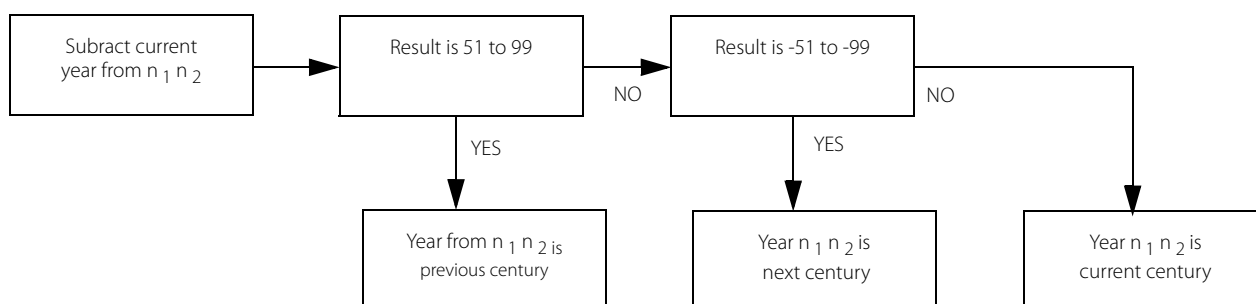


Figure 17 Calculation of Year





Documents

The following AI is a document identifier.

- AI (253) - Global Document Type Identifier

Quantities

The following AIs identify the quantity of a trade item.

- AI (30) - Variable count
- AI (37) - Count of trade items contained within a logistic unit

Measurements

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.

GS1 encourages the use of the International System of Units (SI). The SI, commonly called the metric system, is now either obligatory or permissible throughout the world. However, in recognizing that not all trade is conducted using the SI metric system and many industries continue to use the inch/pound system (often referred to as "United States of America customary units"), GS1 make available Application Identifiers covering both the SI and inch/pound systems.

Trading partners should agree on the SI or inch/pound system per recognised industry convention. Those who interpret the data should be prepared to translate from one system to the other within their computer system.

For the full list of the AIs for the inch/pound system, contact GS1 Australia.

Metric Measurements – General

The following AI can be used to identify either a trade item or a logistic unit. Where the fourth digit is "n", this is the decimal point indicator, which shows where the decimal point belongs in the actual data. A fourth digit of 0 means that there is no decimal point and the digit 1 means that the decimal point is 1 position before the last digit of the encoded measurement.

- AI (337n) - Kilograms per square metre





Metric Measurements – Trade

The following AIs identify different types of metric measurements for trade items. Where the fourth digit is “n”, this is the decimal point indicator, which shows where the decimal point belongs in the actual data. A fourth digit of 0 means that there is no decimal point and the digit 1 means that the decimal point is 1 position before the last digit of the encoded measurement.

- AI (310n) - Net weight in kilograms
- AI (311n) - Length or first dimension in metres
- AI (312n) - Width, diameter, or second dimension in metres
- AI (313n) - Depth, thickness, height, or third dimension in metres
- AI (314n) - Area in square metres
- AI (315n) - Net volume in litres
- AI (316n) - Net volume in cubic metres

Metric Measurements – Logistic

The following AIs identify different types of metric measurements for logistic units. Where the fourth digit is “n”, this is the decimal point indicator, which shows where the decimal point belongs in the actual data. A fourth digit of 0 means that there is no decimal point and the digit 1 means that the decimal point is 1 position before the last digit of the encoded measurement.

- AI (330n) - Gross weight in kilograms
- AI (331n) - Length or first dimension in metres
- AI (332n) - Width, diameter, or second dimension in metres
- AI (333n) - Depth, thickness, height, or third dimension in metres
- AI (334n) - Area in square metres
- AI (335n) - Gross volume in litres
- AI (336n) - Gross volume in cubic metres



Amount Payable/Pricing Identification

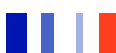
The following AIs identify amount payable and pricing identification. Where the fourth digit is “n”, this is the decimal point indicator, which shows where the decimal point belongs in the actual data. A fourth digit of 0 means that there is no decimal point and the digit 1 means that the decimal point is 1 position before the last digit of the amount payable.

- AI (390n) - Amount payable – Single monetary area
- AI (391n) - Amount payable – With ISO currency code
- AI (392n) - Amount payable for a variable measure trade item – Single monetary unit
- AI (393n) - Amount payable for a variable measure trade item – With ISO currency code
- AI (8005) - Price per unit of measure
- AI (8007) - International Bank Account Number (IBAN)

References

The following AIs identify references. Reference numbers contain information having only an indirect connection with the identification number of the trade item contained. When printed in a bar code symbol on a trade item references supply extra information which may be useful for organisational purposes.

- AI (400) - Customer's purchase order number
- AI (401) - Consignment number
- AI (402) - Shipment identification number
- AI (403) - Routing code
- AI (8002) - Electronic Serial Identifier for Cellular Mobile Telephones
- AI (8020) - Payment slip reference number





Locations

The following AIs identify locations and their related functions.

Use Global Location Numbers (GLNs) to identify the designation of a company, a department, a warehouse, and so on.

- AI (410) - Ship to (deliver to) GLN
- AI (411) - Bill to (invoice to) GLN
- AI (412) - Purchased from GLN of the party from whom goods are purchased
- AI (413) - Ship for (deliver for/forward to) using GLN
- AI (414) - GLN for physical location identification
- AI (415) - GLN of the invoicing party

Postal Codes

The following AIs identify postal codes. Postal codes are usually allocated by a national postal authority. Generally the codes do not identify a specific location but are used as attribute data in applications requiring sorting or routing of transport packages.

- AI (420) - Ship to (deliver to) postal code within a single postal authority
- AI (421) - Ship to (deliver to) postal code with 3 digit ISO country code prefix

Special Applications

The following AI is used in the USA as an addition to the GTIN for hospital pack pharmaceuticals.

- AI (22) - HIBCC – Secondary data (quantity, expiration date, and lot number) for specific health industry products





70 Series AIs

The following AIs are assigned when an AI request meets all the normal criteria except for if the application is not multi-sectoral, or the application is restricted to a country or a region (e.g. is not global)

- AI (7001) - NATO stock number
- AI (7002) - UN/ECE meat carcasses and cuts classification
- AI (703s)* - Approval number of processor with three-digit ISO country code

* The fourth digit "s" indicates the sequence of procedures in the supply chain.

Dimensions

The following AI identifies the variable dimensions of roll products.

- AI (8001) – Roll Products – Width, length, core, diameter, direction, and splices

Assets

The following AIs are used to identify different types of assets.

- AI (8003) - GS1 Identification Key of a returnable asset (GRAI)
- AI (8004) - GS1 Identification Key of an individual asset (GIAI)





Services

The following AI is used to identify a service.

- AI (8018) - Global Service Relation Number (GSRN)

Coupons

The following AIs are used for the identification of promotional coupons with distribution restricted to North America.

- AI (8100) - Coupon extended code – UCC prefix + offer code
- AI (8101) - GS1-128 coupon extender code – UCC prefix + offer code + end of offer code
- AI (8102) - GS1-128 coupon extender code – UCC prefix

Internal

The following AIs can be used for internal purposes and are not to be released into the open market.

- AI (90) - Mutually agreed between trading parents/internal applications (including FACT data identifiers)
- AI (91) to (99) - Company internal information





8.3 All AIs - Detailed Information

The table below summarises the list of AIs currently available.

Please note the following:

- There is no general prescription on the use of Check Digits for the data, as opposed to the Symbol Check Character. However, particular AIs may require the use of a Check Digit on the data and, where appropriate, this is specified in the individual data format descriptions. You may also choose to use Check Digits for your own purposes in any portion of the data content chosen at your own discretion, for example, after batch numbers
- The maximum lengths quoted do not include any auxiliary characters used when presenting the data in a GS1-128 (previously UCC/EAN-128) Bar Code Symbol
- The AI is not part of the data field. When using the data in other applications, for example, in EDI applications, you must drop the AI

Conventions

The conventions that apply for AI data formats are:

- a alphabetic characters
- n numeric characters
- an alpha-numeric characters (ie. alpha or numeric or mixed).

Examples

Some examples of AI data formats are:

- n3 three numeric characters, fixed length
- n..10 up to ten numeric characters, variable length
- an..3 up to three alpha-numeric characters, variable length



AI	Full Title	Format		Data Title	Page
		AI	Data		
00	Serial Shipping Container Code	n2	n18	SSCC	96
01	Global Trade Item Number	n2	n14	GTIN	97
02	GTIN of Trade Items Contained in a Logistic Unit	n2	n14	CONTENT	98
10	Batch or Lot Number	n2	an..20	BATCH/LOT	99
11*	Production Date (YYMMDD)	n2	n6	PROD DATE	100
12*	Date Due (YYMMDD)	n2	n6	DUE DATE	100
13*	Packaging Date (YYMMDD)	n2	n6	PACK DATE	101
15*	Best Before Date (YYMMDD)	n2	n6	BEST BEFORE or SELL BY	101
17*	Expiration Date (YYMMDD)	n2	n6	USE BY or EXPIRY	102
20	Product Variant	n2	n2	VARIANT	102
21	Serial Number	n2	an..20	SERIAL	103
22	Secondary Data for Specific Health Industry Products	n2	an..29	QTY/DATE/BATCH	103
240	Additional Product Identification Assigned by the Manufacturer	n3	an..30	ADDITIONAL ID	104
241	Customer Part Number	n3	an..30	CUST. PART NO.	105
250**	Secondary Serial Number	n3	an..30	SECONDARY SERIAL	105
251**	Reference to Source Entity	n3	an..30	REF. TO SOURCE	106
253	Global Document Type Identifier	n3	n13+n..17	DOC. ID	106
30	Variable Count	n2	n..8	VAR. COUNT	107
310n	Net Weight – Kilograms – Trade	n4	n6	NET WEIGHT (kg)	108
311n	Length of First Dimension – Metres – Trade	n4	n6	LENGTH (m)	109
312n	Width, Diameter, or Second Dimension – Metres – Trade	n4	n6	WIDTH (m)	109
313n	Depth, Thickness, Height, or Third Dimension – Metres – Trade	n4	n6	HEIGHT (m)	110
314n	Area – Square Metres – Trade	n4	n6	AREA (m2)	110
315n	Net Volume – Litres – Trade	n4	n6	NET VOLUME (l)	111
316n	Net Volume – Cubic Metres – Trade	n4	n6	NET VOLUME (m3)	111
330n	Gross Weight – Kilograms – Logistic	n4	n6	GROSS WEIGHT (kg)	112
331n	Length or First Dimension – Metres – Logistic	n4	n6	LENGTH (m), logistic	112
332n	Width, Diameter, or Second Dimension – Metres – Logistic	n4	n6	WIDTH (m), logistic	113

* When only year and month are required, DD must be filled with "00".

** The actual data title may be specified by the issuer of the data.

*** The fourth digit of this AI, "s", indicates the sequence of the processors in the supply chain.

TABLE 30 List of Application Identifiers





AI	Full Title	Format		Data Title	Page
		AI	Data		
333n	Depth, Thickness, Height, or Third Dimension – Metres – Logistic	n4	n6	HEIGHT (m), logistic	113
334n	Area – Square Metres – Logistic	n4	n6	AREA (m2), logistic	114
335n	Gross Volume – Litres – Logistic	n4	n6	VOLUME (l), logistic	114
336n	Gross Volume – Cubic Metres – Logistic	n4	n6	VOLUME (m3), logistic	115
337n	Kilograms Per Square Metre	n4	n6	KG PER m2	115
37	Count of Trade Items Contained in a Logistic Unit	n2	n..8	COUNT	116
390n	Amount Payable – Single Monetary Area	n4	n..15	AMOUNT	116
391n	Amount Payable – With ISO Currency Code	n4	n3+n..15	AMOUNT	117
392n	Amount Payable for a Variable Measure Trade Item – Single Monetary Unit	n4	n..15	PRICE	117
393n	Amount Payable for a Variable Measure Trade Item – With ISO Currency Code	n4	n3+n..15	PRICE	118
400	Customer's Purchase Order Number	n3	an..30	ORDER NO.	118
401	Consignment Number	n3	an..30	CONSIGNMENT	119
402	Shipment Identification Number	n3	n17	SHIPMENT NO.	120
403	Routing Code	n3	an..30	ROUTE	121
410	Ship To – Deliver To GS1 Global Location Number	n3	n13	SHIP TO LOC.	121
411	Bill To – Invoice to GS1 Global Location Number	n3	n13	BILL TO	122
412	Purchased From GS1 Global Location Number	n3	n13	PURCHASE FROM	122
413	Ship For – Deliver For – Forward To GS1 Global Location Number	n3	n13	SHIP FOR LOC.	123
414	Identification of a Physical Location GS1 Global Location Number	n3	n13	LOC. NO.	123
415	GS1 Global Location Number of the Invoicing Party	n3	n13	PAY TO	124
420	Ship To – Deliver To Postal Code Within a Single Postal Authority	n3	an..20	SHIP TO POST	124
421	Ship To – Deliver To Postal Code With Three-Digit ISO Country Code	n3	n3+an..9	SHIP TO POST	125
422	Country of Origin of a Trade Item	n3	n3	ORIGIN	125
423	Country of Initial Processing	n3	n3+n..12	COUNTRY – INITIAL PROCESS.	126
424	Country of Processing	n3	n3	COUNTRY – PROCESS.	126

* When only year and month are required, DD must be filled with "00".

** The actual data title may be specified by the issuer of the data.

*** The fourth digit of this AI, "s", indicates the sequence of the processors in the supply chain.

TABLE 30 List of Application Identifiers





AI	Full Title	Format		Data Title	Page
		AI	Data		
425	Country of Disassembly	n3	n3	COUNTRY – DISASSEMBLY	127
426	Country Covering Full Process Chain	n3	n3	COUNTRY – FULL PROCESS	127
7001	NATO Stock Number	n4	n13	NSN	128
7002	UN/ECE Meat Carcasses and Cuts Classification	n4	an..30	MEAT CUT	128
703s***	Approval Number of Processor with ISO Country Code	n4	n3+an..27	PROCESSOR # s4	129
8001	Roll Products – Width, Length, Core Diameter, Direction, and Splices	n4	n14	DIMENSIONS	130
8002	Electronic Serial Identifier for Cellular Mobile Telephones	n4	an..20	CMT NO.	131
8003	GS1 Global Returnable Asset Identifier	n4	n14+an..16	GRAI	132
8004	GS1 Global Individual Asset Identifier	n4	an..30	GIAI	133
8005	Price Per Unit of Measure	n4	n6	PRICE PER UNIT	134
8006	Identification of the Components of a Trade Item	n4	n14+n2+n2	GCTIN	135
8007	International Bank Account Number	n4	an..30	IBAN	136
8008	Date and Time of Production	n4	n8+n..4	PROD. TIME	136
8018	GS1 Global Service Relation Number	n4	n18	GSRN	137
8020	Payment Slip Reference	n4	an..25	REF. NO.	138
8100	GS1-128 Coupon extender Code – UCC Prefix + Offer Code	n4	n1+n5	-	138
8101	GS1-128 Coupon Extender Code – UCC Prefix + Offer Code + End of Offer Code	n4	n1+n5+n4	-	139
8102	GS1-128 Coupon Extended Code – UCC Prefix	n4	n1+n1	-	139
90**	Information Mutually Agreed Between Trading Partners (Including FACT DIs)	n2	an..30	INTERNAL	140
91-99**	Company Internal Information	n2	an..30	INTERNAL	140

* When only year and month are required, DD must be filled with "00".

** The actual data title may be specified by the issuer of the data.

*** The fourth digit of this AI, "s", indicates the sequence of the processors in the supply chain.

TABLE 30 List of Application Identifiers





AI (00) - Identification of a Logistic Unit

Data Format n18

Data Title SSCC

AI	Ext. Digit	GS1 Company Prefix	Serial Reference	Check Digit
00	0-9	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 n ₁₅ n ₁₆ n ₁₇		n ₁₈

TABLE 31 AI (00) Structure

Assign AI (00) to the serial coding of shipping containers.

AI (00) uniquely identifies logistic units. It also enables you to identify trade items which are packed differently from one transport package to another, for example, where trade items are picked and packed to meet individual orders. This supports operations such as despatch, distribution, and receiving non-standardised packages.

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 GS1 or U.P.C. Company Prefix used should belong to the company originating the logistic unit, which is not always the brand owner. It makes the SSCC unique worldwide but does not identify the origin of the unit.

If you have obtained a prefix to allocate twelve-digit GTINs either directly from GS1 US or via GS1 Australia, you must add a filler zero to the front of the prefix, after the Extension Digit.

The Serial Reference is structured at the discretion of the company responsible for its assignment to uniquely identify each transport package. The method used to allocate the serial reference is at the discretion of the company bar coding the unit.

The Check Digit is mathematically calculated and ensures the whole number is correct. Correct calculation is essential for successful scanning of the bar code symbol.

A check digit calculator program which will automatically calculate the check digit can be obtained from the GS1 Australia web site at www.gs1au.org/services/calculator/_calculator.asp

For instruction on manually calculating the check digit please refer to Appendix A on page 206.

Note: The AI (00) is not part of the Check Digit Calculation.,

For either method of calculating the Check Digit use the 18-Digit ID Key option.

For more information on numbering logistic units refer to "Numbering and Bar Coding Logistic Units" on page 62.





AI (01) - Identification of a Trade Item

Data Format n14

Data Title GTIN

	AI	Global Trade Item Number (GTIN)	Check Digit
GTIN-8	01	0 0 0 0 0 0 n ₇ n ₈ n ₉ n ₁₀ n ₁₁ n ₁₂ n ₁₃	n ₁₄
GTIN-12	01	0 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
GTIN-13	01	0 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
GTIN-14	01	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

TABLE 32 AI (01) Structure

Assign AI (01) to identify the Global Trade Item Number (GTIN). The solution using AI 01 and the GTIN, represented in the GS1-128 Symbology, does not replace the standards for marking non-retail trade items with an EAN-13, UPC-A or ITF-14 Bar Code Symbols. It is provided as an alternative solution for specific applications.

The GTIN can include a GTIN-8, GTIN-12, GTIN-13, or GTIN-14.

The Check Digit is mathematically calculated and ensures the whole number is correct. Correct calculation is essential for successful scanning of the bar code symbol.

A Check Digit Calculator Program which will automatically calculate the Check Digit can be obtained from the GS1 Australia web site at www.gs1au.org/services/calculator/_calculator.asp

For instruction on manually calculating the Check Digit please refer to Appendix A on page 206.

Note: The AI (01) is not part of the Check Digit Calculation.,

For either method of calculating the Check Digit use the 14-Digit ID Key option.

For a description of the number structure, see "Numbering Trade Items" on page 17.





AI (02) - Identification of Trade Items Contained in a Logistic Unit

Data Format n14

Data Title CONTENT

AI	GTIN of the Contained Trade Items	Check Digit
02	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

TABLE 33 AI (02) Structure

AI (02) 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 GTIN.

The GTIN of the Contained Trade Items represents the identification number of the highest level of trade item contained in the logistic unit. If the GTIN of the contained trade items is a GTIN-12 or GTIN-13, add either one or two filler zeros respectively to increase to a fourteen-digit number.

The Check Digit is mathematically calculated and ensures the whole number is correct. Correct calculation is essential for successful scanning of the bar code symbol.

A Check Digit Calculator Program which will automatically calculate the Check Digit can be obtained from the GS1 Australia web site at www.gs1au.org/services/calculator/_calculator.asp

For instruction on manually calculating the Check Digit please refer to Appendix A on page 206.

Note: The AI (02) is not part of the Check Digit Calculation.,

For either method of calculating the Check Digit use the 14-Digit ID Key option.

AI (02) must always be followed with AI (37) - Quantity. It is also a requirement that this AI must be used in conjunction with AI (00) - Serial Shipping Container Code. AI (02) should never appear on a unit that already carries a unique GTIN.

For more information on numbering logistic units refer to "Numbering and Bar Coding Logistic Units" on page 62.





AI (10) - Batch or Lot Number

Data Format an..20

Data Title BATCH/LOT

AI	Batch or Lot Number
10	$a_{n_1} - \text{variable} - a_{n_{20}}$

TABLE 34 AI (10) Structure

Assign AI (10) to identify a batch or lot number. The batch number may refer to either the trade item itself or to items contained. You can use up to twenty alphabetic and/or numeric characters, not including the AI.

Examples of information you can include in AI (10) are:

- production line numbers
- shift numbers
- time of production

Any internal structures encoded into a batch or lot number need not be used by a company other than the one creating the number. Other companies must use the complete number to identify the batch or lot number unambiguously. This is particularly important in situations such as a product recall.

AI (10) must always be used in conjunction with AI (01) - Global Trade Item Number (GTIN), or with the combined AI (02) - GTIN of Trade Items Contained in a Logistic Unit and AI (37) - Count of Trade Items Contained in a Logistic Unit.

AI (10) and AI (23n) - Lot Numbers must not be used on the same trade item at the same time.





AI (11) - Production Date

Data Format n6 (YYMMDD)

Data Title PROD DATE

AI	Year	Month	Day
11	n ₁ n ₂	n ₃ n ₄	n ₅ n ₆

TABLE 35 AI (11) Structure

Assign AI (11) to identify the production date. This is the production or assembly date determined by the manufacturer. The date may refer to the trade item itself or to items contained.

The standard length of a date is six digits, in the format year, month, day (YYMMDD). Please see “Calculation of Year” on page 85 for more information.

AI (11) must always be used in conjunction with AI (01) - Global Trade Item Number (GTIN), or with the combined AI (02) - GTIN of Trade Items Contained in a Logistic Unit and AI (37) - Count of Trade Items Contained in a Logistic Unit.

AI (12) - Due Date for Amount on Payment Slip

Data Format n6 (YYMMDD)

Data Title DUE DATE

AI	Year	Month	Day
12	n ₁ n ₂	n ₃ n ₄	n ₅ n ₆

TABLE 36 AI (12) Structure

Assign AI (12) to identify the date by which the invoice should be paid.

The standard length of a date is six digits, in the format year, month, day (YYMMDD).

Since this information is an attribute of a Payment Slip Reference Number and the Global Location Number (GLN) of the invoicing party, it must always be used in conjunction with AI (8020) - Payment Slip Reference and AI (415) - Global Location Number of the Invoicing Party.





AI (13) - Packaging Date

Data Format n6 (YYMMDD)

Data Title PACK DATE

AI	Year	Month	Day
13	n ₁ n ₂	n ₃ n ₄	n ₅ n ₆

TABLE 37 AI (13) Structure

Assign AI (13) to identify the packaging date. This 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 standard length of a date is six digits, in the format year, month, day (YYMMDD).

AI (13) must always be used in conjunction with AI (01) - Global Trade Item Number (GTIN), or with the combined AI (02) - GTIN of Trade Items Contained in a Logistic Unit and AI (37) - Count of Trade Items Contained in a Logistic Unit

AI (15) - Best Before Date

Data Format n6 (YYMMDD)

Data Title BEST BEFORE or SELL BY

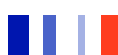
AI	Year	Month	Day
15	n ₁ n ₂	n ₃ n ₄	n ₅ n ₆

TABLE 38 AI (15) Structure

Assign AI (15) to indicate the best before date for the ideal consumption or best effective use date of a product. This is a statement about the quality of the trade item, and may also be referred to as a sell by date or minimum durability date.

The standard length of a date is six digits, in the format year, month, day (YYMMDD).

AI (15) must always be used in conjunction with AI (01) - Global Trade Item Number (GTIN), or with the combined AI (02) - GTIN of Trade Items Contained in a Logistic Unit and AI (37) - Count of Trade Items Contained in a Logistic Unit.





AI (17) - Expiration Date

Data Format n6 (YYMMDD)

Data Title USE BY or EXPIRY

AI	Year	Month	Day
17	n ₁ n ₂	n ₃ n ₄	n ₅ n ₆

TABLE 39 AI (17) Structure

Assign AI (17) to indicate an expiration date, a date that determines the limit of consumption or use of a trade item. It is a statement about public safety and is often referred to as a use by date or maximum durability date.

The standard length of a date is six digits, in the format year, month, day (YYMMDD).

AI (17) must always be used in conjunction with AI (01) - Global Trade Item Number (GTIN), or with the combined AI (02) - GTIN of Trade Items Contained in a Logistic Unit and AI (37) - Count of Trade Items Contained in a Logistic Unit

AI (20) - Product Variant

Data Format n2

Data Title VARIANT

AI	Variant Number
20	n ₁ n ₂

TABLE 40 AI (20) Structure

Assign AI (20) to a variant of a standard trade item. Use AI (20) only when the variation is not sufficiently significant to require a change in the item reference encoded in the GTIN.

The variant number is assigned by the manufacturer. It forms a subsidiary numbering facility that can be used in addition to the item identification number and allows the creation of 100 variants of a particular trade item. Do not, however, use a product variant number previously used as a different variant of the same trade item until the number has been discontinued for the last twelve months.

The AI (20) minimises the number of different GTIN numbers used to identify non-retail trade items, and enables companies to differentiate between minor trade item variants. Example, some types of promotions which do not require the allocation of a different GTIN, minor packaging design changes, side loading as opposed to top loading cases.

The product variant is only for use by the manufacturer and not for the identification of a trade item in dealings with business partners. Outside of the applying company, it is decoded and ignored.

AI (20) must always be used in conjunction with AI (01) - Global Trade Item Number (GTIN), or with the combined AI (02) - GTIN of Trade Items Contained in a Logistic Unit and AI (37) - Count of Trade Items Contained in a Logistic Unit.





AI (21) - Serial Number

Data Format an..20

Data Title SERIAL

AI	Serial Number
21	an ₁ – variable – an ₂₀

TABLE 41 AI (21) Structure

Assign AI (21) to identify a serial number.

A serial number is a unique alpha or alpha-numeric number assigned by a company to an entity for its lifetime. Combined with a GTIN the serial number uniquely identifies each individual trade item. Use any structure to generate the serial number. However, it must be possible for any company to use the combination GTIN/serial number for identifying a specific trade item, regardless of the actual structure of the number.

AI (21) must always be used in conjunction with AI (01) - Global Trade Item Number (GTIN).

AI (22) - Secondary Data for Specific Health Industry Products (HIBCC)

Data Format an..29

Data Title QTY/DATE/BATCH

AI	Secondary Data Fields
22	an ₁ – variable – an ₂₉

TABLE 42 AI (22) - Secondary Data for Specific Health Industry Products

Assign AI (22) to indicate a specific HIBCC Alternate Secondary Data Structure. This data structure includes an optional quantity field, an optional data field, a lot/batch or serial number, and a link character.

The specification of the data structure is described in the “Health Industry Bar Code Supplier Labelling Standard” which can be obtained from the Health Industry Business Communications Council in the USA. Contact GS1 Australia for the address.

AI (22) must always be used in conjunction with the GTIN.

This AI must not be used in conjunction with AI (10) - Batch or Lot Number, AI (17) - Expiration Date, AI (21) - Serial Number, AI (23n) - Lot Number, or AI (30) - Variable Count on the same item/unit at the same time.

This application is used in the USA as an addition to the GTIN for hospital pack pharmaceuticals. It was developed to accommodate an existing, non-GS1 System, standard used for specific healthcare products in the USA. AI (22) is not recommended for new applications or other industries. The use of AI (17) - Expiration Date and AI (10) - Batch or Lot Number is recommended instead.





AI (23n) - Lot Numbers (Withdrawn)

Data Format n..19

Data Title BATCH/LOT

AI	Lot Number
23n	$n_1 - \text{variable} - n_{19}$

TABLE 43 AI (23n) Structure (Withdrawn)

AI (23n) has been withdrawn and is no longer available for use.

Companies currently using this AI should now have transitioned to AI (10) - Batch or Lot Number for use in all applications that require batch or lot numbers.

AI (240) - Additional Product Identification Assigned by the Manufacturer

Data Format an..30

Data Title ADDITIONAL ID

AI	Additional Item Identification
240	$a n_1 - \text{variable} - a n_{30}$

TABLE 44 AI (240) Structure

AI (240) is used for the coding of additional item identification assigned by the manufacturer.

The data is structured at the discretion of the issuing company. The purpose of AI (240) is to enable identification data other than the GTIN to be represented in an GS1 bar code symbol. It is a cross-reference to previously used catalogue numbers. The additional item identification is considered as an attribute of the GTIN e.g. to facilitate migration to the GS1 system during a transitional period. However, it must not be used to replace the GTIN.

AI (240) must always be used in conjunction with AI (01) - Global Trade Item Number (GTIN), or with the combined AI (02) - GTIN of Trade Items Contained in a Logistic Unit and AI (37) - Count of Trade Items Contained in a Logistic Unit.





AI (241) - Customer Part Number

Data Format an..30

Data Title CUST. PART NO.

AI	Customer Part Number
241	$a_{n_1} - \text{variable} - a_{n_{30}}$

TABLE 45 AI (241) Structure

The purpose of AI (241) is to enable identification data other than the GTIN to be represented in an GS1 Bar Code Symbol. It is only to be used between trading partners that are currently using the customer part number for ordering and have agreed to a timetable to convert to the GTIN for their business purposes. The use of the GTIN and the AI (241) on the trade items is for transitional use while the conversion is taking place. The customer part number must not be used to replace the GTIN.

The customer part number is structured at the discretion of the purchaser of the goods.

AI (241) must always be used in conjunction with AI (01) - Global Trade Item Number (GTIN), or with the combined AI (02) - GTIN of Trade Items Contained in a Logistic Unit and AI (37) - Count of Trade Items Contained in a Logistic Unit.

AI (250) - Secondary Serial Number

Data Format an..30

Data Title SECONDARY SERIAL

AI	Secondary Serial Number
250	$a_{n_1} - \text{variable} - a_{n_{30}}$

TABLE 46 AI (250) Structure

While the serial number encoded using AI (21) contains the serial number of the trade item/s, AI (250) is assigned to the coding of the serial number of one of the components of that item.

The secondary serial number may be generated from the primary serial number of the main trade item.

The issuer of the number should define detailed rules for using it. For example, the electronics industry could assign AI (250) to the identification of a chassis serial number.

It is the issuer's responsibility to associate the secondary serial number with the primary item identification number of the trade item to which it relates. Use of this AI in an open environment does not guarantee a unique and unambiguous secondary serial number.

AI (250) must always be used in conjunction with AI (01) - Global Trade Item Number (GTIN) and AI (21) - Serial Number.





AI (251) - Reference to Source Entity

Data Format an..30

Data Title REF. TO SOURCE

AI	Reference to Source Entity
251	$a n_1 - \text{variable} - a n_{30}$

TABLE 47 AI (251) Structure

Use AI (251) to refer back to the original item the trade item was derived from.

For example, this may be useful for tracking the original animal from which a carcass of beef is derived. In the event that the original animal was found to be contaminated, all derived products could be isolated.

It may 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.

AI (251) must always be used in conjunction with the GTIN of the trade item.

AI (253) - Global Document Type Identifier (GDTI)

Data Format n13+n..17

Data Title DOC. ID

AI	GS1 Company Prefix	Document Type	Check Digit	Serial Component (Optional)
253	$n_1 n_2 n_3 n_4 n_5 n_6 n_7 n_8 n_9 n_{10} n_{11} n_{12}$		n_{13}	$n_1 - \text{variable} - n_{17}$

TABLE 48 AI (253) Structure

Assign AI (253) to identify a Global Document Type Identifier (GDTI).

The number is formed with your allocated GS1 Company Prefix, the document type reference which is assigned by the document user, and the Check Digit. The number is allocated in the same way as you allocate a number for a retail trade item. Refer to "Numbering Trade Items" on page 17.

If you have obtained a prefix to allocate twelve-digit GTINs either directly from GS1 US or via GS1 Australia, you must add a filler zero to the front of the prefix, after the Application Identifier.

The optional serial component is assigned to a single document for its lifetime. When combined with a GDTI it uniquely identifies an individual document. The serial component field is numeric and may contain up to seventeen digits. The issuer of the document determines the serial component.





AI (30) - Variable Count

Data Format n..8

Data Title VAR. COUNT

AI	Count of Items
30	$n_1 - \text{variable} - n_8$

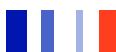
TABLE 49 AI (30) Structure

Assign AI (30) to identify the number of items contained in a Variable Measure Trade Item.

AI (30) must not be used to indicate the contained quantity of a Fixed Measure Trade Item. However, if this AI appears on a Fixed Measure Trade Item (in error) it should not invalidate the item identification but should be treated as redundant data.

In order to generate a short bar code symbol, always enter an even number of digits in the data field by inserting a leading zero.

AI (30) must always be used in conjunction with AI (01) - Global Trade Item Number (GTIN) and a variable measure GTIN (a GTIN-14 starting with 9), or AI (02) - GTIN of Trade Items Contained in a Logistic Unit, a variable measure GTIN, and AI (37) - Count of Trade Items Contained in a Logistic Unit.





AI (310n) - Net Weight – Kilograms – Trade

Data Format n6

Data Title NET WEIGHT (kg)

AI	Value
310n	n ₁ n ₂ n ₃ n ₄ n ₅ n ₆

TABLE 50 AI (310n) Structure

Assign AI (310n) to identify the net weight in kilograms of a trade item. Use this weight in trading transactions as the basis for calculating the invoice amount.

The fourth digit in the AI represents the decimal point indicator, which shows where the decimal point belongs in the actual encoded measurement. The decimal point indicator is also called the “inverse exponent.”

Determine the value expressed of the fourth digit in the AI by dividing the encoded value by 10 to the exponent indicated by the decimal point indicator. For example:

$$(3100)000035 = 000035\text{kg} = 35\text{kg}$$

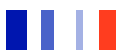
$$(3103)000035 = 0000\overset{3}{\underset{2}{\underset{1}{3}}}\text{5kg} = 0.035\text{kg} = 35\text{g}$$

In other words, starting at the very right of the measurement data field, count to the left between the digits by the amount stated in the decimal point indicator. Place the decimal point between the two digits where you finish counting.

Note: That in the final expanded measurement, the decimal point may appear before the field of six digits, for example:

$$(3109)000035 = 0.\overset{9}{\underset{8}{\underset{7}{\underset{6}{\underset{5}{\underset{4}{\underset{3}{\underset{2}{\underset{1}{3}}}\text{5}}}\text{kg}$$

AI (310n) must always be used in conjunction with AI (01) - Global Trade Item Number (GTIN) and a variable measure GTIN (a GTIN-14 starting with 9), or AI (02) - GTIN of Trade Items Contained in a Logistic Unit, a variable measure GTIN, and AI (37) - Count of Trade Items Contained in a Logistic Unit.





AI (311n) - Length or First Dimension – Metres – Trade

Data Format n6

Data Title LENGTH (m)

AI	Value
311n	n ₁ n ₂ n ₃ n ₄ n ₅ n ₆

TABLE 51 AI (311n) Structure

Assign AI (311n) to identify the length in metres, or the maximum horizontal dimension, of a trade item placed in its normal position.

For further information on the fourth digit (n), please refer to page 108.

AI (311n) must always be used in conjunction with AI (01) - Global Trade Item Number (GTIN) and a variable measure GTIN (a GTIN-14 starting with 9,) or AI (02) - GTIN of Trade Items Contained in a Logistic Unit, a variable measure GTIN, and AI (37) - Count of Trade Items Contained in a Logistic Unit.

AI (312n) - Width, Diameter or Second Dimension – Metres – Trade

Data Format n6

Data Title WIDTH (m)

AI	Value
312n	n ₁ n ₂ n ₃ n ₄ n ₅ n ₆

TABLE 52 AI (312n) Structure

Assign AI (312n) to identify the width, diameter, or second dimension of a trade item in metres.

For further information on the fourth digit (n), please refer to page 108.

AI (312n) must always be used in conjunction with AI (01) - Global Trade Item Number (GTIN) and a variable measure GTIN (a GTIN-14 starting with 9).





AI (313n) - Depth, Thickness, Height or Third Dimension – Metres – Trade

Data Format n6

Data Title HEIGHT (m)

AI	Value
313n	n ₁ n ₂ n ₃ n ₄ n ₅ n ₆

TABLE 53 AI (313n) Structure

Assign AI (313n) to identify the depth, thickness, height, or third dimension of a trade item in metres.

For further information on the fourth digit (n), please refer to page 108.

AI (313n) must always be used in conjunction with AI (01) - Global Trade Item Number (GTIN) and a variable measure GTIN (a GTIN-14 starting with 9).

AI (314n) - Area – Square Metres – Trade

Data Format n6

Data Title AREA (m²)

AI	Value
314n	n ₁ n ₂ n ₃ n ₄ n ₅ n ₆

TABLE 54 AI (314n) Structure

Assign AI (314n) to identify the area, in square metres of a trade item, normally arrived at by multiplying the length by the width.

For further information on the fourth digit (n), please refer to page 108.

AI (314n) must always be used in conjunction with AI (01) - Global Trade Item Number (GTIN) and a variable measure GTIN (a GTIN-14 starting with 9), or AI (02) - GTIN of Trade Items Contained in a Logistic Unit, a variable measure GTIN, and AI (37) - Count of Trade Items Contained in a Logistic Unit.





AI (315n) - Net Volume – Litres – Trade

Data Format n6

Data Title NET VOLUME (l)

AI	Value
315n	n ₁ n ₂ n ₃ n ₄ n ₅ n ₆

TABLE 55 AI (315n) Structure

Assign AI (315n) to identify the net volume of a trade item in litres.

For further information on the fourth digit (n), please refer to page 108.

AI (315n) must always be used in conjunction with AI (01) - Global Trade Item Number (GTIN) and a variable measure GTIN (a GTIN-14 starting with 9), or AI (02) - GTIN of Trade Items Contained in a Logistic Unit, a variable measure GTIN, and AI (37) - Count of Trade Items Contained in a Logistic Unit.

AI (316n) - Net Volume – Cubic Metres – Trade

Data Format n6

Data Title NET VOLUME (m³)

AI	Value
316n	n ₁ n ₂ n ₃ n ₄ n ₅ n ₆

TABLE 56 AI (316n) Structure

Assign AI (316n) to identify the net volume of a trade item in cubic metres, or the measurement normally arrived at by multiplying the maximum length, width, and height of a trade item.

For further information on the fourth digit (n), please refer to page 108.

AI (316n) must always be used in conjunction with AI (01) - Global Trade Item Number (GTIN) and a variable measure GTIN (a GTIN-14 starting with 9), or AI (02) - GTIN of Trade Items Contained in a Logistic Unit, a variable measure GTIN, and AI (37) - Count of Trade Items Contained in a Logistic Unit.





AI (330n) - Gross Weight – Kilograms – Logistic

Data Format n6

Data Title GROSS WEIGHT (kg)

AI	Value
330n	n ₁ n ₂ n ₃ n ₄ n ₅ n ₆

TABLE 57 AI (330n) Structure

Assign AI (330n) to identify the gross weight of a logistic unit (the weight of the goods includes the packaging).

For further information on the fourth digit (n), please refer to page 108.

The AI (330n) must always be used in conjunction with AI (01) - Global Trade Item Number (GTIN) and a variable measure GTIN (a GTIN-14 starting with 9), or AI (00) - Serial Shipping Container Code (SSCC).

AI (331n) - Length or First Dimension – Metres – Logistic

Data Format n6

Data Title LENGTH (m), log

AI	Value
331n	n ₁ n ₂ n ₃ n ₄ n ₅ n ₆

TABLE 58 AI (331n) Structure

Assign AI (331n) to identify the length or first dimension of a logistic unit in metres, or the maximum horizontal dimension of a trade item placed in its normal position.

For further information on the fourth digit (n), please refer to page 108.

AI (331n) must always be used in conjunction with AI (01) - Global Trade Item Number (GTIN) and a variable measure GTIN (a GTIN-14 starting with 9), or AI (00) - Serial Shipping Container Code (SSCC).





AI (332n) - Width, Diameter or Second Dimension – Metres – Logistic

Data Format n6

Data Title WIDTH (m), log

AI	Value
332n	n ₁ n ₂ n ₃ n ₄ n ₅ n ₆

TABLE 59 AI (332n) Structure

Assign AI (332n) to identify the width, diameter, or the second dimension of a logistic unit in metres.

For further information on the fourth digit (n), please refer to page 108.

AI (332n) must always be used in conjunction with AI (01) - Global Trade Item Number (GTIN) and a variable measure GTIN (a GTIN-14 starting with 9), or AI 00 - Serial Shipping Container Code (SSCC).

AI (333n) - Depth, Thickness, Height or Third Dimension – Metres – Logistic

Data Format n6

Data Title HEIGHT (m), log

AI	Value
333n	n ₁ n ₂ n ₃ n ₄ n ₅ n ₆

TABLE 60 AI (333n) Structure

Assign AI (333n) to identify the depth, thickness, height or third dimension of a logistic unit in metres.

For further information on the fourth digit (n), please refer to page 108.

AI (333n) must always be used in conjunction with AI (01) - Global Trade Item Number (GTIN) and a variable measure GTIN (a GTIN-14 starting with 9), or AI (00) - Serial Shipping Container Code (SSCC).





AI (334n) - Area – Square Metres – Logistic

Data Format n6

Data Title AREA (m²), log

AI	Value
334n	n ₁ n ₂ n ₃ n ₄ n ₅ n ₆

TABLE 61 AI (334n) Structure

Assign AI (334n) to identify the area, in square metres of a logistic unit, normally arrived at by multiplying the length by the width.

For further information on the fourth digit (n), please refer to page 108.

AI (334n) must always be used in conjunction with AI (01) - Global Trade Item Number (GTIN) and a variable measure GTIN (a GTIN-14 starting with 9), or AI (00) - Serial Shipping Container Code (SSCC).

AI (335n) - Gross Volume – Litres – Logistic

Data Format n6

Data Title VOLUME (l), log

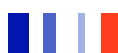
AI	Value
335n	n ₁ n ₂ n ₃ n ₄ n ₅ n ₆

TABLE 62 AI (335n) Structure

Assign AI (335n) to identify gross volume in litres of a logistic unit.

For further information on the fourth digit (n), please refer to page 108.

AI (331n) must always be used in conjunction with AI (01) - Global Trade Item Number (GTIN) and a variable measure GTIN (a GTIN-14 starting with 9), or AI (00) - Serial Shipping Container Code (SSCC).





AI (336n) - Gross Volume – Cubic Metres – Logistic

Data Format n6

Data Title VOLUME (m³), log

AI	Value
336n	n ₁ n ₂ n ₃ n ₄ n ₅ n ₆

TABLE 63 AI (336n) Structure

Assign AI (336n) to identify the gross volume in cubic metres, or the measurement normally arrived at by multiplying the maximum length, width, and height, of a logistics item.

For further information on the fourth digit (n), please refer to page 108.

AI (336n) must always be used in conjunction with AI (01) - Global Trade Item Number (GTIN) and a variable measure GTIN (a GTIN-14 with 9), or AI (00) - Serial Shipping Container Code (SSCC).

AI (337n) - Kilograms Per Square Metre

Data Format n6

Data Title KG PER m²

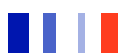
AI	Value
337n	n ₁ n ₂ n ₃ n ₄ n ₅ n ₆

TABLE 64 AI (337n) Structure

Assign AI (337n) to indicate that the encoded data represents an exact measure of the kilograms per square metre of the trade item.

For further information on the fourth digit (n), please refer to page 108.

AI (337n) must always be associated with AI (01) - Global Trade Item Number (GTIN)





AI (37) - Count of Trade Items Contained in a Logistic Unit

Data Format n..8

Data Title COUNT

AI	Count of Trade Items
37	n ₁ – variable – n ₈

TABLE 65 AI (37) Structure

Assign AI (37) to identify the number of trade items contained within a logistic unit.

AI (37) is not stand alone and must only ever be used in conjunction with AI (02) - GTIN of Trade Items Contained within a Logistic Unit and AI (00) - Serial Shipping Container Code (SSCC).

AI (390n) - Amount Payable - Single Monetary Area

Data Format n..15

Data Title AMOUNT

AI	Applicable Amount Payable
390n	n ₁ – variable – n ¹⁵

TABLE 66 AI (390n) Structure

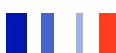
Use AI (390n) to identify the amount payable of a payment slip expressed in the local currency.

To aid unambiguous processing AI (391n) should be used to indicate the currency in which the amount is expressed.

The fourth digit in the AI, “n”, indicates the implied decimal point position where, for example, the digit zero (0) means that there is no decimal point and the digit one (1) means that the decimal point is before the last position of the amount payable.

This information is an attribute to the payment slip reference number and the Global Location Number (GLN) and therefore must always be used in conjunction with AI (8020) - Payment Slip Reference and AI (415) - Global Location Number of the Invoicing Party.

As only one amount payable may be applied on a payment slip this must not be associated with AI (391n) - Amount Payable - With ISO Country Code.





AI 391n - Amount Payable - With ISO Currency Code

Data Format n3+n..15

Data Title AMOUNT

AI	ISO Currency Code	Applicable Amount Payable
391n	n ₁ n ₂ n ₃	n ₄ – variable – n ₁₈

TABLE 67 AI (391n) Structure

Use AI (391n) to encode the amount payable of a payment slip which is expressed in the indicated currency.

The fourth digit in the AI, “n”, indicates the implied decimal point position where, for example, the digit zero (0) means that there is no decimal point and the digit one (1) means that the decimal point is before the last position of the amount payable.

The data consists of the three-digit ISO country code using the ISO 4217 standard followed by the applicable amount payable.

This information is an attribute of the payment slip reference number and the Global Location Number (GLN) and therefore must always be used in conjunction with the AI (8020) - Payment Slip Reference and AI (415) - Global Location Number of the Invoicing Party.

As only one amount payable may be applied on a payment slip this must not be associated with AI (390n) - Amount Payable - Single Monetary Area.

AI (392n) - Amount Payable for a Variable Measure Trade Item – Single Monetary Area

Data Format n..15

Data Title PRICE

AI	Applicable Amount Payable
392n	n ₁ – variable – n ₁₅

TABLE 68 AI (392n) Structure

Use AI (392n) to encode the amount payable in a single monetary area for a trade item which carries a variable measure GTIN, expressed in local currency.

The fourth digit in the AI, “n”, indicates the implied decimal point position where, for example, the digit zero (0) means that there is no decimal point and the digit one (1) means that the decimal point is before the last position of the amount payable.

AI (392n) is used as an attribute to a Variable Measure Trade Item, and therefore must always be used in conjunction with a variable measure GTIN (a GTIN-14 starting with 9).





AI (393n) - Amount Payable for a Variable Measure Trade Item and ISO Currency Code

Data Format n3+n..15

Data Title PRICE

AI	ISO Currency Code	Applicable Amount Payable
393n	n ₁ n ₂ n ₃	n ₄ – variable – n ₁₈

TABLE 69 AI (393n) Structure

Use AI (393n) to encode the amount payable with ISO currency code for a Variable Measure Trade Item expressed in the indicated currency. The data consists of the three-digit ISO code from the ISO/IEC 4217 standard to indicate the currency followed by the actual amount payable.

The fourth digit in the AI, “n”, indicates the implied decimal point position where, for example, the digit zero (0) means that there is no decimal point and the digit one (1) means that the decimal point is before the last position of the amount payable.

AI (393n) is used as an attribute to a variable measure trade item, and therefore must always be used in conjunction with a variable measure GTIN (a GTIN-14 starting with 9).

AI (400) - Customer's Purchase Order Number

Data Format an..30

Data Title ORDER NO.

AI	Customer's Purchase Order Number
400	n ₁ – variable – n ₃₀

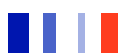
TABLE 70 AI (400) Structure

Assign AI (400) to identify the customer's purchase order number or the number assigned by the buyer to an order. It may also include release and line numbers at the discretion of the issuer.

Representing the purchase order number in bar code symbol form allows you to check receipts of goods and automatically match the trade items to a delivery note and/or purchase order. In addition, it can facilitate more accurate invoice matching procedures.

AI (400) may be processed as stand-alone information where applicable or processed with the identification data of the same unit.

AI (400) and its associated data must be removed from the unit before the unit leaves the premises of the customer.





AI (401) - Consignment Number

Data Format an..30

Data Title CONSIGNMENT

AI	GS1 Company Prefix →	Consignment Information →
401	$n_1 - n_g$	$a_{n_{g+1}} - \text{variable length} - a_{n_h} (h \leq 30)$

TABLE 71 AI (401) Structure

AI (401) is assigned to identify 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.

- A freight forwarder 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 is a party that undertakes the transportation of goods from one point to another
- A consignor is the party that sends the goods

Normally AI (400) is used in conjunction with AI (00) - Serial Shipping Container Code (SSCC). The SSCC individually identifies each parcel being part of a shipment. The consignment number may be marked on the different components of a shipment to provide a common reference.

The GS1 or U.P.C. Company Prefix used is the one belonging to the carrier.

If you have obtained a prefix to allocate twelve-digit GTINs either directly from GS1 US or via GS1 Australia, you must add a filler zero to the front of the prefix, after the Application Identifier.

The Consignment Information is assigned at the discretion of the organisation issuing the number.

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, previous consignment data must be removed from the physical units.





AI (402) - Shipment Identification Number

Data Format n17

Data Title SHIPMENT NO.

AI	GS1 Company Prefix	Shipper Reference	Check Digit
402	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

TABLE 72 AI (402) Structure

The Shipment Identification Number 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.

The GS1 Company Prefix used is the one belonging to the consignor.

If you have obtained a prefix to allocate twelve-digit GTINs either directly from GS1 US or via GS1 Australia, you must add a filler zero to the front of the prefix, after the Extension Digit.

The Shipper Reference is assigned by the consignor. It is recommended that numbers are allocated sequentially.

The Check Digit is mathematically calculated and ensures the whole number is correct. Correct calculation is essential for successful scanning of the bar code symbol.

A Check Digit calculator program which will automatically calculate the Check Digit can be obtained from the GS1 Australia web site at www.gs1au.org.

For instruction on manually calculating the Check Digit please refer to Appendix A on page 206.

Note: The AI (402) is not part of the Check Digit Calculation.

For either method of calculating the Check Digit add a filler zero to the front of the number and use the 18-Digit ID Key option.

The shipment identification number may be processed as stand alone information where applicable or with the identification data appearing on the same unit.





AI (403) - Routing Code

Data Format an..30

Data Title ROUTE

AI	Routing Code
403	$a n_1 - \text{variable} - a n_{30}$

TABLE 73 AI (403) Structure

Assign AI (403) to encode data which represents the routing code as determined by the transport company.

AI (403) is an attribute to the Serial Shipping Container Code (SSCC) and is intended to provide a migration path to the adoption of a yet-to-be-defined international solution.

The routing code must not be used to encode information which could be encoded in a separate AI (such as a Ship to Postal Code).

The routing code's contents and structure are at the discretion of the parcel carrier issuing the code. If a parcel carrier wishes to enter co-operative agreements with other parcel carriers, then a mutually agreed indicator is required to indicate the structure of the routing code.

AI (403) is an attribute to the SSCC it must be used in conjunction with AI (00) - Serial Shipping Container Code (SSCC).

AI (410) - Ship To – Deliver To Global Location Number (GLN)

Data Format n13

Data Title SHIP TO LOC.

AI	GS1 Company Prefix	Location Reference	Check Digit
410	$n_1 n_2 n_3 n_4 n_5 n_6 n_7 n_8 n_9 n_{10} n_{11} n_{12}$		n_{13}

TABLE 74 AI (410) Structure

Assign AI (410) to indicate the GLN of the party to which goods should be delivered. This data may be processed independently or together with related identifications.





AI (411) - Bill To – Invoice To Global Location Number (GLN)

Data Format n13

Data Title BILL TO

AI	GS1 Company Prefix	Location Reference	Check Digit
411	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

TABLE 75 AI (411) Structure

Assign AI (411) to indicate the GLN identifying the party to whom an invoice is issued.

AI (412) - Purchased from Global Location Number (GLN)

Data Format n13

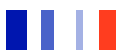
Data Title PURCHASE FROM

AI	GS1 Company Prefix	Location Reference	Check Digit
412	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

TABLE 76 AI (412) Structure

Assign AI (412) to indicate the GLN of the company from which the respective trade item has been purchased.

This data may be processed independently or together with related identifications.





AI 413 - Ship For – Deliver For – Forward to Global Location Number (GLN)

Data Format n13

Data Title SHIP FOR LOC.

AI	GS1 Company Prefix	Location Reference	Check Digit
413	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	

TABLE 77 AI (413) Structure

AI (413) contains the GLN of the internal or subsequent final destination of a physical unit. This AI can be used in conjunction with AI (410) - Ship To, where the Ship-To GLN identifies the location of the intermediary destination such as a warehouse or cross docking station.

This data may be processed independently or together with related identifications.

Note: This data is for the internal use of the consignee and is not to be used by the carrier.

AI (414) - Identification of a Physical Location – Global Location Number (GLN)

Data Format n13

Data Title LOC. NO.

AI	GS1 Company Prefix	Location Reference	Check Digit
414	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	

TABLE 78 AI (414) Structure

AI (414) is assigned to identify the GLN of a physical location. The bar code symbol encoding AI (414) and the GLN will normally be fixed to the physical location being identified.





AI (415) - Global Location Number of the Invoicing Party

Data Format n13

Data Title PAY TO

AI	GS1 Company Prefix	Location Reference	Check Digit
415	$n_1 n_2 n_3 n_4 n_5 n_6 n_7 n_8 n_9 n_{10} n_{11} n_{12}$		n_{13}

TABLE 79 AI (415) Structure

Assign AI (415) to identify the GLN of the invoicing party to be used on a payment slip. This AI and its associated data are mandatory information for use on a payment slip. Together with AI (8020) - Payment Slip Reference Number, it identifies a payment slip uniquely.

AI (415) must always be used in conjunction with AI (8020) - Payment Slip Reference.

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

Data Format an..20

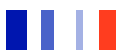
Data Title SHIP TO POST

AI	Postal Code
420	$a_{n_1} - \text{variable} - a_{n_{20}}$

TABLE 80 AI (420) Structure

Assign AI (420) to indicate the postal code of the party to which goods should be delivered. It is assumed that the “ship from” and “ship to” parties are located under the same postal authority.

AI (420) cannot be used in conjunction with AI (421) on the same unit at the same time.





AI (421) - Ship to – Deliver to Postal Code With Three-Digit ISO Country Code

Data Format n3+an..9

Data Title SHIP TO POST

AI	ISO Country Code	Postal Code
421	n ₁ n ₂ n ₃	an ₄ – variable – an ₁₃

TABLE 81 AI (421) Structure

Assign AI (421) to indicate the ISO country code and the postal code of the party to which goods should be delivered. It is assumed that the “ship from” and “ship to” parties are located under different postal authorities.

Use the country codes established in the International Standards ISO 3166.

AI (421) cannot be used in conjunction with AI (420) on the same unit at the same time.

AI (422) - Country of Origin of a Trade Item

Data Format n3

Data Title ORIGIN

AI	ISO Country Code
422	n ₁ n ₂ n ₃

TABLE 82 AI (422) Structure

AI 422 is assigned to identify the country of origin. The country of origin is normally the country in which the goods have been produced or manufactured. However, due to a wide range of definitions for country of origin, it is the manufacturer’s responsibility to ensure that the correct country of origin is assigned.

The country of origin, calculated according to the appropriate rules, is coded according to the three-digit ISO 3166 standards.

AI (422) must always be used in conjunction with AI (01) - Global Trade Item Number (GTIN), or with the combined AI (02) - GTIN of Trade Items Contained in a Logistic Unit and AI (37) - Count of Trade Items Contained in a Logistic Unit.

AI (422) must not be used in conjunction with AI (426) - Country Covering Full Process Chain on the same item at the same time.





AI (423) - Country of Initial Processing

Data Format n3+n..9

Data Title COUNTRY – INITIAL PROCESS.

AI	ISO Country Code(s)
423	n ₁ n ₂ n ₃ ... n ₁₅

TABLE 83 AI (423) Structure

Assign AI (423) to encode the ISO country code(s) of the country or countries of initial processing of the trade item. 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, there may be up to five different countries involved in the initial processing. It is the responsibility of the supplier to allocate the correct country code(s).

The country of origin is coded according to the three-digit ISO 3166 standards.

AI (423) must always be used in conjunction with AI (01) - Global Trade Item Number (GTIN), or with the combined AI (02) - GTIN of Trade Items Contained in a Logistic Unit and AI (37) - Count of Trade Items Contained in a Logistic Unit.

AI (423) must not be used in conjunction with AI (426) - Country Covering Full Process Chain on the same item at the same time.

AI (424) - Country of Processing

Data Format n3

Data Title COUNTRY – PROCESS

AI	ISO Country Code
424	n ₁ n ₂ n ₃

TABLE 84 AI (424) Structure

Assign AI (424) to identify the ISO country code of the country of processing of the trade item. It is the responsibility of the processor of the trade item to allocate the correct country code.

The country of origin is coded according to the three-digit ISO 3166 standards.

AI (424) must always be used in conjunction with AI (01) - Global Trade Item Number (GTIN), or with the combined AI (02) - GTIN of Trade Items Contained in a Logistic Unit and AI (37) - Count of Trade Items Contained in a Logistic Unit.

AI (424) must not be used in conjunction with AI (426) - Country Covering Full Process Chain on the same item at the same time.





AI (425) - Country of Disassembly

Data Format n3

Data Title COUNTRY – DISASSEMBLY

AI	ISO Country Code
425	n ₁ n ₂ n ₃

TABLE 85 AI (425) Structure

Assign AI (425) to identify the ISO country code of the country of disassembly of the trade item. It is the responsibility of the party doing the disassembly of the trade item to allocate the correct country code.

The country of origin is coded according to the three-digit ISO 3166 standards.

AI (425) must always be used in conjunction with AI (01) - Global Trade Item Number (GTIN), or with the combined AI (02) - GTIN of Trade Items Contained in a Logistic Unit and AI (37) - Count of Trade Items Contained in a Logistic Unit.

AI (425) must not be used in conjunction with AI (426) - Country Covering Full Process Chain on the same item at the same time.

AI (426) - Country Covering Full Process Chain

Data Format n3

Data Title COUNTRY – FULL PROCESS

AI	ISO Country Code
426	n ₁ n ₂ n ₃

TABLE 86 AI (426) Structure

Assign AI (426) to identify the ISO country code of the country where all the processing of the trade item took place. 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.

The country of origin is coded according to the three-digit ISO 3166 standards.

AI (426) must always be used in conjunction with AI (01) - Global Trade Item Number (GTIN), or with the combined AI (02) - GTIN of Trade Items Contained in a Logistic Unit and AI (37) - Count of Trade Items Contained in a Logistic Unit.





AI (7001) - NATO Stock Number (NSN)

Data Format n13

Data Title NSN

AI	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

TABLE 87 AI (7001) Structure

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.

This 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.

AI (7001) must always be used in conjunction with AI (01) - Global Trade Item Number (GTIN), or with the combined AI (02) - GTIN of Trade Items Contained in a Logistic Unit and AI (37) - Count of Trade Items Contained in a Logistic Unit.

AI (7002) - UN/ECE Meat Carcasses and Cuts Classification

Data Format an..30

Data Title MEAT CUT

AI	UC/ECE Product Classification
7002	an ₁ – variable – an ₃₀

TABLE 88 AI (7002) Structure

Assign AI (7002) to encode the UN/ECE product classification.

This AI is only for use within the context of UN/ECE standards for the quality of meat carcasses and cuts (bovine, porcine, ovine, and caprine).

AI (7002) must always be used in conjunction with AI (01) - Global Trade Item Number (GTIN), or with the combined AI (02) - GTIN of Trade Items Contained in a Logistic Unit and AI (37) - Count of Trade Items Contained in a Logistic Unit.





AI (703s) - Approval Number of Processor With Three-Digit ISO Country Code

Data Format n3+an..27

Data Title PROCESSOR # s4

AI	ISO Country Code	Approval Number of Processor
703s	n ₁ n ₂ n ₃	an ₄ – variable – an ₃₀

TABLE 89 AI (703s) - Approval Number of Processor with Three-Digit ISO Country Code

The AI (703s) indicates that the data field contains the ISO country code (n3) and approval number of the processor (an..27) of a trade item. As many processors may be involved, each with an individual approval number, the fourth digit of the AI indicates the sequence of the processors. For a typical meat supply chain, the following sequence would be used:

AI (7030)	slaughterhouse
AI (7031)	first deboning/cutting hall
AI (7032) to (7039)	second through ninth processing location (cutting hall)

The approval number of the processor designates the approval number of the company who did the processing. The approval number is usually assigned by a national or pluri-national authority.

AI (703n) must always be used in conjunction with AI (01) - Global Trade Item Number (GTIN), or with the combined AI (02) - GTIN of Trade Items Contained in a Logistic Unit and AI (37) - Count of Trade Items Contained in a Logistic Unit.





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

Data Format n14

Data Title DIMENSIONS

AI	Variable Values of a Roll Product				
8001	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

TABLE 90 AI (8001) Structure

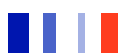
Owing to the method of production, some roll product cannot be numbered according to standard criteria which have been determined in advance. They are, therefore, classified as variable items. For those products where the standard trade measures are not sufficient, the following guidelines should be used.

The identification of a roll product consists of the GTIN and the variable attributes. The basic product (e.g. a certain type of paper) is numbered GTIN-14 and the variables contain information about the special features of the particular trade item that has been produced.

The variable values of a roll product, n₁ to n₁₄, consist of the following data:

- n₁ – n₄ slit width in millimetres (width of roll) 4 digits
- n₅ – n₉ actual length in metres 5 digits
- n₁₀ – n₁₂ internal core diameter in millimetres 3 digits
- n₁₃ winding direction (face out 0, face in 1, undefined 9) 1 digit
- n₁₄ number of splices (0 to 8 = actual number, 9 = number unknown) 1 digit

AI (8001) must always be used in conjunction with AI (01) - Global Trade Item Number (GTIN) and a variable measure GTIN (a GTIN-14 starting with 9).





AI (8002) - Cellular Mobile Telephone Identifier (CMTI)

Data Format an..20

Data Title CMT NO.

AI	Identifier
8002	$a_{n_1} - \text{variable} - a_{n_{20}}$

TABLE 91 AI (8002) Structure

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.

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

The CMTI is usually assigned by a national or pluri-national authority and can be carried by a bar code symbol placed directly on the cellular phone. 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.





AI (8003) - Global Returnable Asset Identifier (GRAI)

Data Format n14+an..16(optional)

Data Title GRAI

AI	GS1 Co. Prefix	Asset Type	Check Digit	Serial Number (Optional)
8003	0 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	a _{n1} – variable – a _{n16}

TABLE 92 AI (8003) Structure

Assign AI (8003) to identify a global returnable asset as a physical item with no reference to the contents.

A returnable asset is a reusable package or transport equipment of a certain value such as a beer keg, gas cylinder, plastic pallet or crate. AI (8003) facilitates the tracking and inventory control of returnable assets.

The GS1 Company Prefix is the one allocated to the owner of the asset.

If the prefix you have been allocated is used to generate thirteen-digit GTINs, add one filler zero to the front of the prefix. If you have obtained a prefix to allocate twelve-digit GTINs, either directly from GS1 US or via GS1 Australia, you must add a filler zero to the front of the prefix.

The Asset Type is a number assigned by the owner of the asset to uniquely identify each type of asset.

The Check Digit is mathematically calculated and ensures the whole number is correct. Correct calculation is essential for successful scanning of the bar code symbol.

A Check Digit Calculator Program which will automatically calculate the Check Digit can be obtained from the GS1 Australia web site at www.gs1au.org.

For instruction on manually calculating the Check Digit please refer to Appendix A on page 206.

Note: The AI (8003) is not part of the Check Digit calculation.

For either method of calculating the Check Digit use the 14-Digit ID Key option.

The Serial Number (optional) is assigned by the owner of the asset. It identifies an individual asset within a given asset type. The field is alphanumeric and variable in length up to 16 characters.

When it is not possible to assign an asset type (e.g. for museum exhibit), 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 AI (8004) - Global Individual Asset Identifier (GIAI), should be used.

For more information on asset numbering refer to "Numbering Assets" on page 78





AI (8004) - Global Individual Asset Identifier (GIAI)

Data Format an..30

Data Title GIAI

AI	GS1 or Company Prefix	Individual Asset Reference
8004	$n_1 - n_g$	$a_{g+1} - \text{variable length} - a_n (h \leq 30)$

TABLE 93 AI (8004) Structure

AI (8004) is assigned for the unique identification of assets to provide a means to store relevant data.

An asset identified by AI (8004) is uniquely identified using the GS1 or U.P.C. Company Prefix and an individual asset reference (serial number). The identification facilitates tracking and inventory control of the unique asset and recording the asset's:

- useable life cycle history
- calibration or test history
- history of the refilling of its contents
- assembled configuration history

AI (8004) may also be used when the combination of AI (01) - Global Trade Item Number (GTIN) and AI (21) - Serial Number is not appropriate. This is the case when no GTIN is available or when the GTIN is irrelevant to the application.

The GS1 Company Prefix is the one allocated to the company assigning the individual asset reference.

If you have obtained a prefix to allocate twelve-digit GTINs either directly from GS1 US or via GS1 Australia, you must add a filler zero to the front of the prefix, after the Application Identifier.

The Individual Asset Reference is allocated and structured at the discretion of the holder of the GS1 or U.P.C. Company Prefix. The data can be alphanumeric, and is of variable length, ensuring that the entire GIAI is not longer than 30 characters.

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 GS1 System recommends that GIAIs be allocated sequentially and not contain classifying elements.

AI (8004) may not be used to replace AI (00) - Serial Shipping Container Code (SSCC) or a GTIN.

For more information on asset numbering refer to "Numbering Assets" on page 78





AI (8005) - Price Per Unit of Measure

Data Format n6

Data Title PRICE PER UNIT

AI	Price Per Unit of Measure
8005	n ₁ n ₂ n ₃ n ₄ n ₅ n ₆

TABLE 94 AI (8005) Structure

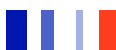
Assign AI (8005) to indicate the price per unit of measure of price marked goods on a Variable Measure Trade Item to discriminate price variants of the same item. It is considered as an attribute of the respective trade item and not as part of its identification.

This AI can be used when manufacturers source-mark the customer retail price on variable weight products, at the request of their customers.

AI (8005) should only be used when the source-marked customer retail price is variable between non-retail trade items.

Content and structure of the price per unit of measure field are left to the discretion of the trading partners.

AI (8005) must always be used in conjunction with AI (01) - Global Trade Item Number (GTIN) and a variable measure GTIN (a GTIN-14 starting with 9), or AI (02) - GTIN of Trade Items Contained in a Logistic Unit, a variable measure GTIN, and AI (37) - Count of Trade Items Contained in a Logistic Unit.





AI (8006) - Identification of the Components of a Trade Item

Data Format n14+n2+n2

Data Title GCTIN

AI	Global Trade Item Number (GTIN)	Relative number of the Component Within the Assembly	Total Number of Components in the Assembly
8006	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

TABLE 95 AI (8006) Structure

AI (8006) identifies a parcel, which is part of an item identified with a GTIN. In some industries (such as furniture), a unit intended to be sold to the final consumer may be composed of several physical parcels. This AI is marked on each individual physical unit of the same retail unit. In shipping or receiving applications, it ensures that all components of the same retail unit are present.

The GTIN is the number under which the whole item is traded.

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.

This AI should never be used on retail units which may be sold separately.

The AI (8006) can never be associated with another GTIN.





AI (8007) - International Bank Account Number (IBAN)

Data Format an..30

Data Title IBAN

AI	International Bank Account Number
8007	$a n_1 - \text{variable} - a n_{30}$

TABLE 96 AI (8007) Structure

Use AI (8007) to indicate the International Bank Account Number (IBAN) as defined in 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.

It indicates the International Bank Account Number to which the amount of the respective payment slip is to be transferred. The invoicing party determines the applicable bank account number.

AI (8007) must always be used in conjunction with AI (8020) - Payment Slip Reference and AI (415) - Global Location Number (GLN) of the Invoicing Party.

AI (8008) - Date and Time of Production

Data Format n8+n..4(optional)

Data Title PROD TIME

AI	YY	MM	DD	HH	MM (Optional)	SS (Optional)
8008	$n_1 n_2$	$n_3 n_4$	$n_5 n_6$	$n_7 n_8$	$n_9 n_{10}$	$n_{11} n_{12}$

TABLE 97 AI (8008) - Date and Time Production

Assign AI (8008) to encode both the date and time of production or assembly as determined by the manufacturer. The date and time may refer to the trade item itself or to the trade items contained.

The standard length of this data is variable up to twelve digits (with eight being mandatory and four being optional) in the format: year, month, day, hour, minutes, seconds (YYMMDDHHMMSS). For year calculation see Figure 17 on page 85.

AI (8008) must always be used in conjunction with AI (01) - Global Trade Item Number (GTIN), or with the combined AI (02) - GTIN of Trade Items Contained in a Logistic Unit and AI (37) - Count of Trade Items Contained in a Logistic Unit.





AI (8018) - Global Service Relation Number (GSRN)

Data Format n18

Data Title Ref No

AI	GS1 or U.P.C. Company Prefix	Service Reference	Check Digit
8018	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

TABLE 98 AI (8018) Structure

Assign AI (8018) to identify a Global Service Relation Number (GSRN).

When this number is used, the service provider must be identified by other means, such as a company card. If security is required, such as for monetary transactions, the security must be provided through other means.

The GS1 or U.P.C. Company Prefix is the one allocated to the service provider.

The Service Reference is structured at the discretion of the company responsible for its assignment (the service provider).

The Check Digit is mathematically calculated and ensures the whole number is correct. Correct calculation is essential for successful scanning of the bar code symbol.

A Check Digit Calculator Program which will automatically calculate the Check Digit can be obtained from the GS1 Australia web site at www.gs1au.org/services/calculator/_calculator.asp

For instruction on manually calculating the Check Digit please refer to Appendix A on page 206.

Note: The AI (8018) is not part of the Check Digit calculation.

For either method of calculating the Check Digit use the 18-Digit ID Key option.

The GSRN must remain unique for a period well beyond the lifetime of the records relevant to this service relationship.





AI (8020) - Payment Slip Reference Number

Data Format an..25

Data Title REF. NO.

AI	Payment Slip Reference Number
8020	$a_{n_1} - \text{variable} - a_{n_{25}}$

TABLE 99 AI (8020) Structure

Assign AI 8020 to identify the Payment Slip Reference Number.

The Payment Slip Reference Number, assigned by the invoicing party, is information identifying a payment slip within a given Global Location Number (GLN) of the invoicing party. Together with the GLN of the invoicing party it identifies a payment slip uniquely.

AI (8020) must be used in conjunction with AI (415) - Global Location Number of the Invoicing Party.

AI (8100) - Coupon Extended Code – U.P.C. Prefix + Offer Code

Data Format n1+n5

AI	U.P.C. Prefix	Offer Code
8100	n_1	$n_2 \ n_3 \ n_4 \ n_5 \ n_6$

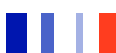
TABLE 100 AI (8100) Structure

AI (8100) identifies the U.P.C. Prefix followed by a five-digit offer code generated by the coupon issuer.

The Offer Code is assigned by the issuer and identifies a particular promotion.

The Coupon Extender code is an attribute always used in conjunction with the GS1 US coupon number.

For more information regarding coupon number please refer to Section 3.10 Coupons on page 43.





AI (8101) - Coupon Extended Code – U.P.C. Prefix + Offer + End of Offer Code

Data Format n1+n5+n4

AI	U.P.C. Prefix	Offer Code	Expiration Date (Month + Year)
8101	n ₁	n ₂ n ₃ n ₄ n ₅ n ₆	n ₇ n ₈ n ₉ n ₁₀

TABLE 101 AI (8101) Structure

AI (8101) identifies the U.P.C. Prefix followed by a five-digit offer code, followed by a four-digit expiration date (MMYY).

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 Coupon Extender code is an attribute always used in conjunction with the GS1 US coupon number.

For more information regarding coupon number please refer to Section 3.10 Coupons on page 43.

AI (8102) - Coupon Extended Code – U.P.C. Prefix

Data Format n1+n1

AI	Filler Digit	U.P.C. Prefix
8102	0	n ₁

TABLE 102 AI (8102) Structure

AI (8102) data consists of the U.P.C. Prefix preceded by a filler zero.

It is an attribute always used in conjunction with the GS1 US coupon number.

For more information regarding coupon number please refer to Section 3.10 Coupons on page 43.





AI (90) - Information Mutually Agreed Between Trading Partners (Including FACT DIs)

Data Format an..30

Data Title INTERNAL

AI	Data field
90	an ₁ – variable – an ₃₀

TABLE 103 AI (90) Structure

AI (90) identifies information of any kind mutually agreed between trading partners with distribution restricted to the trading partners.

Companies may devise their own internal numbering structures of any length up to thirty characters, formed from alphabetic and/or numeric characters.

The bar code symbol containing AI (90) should be removed from any trade item that leaves the jurisdiction of the trading partners.

AI (91) to (99) - Company Internal Information

Data Format an..30

Data Title INTERNAL

AI	Data field
91-99	an ₁ – variable – an ₃₀

TABLE 104 AI (91) to (99) Structure

Assign AIs (91) through (99) to internal applications.

Companies may devise their own internal code structures for their own purposes and encode them together with these AIs at their own discretion. These AIs are not to be used for open trade applications.

As an additional security against ambiguity, these AIs should be removed from any item that leaves the jurisdiction of the company.



9 Bar Code Symbol Printing Considerations



9.1 Introduction

A bar code symbol is a means of representing data in machine readable form. Once a GS1 Identification Key has been allocated by following the guidelines in Chapter 2 Introduction to GS1 Identification Keys on page 12, the next step is to select the bar code symbol type.

While factors such as printing and packaging constraints, scanning environment and item type may have been considered when selecting the correct GS1 ID Key, these factors, along with substrate, need to be considered when selecting the most appropriate bar code symbol type.

As well as using the information provided in this manual, it is also important to consult your printer and packaging designer in regards to printing and packaging considerations that need to be taken into account.

The printer should be consulted 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 the symbol of double ink layer)
- The optimum orientation of the symbol on the printed web (the direction of movement of the media in relation to a printing plate on a printing press)

The packaging designer should be consulted to:

- Ensure the bar code 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 bar code symbol intended for scanning will be scanned (e.g. obscure all symbols on the individual units within larger trade items so that the individual units' symbols do not scan instead of the larger units' symbol)





9.2 Choosing the Correct Bar Code Symbol

The table below can be used as a guide to determine which type of bar code symbol to use.

Symbol	Encoded GTIN	Application Areas	Page
EAN-13	GTIN-13	Retail Point-of-Sale and General Distribution Scanning	150
EAN-8	GTIN-8	Retail Point-of-Sale, small items only	152
UPC-A	GTIN-12	North America retail Point-of-Sale and General Distribution	154
UPC-E	Zero Suppressed GTIN-12	North America retail Point-of-Sale, small items only	156
ITF-14	GTIN-13 with a Filler Zero	General Distribution, ideal for printing on corrugate	160
	GTIN-14 Indicator Method	General Distribution, can encode attribute data, ideal for printing on labels	160
GS1-128 (previously UCC/EAN-128)	GTIN-13 with a Filler Zero	General Distribution, ideal for printing on corrugate	164
	GTIN-14 Indicator Method	General Distribution, can encode attribute data, ideal for printing on labels	164

TABLE 105 Choosing the Correct Bar Code Symbol





9.3 Application Methods

There are three ways to apply the bar code symbol to your trade item:

Pre-Printed Labels

A printer or label service can print labels carrying bar code symbols, or your company can print them on-site. Ask equipment suppliers for a demonstration of on-site bar code symbol printing equipment. The equipment automatically generates the bar code symbol directly from data.

On-Site Direct Printing on Packaging

On-site printing equipment is also available which allows you to print the bar code symbol directly onto the package during the manufacturing, packaging, and distribution process.

Printing on Packaging at Source

Bar code symbols may be able to be incorporated into the artwork for your item, and printed directly onto the packaging. For more information regarding this application method you will need to contact your printer.





9.4 Bar Code Symbol Characteristics

When printing bar code symbols, there are various considerations to ensure the symbol is of sufficient quality to ensure consistent scanning.

9.4.1 Magnification

The magnification (size) of the bar code symbol is determined by the X-dimension (one narrow module width) in relation to a nominal size.

The allowable magnification range depends on the symbol type and the intended scanning environment. Reliability of scanning is always enhanced by selecting a magnification higher than the minimum.

Your printer may recommend a magnification larger than the minimum allowable. This should not be taken as a reflection on the quality of your printer. To print an accurate and high quality bar code symbol a number of factors, such as the printing process, ink quality, and substrate, must be taken into consideration. The printer can run tests to determine the print quality in different scenarios. This is usually done with Print Gain Gauges, which can be obtained from GS1 Australia.

The artwork designer must work closely with the printer to ensure that the space allowed for the bar code symbol is sufficient. The designer will not be able to decide on the area required for the symbol prior to consultation with the printer.

A Bar Code Size Gauge can be obtained from GS1 Australia to be used as a guide to show the sizes of various symbol types at different magnifications. The Size Gauge is not intended to be a precise measuring tool, but can be a handy tool during the artwork stage to determine the amount of space needed for the required/chosen magnification.





9.4.2 Bar Height

Once the magnification of the bar code symbol has been determined, for EAN/UPC Bar Code Symbols it is important to ensure that the height remains in proportion to the magnification, and does not drop below the minimum specified.

For ITF-14 and GS1-128 (previously UCC/EAN-128) Bar Code Symbols the magnification does not impact the height, rather the height is determined by the scanning environment.

Please note that truncation (height reduction) on any symbol will reduce scanning reliability, and where space permits the full height should always be printed.

9.4.3 Quiet Zones (Light Margins)

The Quiet Zones (Light Margin) of the bar code symbol are the solid, light areas before the first bar and after the last bar. These areas are extremely important as they allow the scanner to recognise the beginning and end of the bar code symbol. Any obstruction or reduction in the Quiet Zones will most likely result in scanning difficulties.

The minimum size required for the Quiet Zones depends on the magnification of the bar code symbol. It is recommended to allow slightly more than the minimum required Quiet Zones to allow for any possible ink spread or plate registration issues.

9.4.4 Colours

The colours and type of ink you choose for your bar code symbols is very important.

As a scanner reads a bar code symbol using an infrared light source it sees the symbol differently to the human eye. As a result, some colour combinations and ink types are unsuitable for scanning because they do not provide sufficient contrast between the dark bars and the light background, or they provide a much too high reflectance value.

The most suitable and reliable colour combination is black bars on a white background. However, as a general rule, the background of the bar code symbol can be a light, warm colour that does not contain any black (such as yellow or light orange), and the bar colour can be a dark, cool colour that has no, or low, red content (such as dark blue or dark green). It is also a recommendation to avoid high gloss inks as this can cause problems with the reflectance values.

Consult your printer or GS1 Australia if you are uncertain about colour choice/options.

The following colour chart shows a few examples of suitable and unsuitable colour combinations





Figure 18 Colour Chart





9.5 Substrate

The substrate (the material the bar code symbol is printed on) is very important. If unsuitable this can cause scanning difficulties. Different packaging materials reflect light differently, which can have an effect on the scanning ability of the bar code symbol. This is especially evident on transparent and translucent packages where the background is not printed.

For printing bar code symbols it is recommended that you avoid the following:

- High gloss substrates
- Transparent or semi-transparent backgrounds
- Transparent wrappers over the printed bar code symbol

If necessary to print onto a highly reflective (flexible) substrate, we recommend the following:

- Increase the magnification of the bar code symbol to between 105% and 120%
- Increase the amount of Bar Width Reduction
- Make the background of the symbol as dense and less reflective as possible. To do this you may try the following:
 - If you are not using wet inks, print two background layers. This may be two layers of the one colour, or you may use all light colours in the print run (e.g. white and yellow)
 - Use a less viscous ink that will provide maximum coverage and density





9.6 Bar Widths and Print Quality

Always ensure that the print quality of the bar code symbol is of a high standard. Ensure that the bars in the symbol are clearly defined, watch for voids or smudging, and avoid flecks in the background colour.

Maintaining acceptable print quality and consistent print gain (ink spread) requires regular ongoing checks. One method of quality assurance checking can be to use the Print Gain Gauges mentioned earlier. Run the Print Gain Gauges on the edge of the job, outside the die cuts, to monitor the ink spread. Please refer to GS1 Australia for further clarification.

9.7 Checklist for Generating and Printing Bar Code Symbols

Below is a quick checklist of things to check during the bar code symbol generation and printing processes. They represent common errors/problems seen by GS1 Australia.

- Ensure that the correct symbol is used for the relevant product, application, and scanning environment
- Check that the bar code symbol will remain readable in the environment in which the product will be stored, handled, and distributed
- Ensure that the check digit is correct
- Check the size of the bar code symbol, both the magnification and the bar height
- Ensure that there are adequate Quiet Zones (Light Margins), and that any optional Quiet Zone Indicators are correctly placed
- Check that the contrast between the bars and the background is adequate, and that the colours chosen will scan
- Make sure that the colour of the contents of the packaging will not unduly affect the contrast between the bars and spaces
- Check the position of the symbol on the final, formed product
- Ensure that no shrink-wrap, tape, or other printing will obscure the bar code symbol on the finished product
- Ensure that no other bar code symbols will be visible or show through from the inside of the pack
- Carry out routine verification at all levels of packaging to ensure that the bar code symbol complies with the required quality standard, and to identify any potential problems
- Check the print quality regularly throughout the print run by verifying the bar code symbol quality
- Notify trading partners of the GTINs and the products they identify in good time
- Consider having GS1 Australia prepare a Bar Code Verification Report on the artwork for you prior to the final print to help detect any errors or areas for improvement



10 Bar Code Symbol Dimensions



10.1 Introduction

After you have selected your GS1 Identification Key using Chapter 2 Introduction to GS1 Identification Keys on page 12, and selected the bar code symbol type and determined any printing considerations using Chapter 9 Bar Code Symbol Printing Considerations on page 141, the next step is to select dimensions for your chosen symbology.

In this chapter you will find all of the specific dimensional requirements for the following bar code symbol types:

- EAN/UPC Bar Code Symbologies
 - 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
- ITF-14 Bar Code Symbology
- GS1-128 (Previously UCC/EAN-128) Bar Code Symbology

Please note that it is the print quality of the bar code symbol that determines the minimum magnification factor you must apply, not a predetermined space on the packaging. Always refer to your printer.





10.2 EAN/UPC Symbology Specifications

10.2.1 EAN-13 Symbology Specifications

The EAN-13 Bar Code Symbol is used to encode a GTIN-13, and can be scanned in both a retail POS and a General Distribution Scanning Environment.

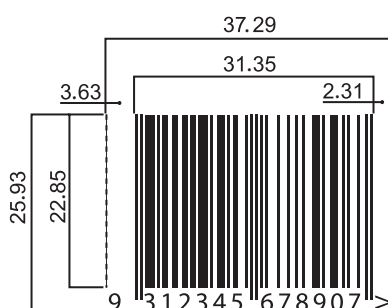


Figure 19 EAN-13 Bar Code Symbol at Nominal Size (100%)

Magnification

The specified magnification range for an EAN-13 Bar Code Symbol being scanned at retail POS 80% - 200% (X-dimension 0.26mm - 0.66mm).

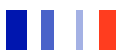
An allowable minimum magnification of 75% (X-dimension 0.25mm) is applicable only to on demand (e.g. thermal) print processes. In this case, the bar height should never be truncated below the minimum required height for an 80% magnification bar code symbol.

Where an item may also be scanned in a General Distribution Scanning environment (automated scanning), the allowable magnification range is 150% to 200% (X-dimension 0.50mm – 0.66mm).

Human Readable Interpretation

The Human Readable Interpretation should be printed beneath the bar code symbol.

The recommended typeface for the Human Readable Interpretation is OCR-B at a height of 2.75mm at nominal size (100% magnification, X-dimension 0.33mm). This typeface is a recommendation only and alternative type fonts and character sizes are acceptable provided the digits are clearly legible.





EAN-13 Bar Code Symbol Dimensions

Magnification	X-dimension	Width	Bar Height	Left Quiet Zone	Right Quiet Zone
80%	0.26	25.08	18.28	2.90	1.85
85%	0.28	26.65	19.42	3.09	1.96
90%	0.30	28.22	20.57	3.27	2.08
95%	0.31	29.78	21.71	3.45	2.19
100%	0.33	31.35	22.85	3.63	2.31
105%	0.35	32.92	23.99	3.81	2.43
110%	0.36	34.49	25.14	3.99	2.54
115%	0.38	36.05	26.28	4.17	2.66
120%	0.40	37.62	27.42	4.36	2.77
125%	0.41	39.19	28.56	4.54	2.89
130%	0.43	40.76	29.71	4.72	3.00
135%	0.45	42.32	30.85	4.90	3.12
140%	0.46	43.89	31.99	5.08	3.23
145%	0.48	45.46	33.13	5.26	3.35
150%	0.50	47.03	34.28	5.45	3.47
155%	0.51	48.59	35.42	5.63	3.58
160%	0.53	50.16	36.56	5.81	3.70
165%	0.54	51.73	37.70	5.99	3.81
170%	0.56	53.30	38.85	6.17	3.93
175%	0.58	54.86	39.99	6.35	4.04
180%	0.59	56.43	41.13	6.53	4.16
185%	0.61	58.00	42.27	6.72	4.27
190%	0.63	59.57	43.42	6.90	4.39
195%	0.64	61.13	44.56	7.08	4.50
200%	0.66	62.70	45.70	7.26	4.62

Note: In the heading of this table, Width = Width of bar code symbol excluding Quiet Zones (Light Margins), Bar Height = Bar Height excluding guard bars, Quiet Zone = Light Margin
All measurements are in millimetres.

TABLE 106 EAN-13 Bar Code Symbol Dimensions





10.2.2 EAN-8 Symbology Specifications

The EAN-8 Bar Code Symbol is used to encode a GTIN-8, and is intended for scanning at retail POS only.



Figure 20 EAN-8 Bar Code Symbol at Nominal Size (100%)

Magnification

The specified magnification range for an EAN-8 Bar Code Symbol being scanned at retail POS is between 80% and 200% (X-dimension 0.26mm - 0.66mm).

An allowable minimum magnification of 75% (X-dimension 0.25mm) is applicable only to on demand (e.g. thermal) print processes. In this case, the bar height should never be truncated below the minimum required height for an 80% magnification bar code symbol.

Human Readable Interpretation

The Human Readable Interpretation should be printed beneath the bar code.

The recommended typeface for the Human Readable Interpretation is OCR-B at a height of 2.75mm at nominal size (100% magnification, X-dimension 0.33mm). This typeface is a recommendation only and alternative type fonts and character sizes are acceptable provided the digits are clearly legible.





EAN-8 Bar Code Symbol Dimensions

Magnification	X-dimension	Width	Bar Height	Left Quiet Zone	Right Quiet Zone
80%	0.26	17.69	14.58	1.85	1.85
85%	0.28	18.79	15.50	1.96	1.96
90%	0.30	19.90	16.41	2.08	2.08
95%	0.31	21.00	17.32	2.19	2.19
100%	0.33	22.11	18.23	2.31	2.31
105%	0.34	23.22	19.14	2.43	2.43
110%	0.36	24.32	20.05	2.54	2.54
115%	0.38	25.43	20.96	2.66	2.66
120%	0.40	26.53	21.88	2.77	2.77
125%	0.41	27.64	22.79	2.89	2.89
130%	0.43	28.74	23.70	3.00	3.00
135%	0.45	29.85	24.61	3.12	3.12
140%	0.46	30.95	25.52	3.23	3.23
145%	0.48	32.06	26.43	3.35	3.35
150%	0.50	33.17	27.35	3.47	3.47
155%	0.51	34.27	28.26	3.58	3.58
160%	0.53	35.38	29.17	3.70	3.70
165%	0.54	36.48	30.08	3.81	3.81
170%	0.56	37.59	30.99	3.93	3.93
175%	0.58	38.69	31.90	4.04	4.04
180%	0.59	39.80	32.81	4.16	4.16
185%	0.61	40.90	33.73	4.27	4.27
190%	0.63	42.01	34.64	4.39	4.39
195%	0.64	43.11	35.55	4.50	4.50
200%	0.66	44.22	36.46	4.62	4.62

Note: In the heading of this table, Width = Width of bar code symbol excluding Quiet Zones (Light Margins),
Bar Height = Bar Height excluding guard bars, Quiet Zone = Light Margin
All measurements are in millimetres.

TABLE 107 EAN-8 Bar Code Symbol Dimensions





10.2.3 UPC-A Symbology Specifications

The UPC-A Bar Code Symbol is used to encode a GTIN-12 and can be scanned in both a retail POS and a General Distribution Scanning Environment

Note: In regards to dimensions, the only difference between the EAN-13 and UPC-A Bar Code Symbols is the minimum required Quiet Zones.



Figure 21 UPC-A Bar Code Symbol at Nominal Size (100%)

Magnification

The specified magnification range for a UPC-A Bar Code Symbol being scanned at retail POS is between 80% and 200% (X-dimension 0.26mm - 0.66mm).

An allowable minimum magnification of 75% (X-dimension 0.25mm) is applicable only to on demand (e.g. thermal) print processes. In this case, the bar height should never be truncated below the minimum required height for an 80% magnification bar code symbol.

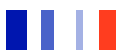
Where an item may also be scanned in a General Distribution Scanning environment (automated scanning), the allowable magnification range is 150% to 200% (X-dimension 0.50mm - 0.66mm).

Human Readable Interpretation

With a UPC-A Symbol the first and last human readable digits are smaller than the other digits. Reduce the U.P.C. Prefix (first digit) and the Check Digit (last digit) to a maximum character width of 1.32mm, four module widths, at nominal size (100% magnification, X-dimension 0.33mm), and a height that is proportional to the modified width.

Locate the human readable number system character 1.65mm, five module widths, at nominal size (100% magnification, X-dimension 0.33mm) to the left of the guard bars. Locate the human readable Check Digit 1.65mm, five module widths, at nominal size (100% magnification, X-dimension 0.33mm) to the right of the guard bars.

Ensure that only the twelve digits encoded in the bar code symbol are printed below it in the Human Readable Interpretation.





UPC-A Bar Code Symbol Dimensions

Magnification	X-dimension	Width	Bar Height	Left Quiet Zone	Right Quiet Zone
80%	0.26	25.08	18.28	2.38	2.38
85%	0.28	26.65	19.42	2.52	2.52
90%	0.30	28.22	20.57	2.67	2.67
95%	0.31	29.78	21.71	2.82	2.82
100%	0.33	31.35	22.85	2.97	2.97
105%	0.36	32.92	23.99	3.12	3.12
110%	0.36	34.49	25.14	3.27	3.27
115%	0.38	36.05	26.28	3.42	3.42
120%	0.40	37.62	27.42	3.56	3.56
125%	0.41	39.19	28.56	3.71	3.71
130%	0.43	40.76	29.71	3.86	3.86
135%	0.45	42.32	30.85	4.01	4.01
140%	0.46	43.89	31.99	4.16	4.16
145%	0.48	45.46	33.13	4.31	4.31
150%	0.50	47.03	34.28	4.46	4.46
155%	0.51	48.59	35.42	4.60	4.60
160%	0.53	50.16	36.56	4.75	4.75
165%	0.54	51.73	37.70	4.90	4.90
170%	0.56	53.30	38.85	5.05	5.05
175%	0.58	54.86	39.99	5.20	5.20
180%	0.59	56.43	41.13	5.35	5.35
185%	0.61	58.00	42.27	5.49	5.49
190%	0.63	59.57	43.42	5.64	5.64
195%	0.64	61.13	44.56	5.79	5.79
200%	0.66	62.70	45.70	5.94	5.94

Note: In the heading of this table, Width = Width of bar code symbol excluding Quiet Zones, (Light Margin), BarHeight = Bar Height excluding guard bars, Quiet Zone = Light Margin
All measurements are in millimetres.

TABLE 108 UPC-A Bar Code Symbol Dimensions





10.2.4 UPC-E Symbology Specifications

The UPC-E Bar Code Symbol is used to encode a Zero Suppressed GTIN-12 and is intended for scanning in a retail POS environment only.

Note: GS1 US is no longer allocating GTIN-12s that are able to be zero suppressed.

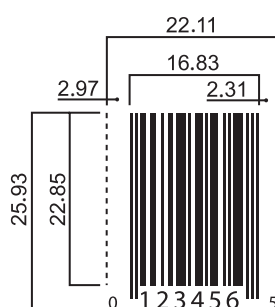


Figure 22 UPC-E Bar Code Symbol at Nominal Size (100%)

Magnification

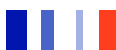
The specified magnification range for a UPC-E Bar Code Symbol being scanned at retail POS is between 80% and 200% (X-dimension 0.26mm - 0.66mm).

Human Readable Interpretation

The Human Readable Interpretation should be printed beneath the bar code symbol. The U.P.C. Prefix digit and Check Digit, encoded by variable parity, are shown outside the guard bars, to the left and right respectively, and within the Quiet Zones (Light Margins). These two human readable digits are aligned with the other six digits.

The U.P.C. Prefix and the Check Digit are reduced in size to a maximum character width of 1.32mm, four module widths, at nominal size (100% magnification, X-dimension 0.33mm), with a proportional height. The U.P.C. Prefix should be located 1.65mm, five module widths, at nominal size (100% magnification, X-dimension 0.33mm) to the left of the start guard bar, and the Check Digit should be a minimum of 0.99mm, three module widths at nominal size (100% magnification, X-dimension 0.33mm) to the right of the end guard bar.

Previous specifications have suggested that the U.P.C. Prefix and Check Digits be shown in Human Readable Interpretation half way up the bar code symbol to the left and right, or that the Check Digit be omitted altogether. While it is not the current recommendation, UPC-E Bar Code Symbols in this format may continue to appear.





Format of the UPC-E Bar Code Symbol

The UPC-E Bar Code Symbol is made up as follows:

- a normal guard pattern
- six digit characters—from number sets A or B
- a version “E” stop guard pattern comprising six modules made up from module set 010101, where 0 is a light module and 1 is a dark module. The X-dimension (module width) is 0.33 mm. The total width of the Version E guard pattern is 1.98 mm.

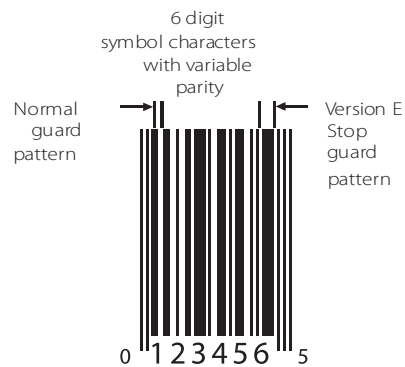


Figure 23 UPC-E Bar Code Symbol Format

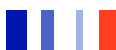


UPC-E Bar Code Symbol Dimensions

Magnification	X-dimension	Width	Bar Height	Left Quiet Zone	Right Quiet Zone
0.80	0.26	13.47	18.28	2.38	1.85
0.85	0.28	14.31	19.42	2.52	1.96
0.90	0.30	15.15	20.57	2.67	2.08
0.95	0.31	15.99	21.71	2.82	2.19
1.00	0.33	16.83	22.85	2.97	2.31
1.05	0.35	17.67	23.99	3.12	2.43
1.10	0.36	15.51	25.14	3.27	2.54
1.15	0.38	19.36	26.28	3.42	2.66
1.20	0.40	20.20	27.42	3.56	2.77
1.25	0.41	21.04	28.56	3.71	2.89
1.30	0.43	21.88	29.71	3.86	3.00
1.35	0.45	22.72	30.85	4.01	3.12
1.40	0.46	23.56	31.99	4.16	3.23
1.45	0.48	24.40	33.13	4.31	3.35
1.50	0.50	25.25	34.28	4.46	3.47
1.55	0.51	26.09	35.42	4.60	3.58
1.60	0.53	26.93	36.56	4.75	3.70
1.65	0.54	27.77	37.70	4.90	3.81
1.70	0.56	28.61	38.85	5.05	3.93
1.75	0.58	29.45	39.99	5.20	4.04
1.80	0.59	30.29	41.13	5.35	4.16
1.85	0.61	31.14	42.27	5.49	4.27
1.90	0.63	31.98	43.42	5.64	4.39
1.95	0.64	32.82	44.56	5.79	4.50
2.00	0.66	33.66	45.70	5.94	4.62

Note: In the heading of this table, Width = Width of bar code symbol excluding Quiet Zones (Light Margin),
Bar Height = Bar Height excluding guard bars, Quiet Zone = Light Margin
All measurements are in millimetres.

TABLE 109 UPC-E Bar Code Symbol Dimensions





10.2.5 Add-On Symbol Specifications

The two-digit and five-digit Add-On Symbols were designed to encode information supplementary to that in the main bar code symbol on serials and paperback books.

For information on the use of Add-On Symbols please refer to Section 3.7.3 Five-Digit Add-On Symbols on page 32 for books and Section 3.8.5 Two-Digit Add-On Symbol on page 37 and Section 3.8.6 Five-Digit Add-On Symbol on page 37 for serials.

Magnification

The magnification (X-dimension) of an Add-On Symbol shall be the same as the magnification of its associated main bar code symbol.

Height

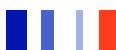
The height of any two-digit or five-digit Add-On Symbol used must be the same height as the primary symbol. The height including the Human Readable Interpretation must not extend outside the symbol height dimensions of the main symbol.

Human Readable Interpretation

The Human Readable Interpretation should be printed above the Add-On Symbol. The digits should be the same height as those of the main symbol, and the upper edges of the digits should be aligned with the upper edges of the bars of the main symbol.

Positioning of the Add-On Symbol

The Add-On Symbol shall not encroach on the right Quiet Zone (Light Margin) of the main bar code symbol. The bottom edge of the bars in the Add-On Symbol shall be horizontally aligned with the bottom edge of the guard bars of the main symbol.





10.3 ITF-14 (Interleaved 2-of-5) Symbology Specifications

The ITF-14 Bar Code Symbol is used to encode a GTIN-14, a GTIN-13 with a filler zero, or a GTIN-12 with two filler zeros. It is intended for scanning in a General Distribution Scanning environment.



Figure 24 ITF-14 Bar Code Symbol at Nominal Size (100%)

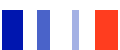
Magnification

The specified magnification range for ITF-14 Bar Code Symbols that are to be scanned in a General Distribution Scanning environment (automated scanning) is between 50% and 100% (X-dimension 0.51mm – 1.02mm). For other scanning environments (not automated scanning), the allowable magnification range is between 25% and 100% (X-dimension 0.25mm – 1.02mm).

For all scanning environments printing at the higher end of the magnification range is recommended.

Regardless of the scanning environment, ITF-14 Bar Code Symbols with a magnification less than 62.5% (X-dimension 0.64mm) should not be printed directly onto corrugate fibreboard.

Magnifications between 100% and 120% (X-dimension between 1.02mm and 1.22mm) are acceptable based on historical specifications, but a migration to the 100% maximum magnification should be made on new artwork.





Height of Bars

For scanning in a General Distribution Scanning environment (automated scanning), the minimum recommended bar height for an ITF-14 Bar Code Symbol is 32mm.

For all other scanning environments the bar height should be printed as high as possible. In no case shall the bar height be less than 13mm. While 13mm is the minimum height for bar code symbols not being scanned in an automated scanning environment, every effort should be made to increase the bar height to as close to 32mm as possible.

Human Readable Interpretation

Print the Human Readable Interpretation clearly and in proportion to the size of the bar code symbol. Character size and font are not specified, and the digits may be printed anywhere in the area surrounding the bar code symbol, although the preference is directly below the symbol ensuring Quiet Zones are not infringed upon.

Bar Width Ratio

Bar width ratio is the comparison in bar widths between the wide modules and the narrow modules in an ITF-14 Bar Code Symbol.

The target bar width ratio is 2.5:1, meaning that the wide bars are 2.5 times the width of the narrow bars.

While the preferred bar width ratio is 2.5:1, the acceptable range is 2.25:1 to 3:1.





Bearer Bars

The purpose of the Bearer Bar is:

- To equalise the pressure exerted by the printing plate over the entire surface of the bar code symbol
- To enhance the reading reliability assisting in the reduction of the probability of misreads or short scans which may occur when a skewed scanning beam enters or exits the bar code through the top or bottom edge
- To possibly provide a visible check that all the print head elements are working if using a thermal print process



Figure 25 Example of a Skewed Scanning Beam

The top and bottom Bearer Bars are mandatory unless it is not technically feasible to apply it, in which case reading reliability is reduced. The vertical Bearer Bars are optional when using printing methods not requiring printing plates.

For printing methods requiring printing plates, the nominal Bearer Bar has a constant thickness of 4.8mm and must completely surround the bar code symbol, including its Quiet Zones (Light Margins), and butt directly against the top and bottom of the symbol bars.

For printing methods that do not require printing plates, the Bearer Bar only needs to be applied to the top and bottom of the bar code symbol. Make the Bearer Bar a minimum of two times the X-dimension (width of the narrow bar), which at nominal size (100%) is:

$$\text{X-dimension (nominal narrow bar width)} \times 2 = 1.02 \times 2 = 2.04\text{mm.}$$



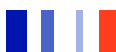


ITF-14 Bar Code Symbol Dimensions

Magnification	X-Dimension	Width	Bar Height	Quiet Zones
25%	0.25	30.62	13.00	2.54
30%	0.30	36.73	13.00	3.05
35%	0.36	42.85	13.00	3.56
40%	0.41	48.97	13.00	4.06
45%	0.46	55.09	13.00	4.57
50%	0.51	61.21	32.00	5.08
55%	0.56	67.34	32.00	5.59
60%	0.61	73.46	32.00	6.10
62.5%	0.64	76.52	32.00	6.35
65%	0.66	79.58	32.00	6.60
70%	0.71	85.70	32.00	7.11
75%	0.76	91.82	32.00	7.62
80%	0.81	97.94	32.00	8.13
85%	0.86	104.06	32.00	8.64
90%	0.91	110.19	32.00	9.14
95%	0.97	116.31	32.00	9.65
100%	1.02	122.43	32.00	10.16

Note: In the heading of this table, Width = Width of bar code symbol excluding Quiet Zones (Light Margins), Bar Height = Bar Height excluding Bearer Bars, Quiet Zones = Light Margins
All measurements are in millimetres.

TABLE 110 ITF-14 Bar Code Symbol Dimensions





10.4 GS1-128 (previously UCC/EAN-128) Symbology Specifications

The GS1-128 (previously UCC/EAN-128) Bar Code Symbology is used to encode a GTIN-14, a GTIN-13 with a filler zero, or a GTIN-12 with two filler zeros. It is intended for scanning in a General Distribution Scanning environment



Figure 26 GS1-128 Bar Code Symbol at Nominal Size (100%)

Concatenation

Concatenation (stringing data elements together) is an effective means for presenting multiple element strings in a single GS1-128 Bar Code Symbol and should be used to conserve label space and optimise scanning operations.

Maximum Length

When concatenating data strings the maximum number of characters in the GS1-128 Bar Code Symbol, including Function 1 characters when used as field separators, must not exceed 48 characters.

When concatenating data strings the maximum number of characters in the GS1-128 Bar Code Symbol must not exceed 48 characters. This includes Function Code 1 (FNC1) when used as a field separator, but excludes auxiliary characters and the Symbol Check Character (Modulo 103).

The length of the GS1-128 Bar Code Symbol must never exceed 165mm in length, including the Quiet Zones (Light Margins).





Magnification

The size of the GS1-128 Bar Code Symbol depends on:

- the X-dimension (module width) chosen
- the number of characters encoded
- the number of non-numeric characters in the data

For GS1-128 bar code symbols that are to be scanned in a General Distribution Scanning environment (automated scanning), the X-dimension range is 0.50mm to 1.02mm (magnifications between 48.7% and 100%).

For other scanning environments, the X-dimension range is 0.25mm to 1.02mm (magnifications between 25% and 100%).

For information on the size specifications for Serial Shipping Container Codes (SSCCs) and other GS1-128 Bar Code Symbols on logistics labels refer to Section 5.5 Bar Code Symbol Specifications on page 67.

Mathematically, when W is width, 11 is the number of modules per symbol character, N is the number of symbol characters encoded (excluding the Start and Stop Characters and Symbol Check Character), 66 is the auxiliary characters and X is X-dimension (module width), which at 100% magnification is 1.02mm.

$W = (11N + 66)X$ (including Quiet Zones (Light Margins))

Height of Bars

For scanning in a General Distribution Scanning (automated scanning) environment, the minimum bar height for a GS1-128 Bar Code Symbol is 32mm.

For all other scanning environments the bar height should be printed as high as possible. In no cases shall the bar height be less than 13mm. While 13mm is the minimum height for GS1-128 Bar Code Symbols not being scanned in an automated scanning environment, every effort should be made to increase the bar height to as close to 32mm as possible.

Human Readable Interpretation

Print the Human Readable Interpretation either above or below the symbol bars. Make sure Application Identifiers (AIs) are clearly recognisable by placing them in brackets in the Human Readable Interpretation only.

Note: The Symbol Check Character (Modulo 103) is not part of the data, therefore do not show it in the Human Readable Interpretation.

For information on printing Human Readable Interpretation on Logistics Labels, refer to Section 5.5.1.4 Human Readable Interpretation on page 68.





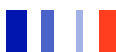
GS1-128 Bar Code Symbol Dimensions

Magnification	X-dimension	Width	Bar Height	Quiet Zones
25%	0.25	34.04	13.00	2.54
30%	0.30	40.84	13.00	3.05
35%	0.36	47.65	13.00	3.56
40%	0.41	54.46	13.00	4.06
45%	0.46	61.26	13.00	4.57
50%	0.51	68.07	32.00	5.08
55%	0.56	74.88	32.00	5.59
60%	0.61	81.68	32.00	6.10
65%	0.66	88.49	32.00	6.60
70%	0.71	95.30	32.00	7.11
75%	0.76	102.11	32.00	7.62
80%	0.81	108.91	32.00	8.13
85%	0.86	115.72	32.00	8.64
90%	0.91	122.53	32.00	9.14
95%	0.97	129.33	32.00	9.65
100%	1.02	136.14	32.00	10.16

Note: In the heading of this table, Width = Width of bar code symbol excluding Quiet Zones (Light Margins),
Quiet Zones = Light Margins
All measurements are in millimetres.

These dimensions are only indicative of a GS1-128 Bar Code Symbol with one Application Identifier and a GTIN-14 without any attribute data, e.g. (01)09312345678907.

TABLE 111 GS1-128 Bar Code Symbol Dimensions



11 Bar Code Symbol Location



11.1 Introduction

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 the bar coded item travels past. The recommendations in this section are advisory, not compulsory; but we strongly recommend that you follow them. Respecting the guidance in this section will result in the consistency and predictability required.

This guideline replaces previous recommendations, but it is not intended that manufacturers should scrap packaging printed according to previous guidelines. When packaging is redesigned these recommendations should be observed. In the meantime, provided scannability has not been effected, breaking these guidelines should not be taken as a reason for rejection of the trade item.





11.2 General Placement Principles

The following general principles for bar code symbol placement should be considered for any package type, whether it is scanned as the retail Point-of-Sale (POS) or elsewhere in the supply chain.

11.2.1 Scanning Environment

Before considering the package type, determine whether the item will be scanned in a POS or a General Distribution Scanning environment. If the item is scanned at POS only, the guidelines “Location for Retail Point-of-Sale (POS)” on page 173 apply. However, if the item is scanned in both a POS and a General Distribution Scanning environment or in a General Distribution Scanning environment only, “Location for General Distribution Scanning (Non-Retail Trade Items)” on page 191 takes precedence.



11.2.2 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 item. Rules for positioning bar code symbols on curved surfaces are given on page 170.

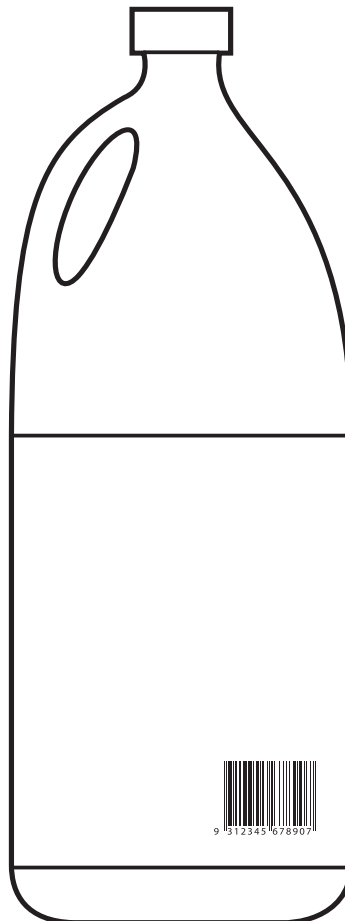


Figure 27 Picket Fence Orientation





11.2.3 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.

11.2.4 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 magnification 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.



Figure 28 Ladder Orientation





Maximum Symbol Magnification

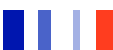
The table below provides a guide to the relationship between the magnification of the bar code symbol and the diameter of the curve of the trade item, and outlines the maximum allowable magnification factor based on the curve diameter.

Curve Diameter (mm)	EAN-13 or UPC-A Bar Code Symbol Maximum Magnification	EAN-8 Bar Code Symbol Maximum Magnification
30 or below	*	*
35	*	<i>(85%)</i>
40	*	<i>(95%)</i>
45	*	107%
50	<i>(83%)</i>	118%
55	<i>(92%)</i>	130%
60	100%	142%
65	108%	154%
70	117%	166%
75	125%	178%
80	135%	190%
85	142%	200%
90	150%	200%
95	159%	200%
100	167%	200%
105	175%	N/A
110	184%	N/A
115	192%	N/A
120 or above	200%	N/A

* Indicates that the package diameter is too small to permit a picket fence orientation bar code symbol, and that the symbol must be rotated 90 degrees to a ladder orientation.

Italics indicate magnifications that are permissible, but are not recommended on curved surfaces.

TABLE 112 Maximum Allowable Magnification on Curved Items





Minimum Allowable Curve Diameter

The table below provides a guide to the relationship between the magnification of the bar code symbol and the diameter of the curve of the trade item, and outlines the minimum allowable curve diameter based on the magnification of the bar code symbol.

Magnification	EAN-13 or UPC-A Bar Symbol Code Minimum Curve Diameter (mm)	EAN-8 Bar Code Symbol Minimum Curve Diameter (mm)
80%	48	34
90%	54	38
100%	60	42
110%	66	47
120%	72	51
130%	78	55
140%	84	59
150%	90	64
160%	96	68
170%	102	72
180%	108	76
190%	114	80
200%	120	85

TABLE 113 Minimum Allowable Curve Diameter for Curved Items

11.2.5 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 symbol
- Never place bar code symbols, including light margin areas, 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 light margin areas
- Never place a bar code symbol under a package flap





11.3 Location for Retail Point-of-Sale (POS)

11.3.1 Number of Symbols

Only one bar code symbol and GTIN should be visible on a trade item intended for POS. Exceptions include large or bulky items and random or unregistered wrapping.

11.3.2 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.

Where an item is deemed to have two fronts, one in each orientation, the "portrait" face takes priority as the front.

11.3.3 Symbol Placement

The preferred bar code symbol placement is on the lower right quadrant of the back, respecting the proper light margin areas around the bar code and the edge rule.

To avoid scanning difficulties make sure the distance between the bar code symbol area and the scanner surface does not exceed 12 mm.

The undesirable alternative placement for a bar code symbol is the lower right quadrant of another side of the container. Positioning the bar code symbol on the base of a trade item continues to be acceptable, except for large, heavy or bulky trade items, however it is not preferred.

Whenever possible, do not place the bar code symbol on the lid or neck of a trade item. This helps ensure that contents do not spill or leak when the trade item is passed over the scanner.





11.3.4 Edge Rule

When possible, the bar code symbol must not be closer than 8mm or further than 100mm from the nearest edge of the item. Previous guidelines suggested a distance of 5mm as a minimum; however practical experience has shown this to be inadequate.

11.3.5 Avoid Truncated Symbols

Truncation of a bar code symbol is the reduction of the height of a symbol relative to its length/width. Truncation is not recommended because it destroys the ability of a symbol to be scanned omnidirectionally at the POS. A truncated symbol can only be scanned when the trade item is orientated 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, for example, when printing on a tightly curved surface, and then the maximum height possible should be printed.





11.3.6 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.

Bags are often called sacks or pouches. This category includes paper or plastic containers that are:

- Fold-sealed on both ends (i.e. flour and sugar)
- Fold-sealed on one end and pinched sealed at the other end (i.e. potato chips)
- Pinch-sealed at both ends (i.e. cough drops)
- Fold-sealed on one end and gathered at the other end (i.e. bread)

Note: Some bags are sealed at both ends and carded for display, such as bags of sweets. These types of trade items are not considered a bag package type.

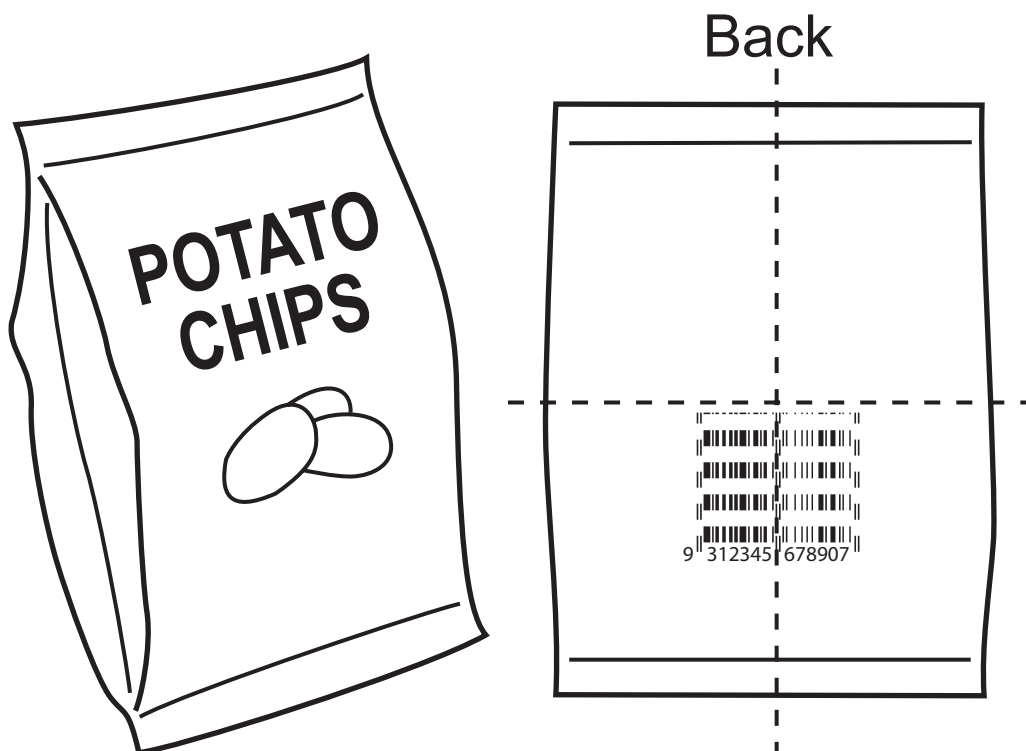


Figure 29 Symbol Placement on Bags





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 item must be considered. In these cases, make sure the distance between the bar code area and the scanner surface does not exceed 12mm.

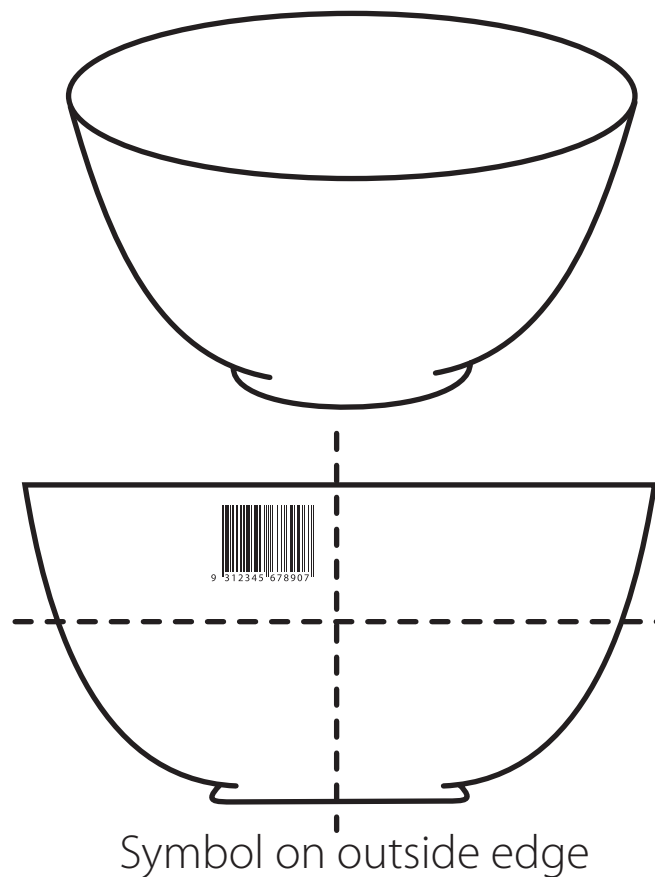
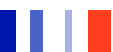
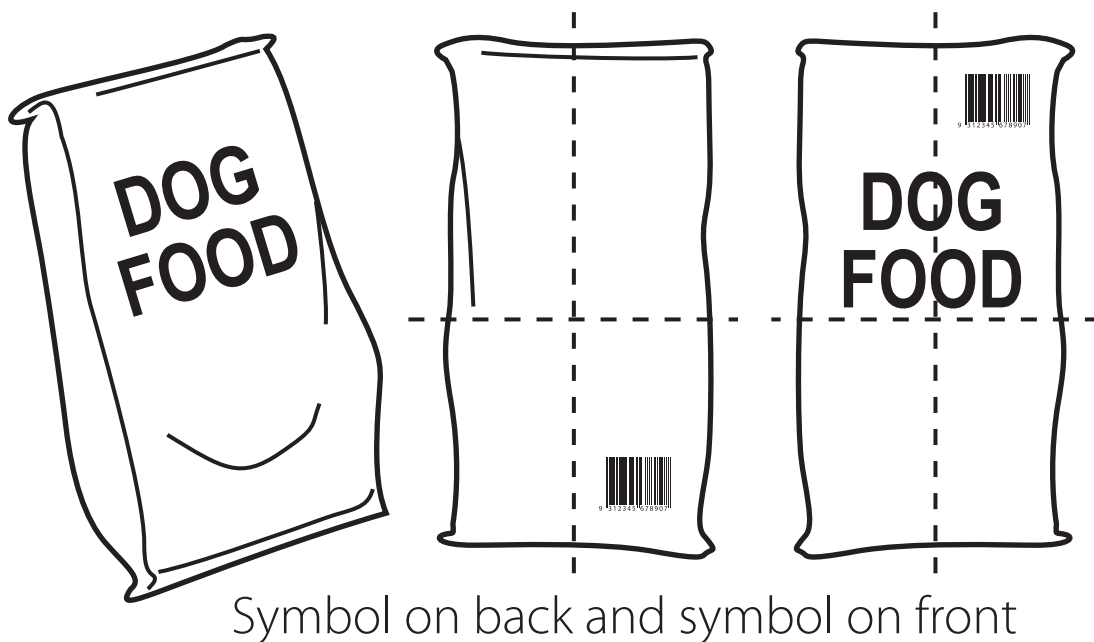


Figure 30 Symbol Placement on an Unpackaged Bowl





Large, heavy, or bulky items. Any item weighing more than 13kg or having two dimensions greater than 450mm (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.



Symbol on back and symbol on front

Figure 31 Symbol Placement on Large, Heavy or Bulky Items



Thin items or containers. Thin items or containers are items with a dimension less than 25mm (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. The preferred location is on the lower right quadrant of the back, near the edge, respecting the proper light margin areas.

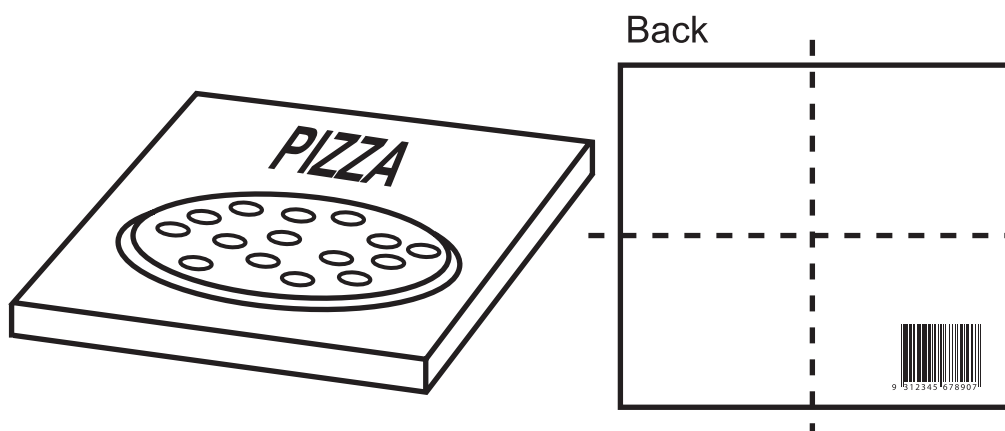


Figure 32 Symbol Placement on Thin Items or Containers





11.3.7 Special Packaging Considerations for Bar Code Symbol 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.

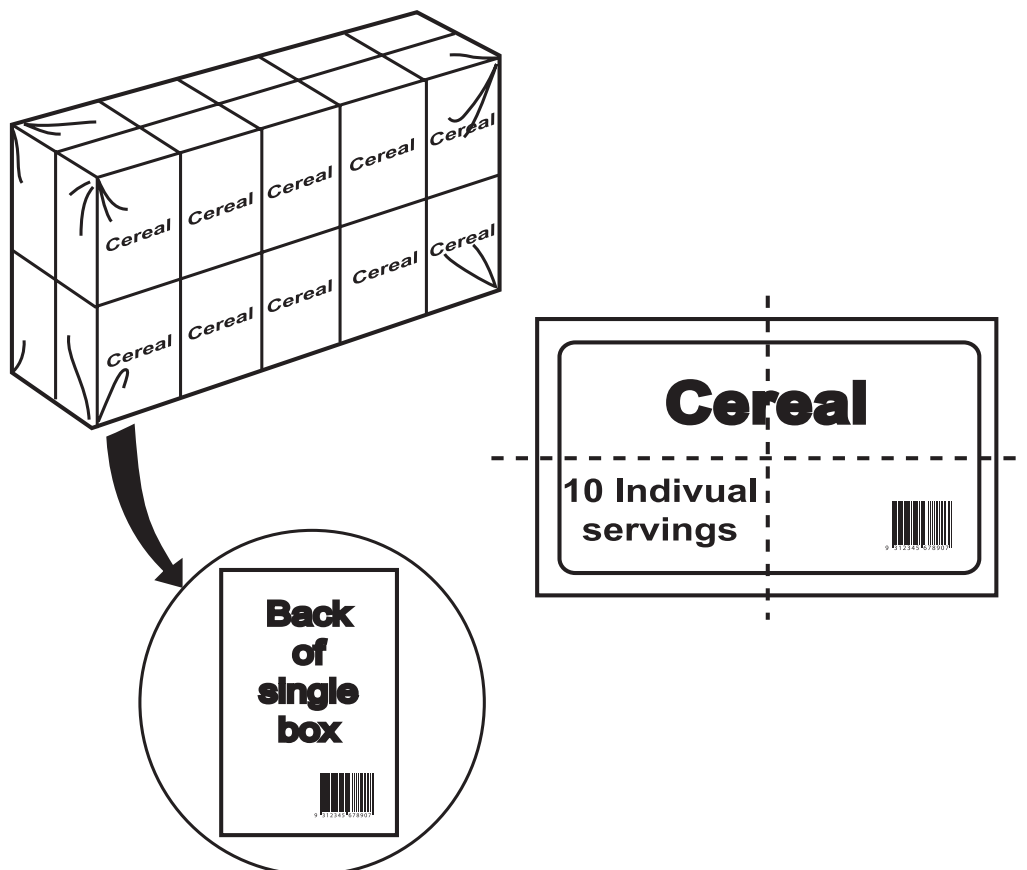


Figure 33 Symbol Placement on Over-Wrapped Items





Random (Unregistered) Wrap. Some wrappers, like those used on sandpaper, 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 bar code 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 bar code symbol with sufficient frequency that a full symbol will appear on one package face.

Double reads are more likely when the gaps between the bar code symbols are larger. Repeating symbols should never be more than 150mm apart.

Consideration should also be given to elongating the bars of the bar code to ensure a full bar code symbol on one face, instead of repeating it.



Figure 34 Symbol Placement on a 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. The figure below shows a bar code symbol placement on hot dogs. Since the curvature of the hot dogs was greater than the diameter shown within the figures in Figure 28 on page 170 a ladder orientation bar code 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.

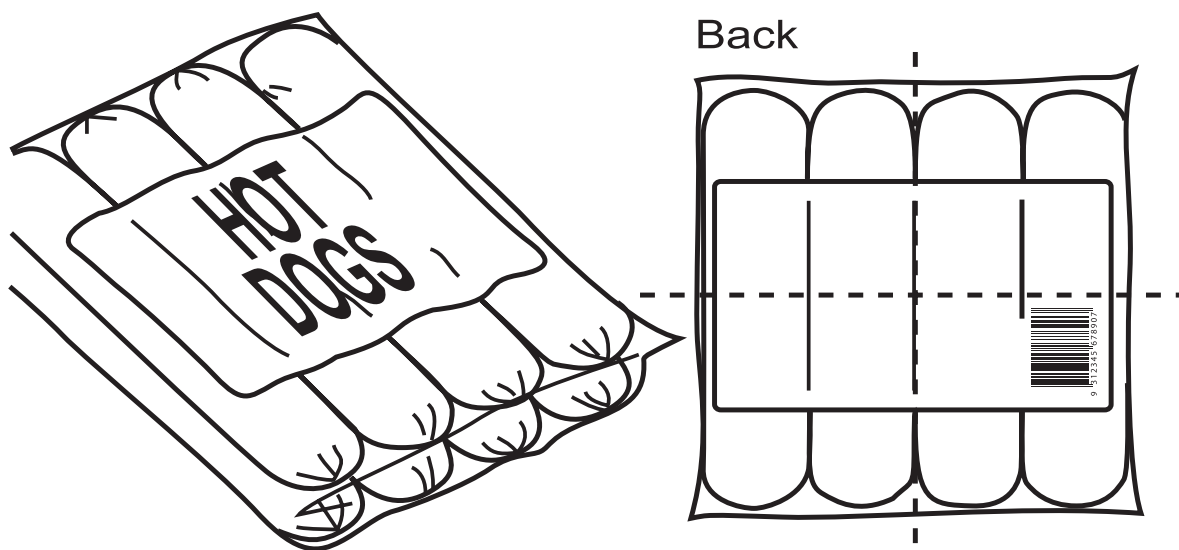


Figure 35 Symbol Placement on Shrink Film/Vacuum-Formed Items





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, tableware, and glassware. The most suitable type of spot labels are those that cannot be removed from the item without destroying the symbol. Labels that are applied directly to the product should use an adhesive that is strong enough to adhere to the label for an extended shelf life, but which also allows the label to be removed without the use of solvents or abrasives.

To determine proper bar code symbol placement on items bearing spot labels, follow the guidelines specific to the applicable package type/shape.

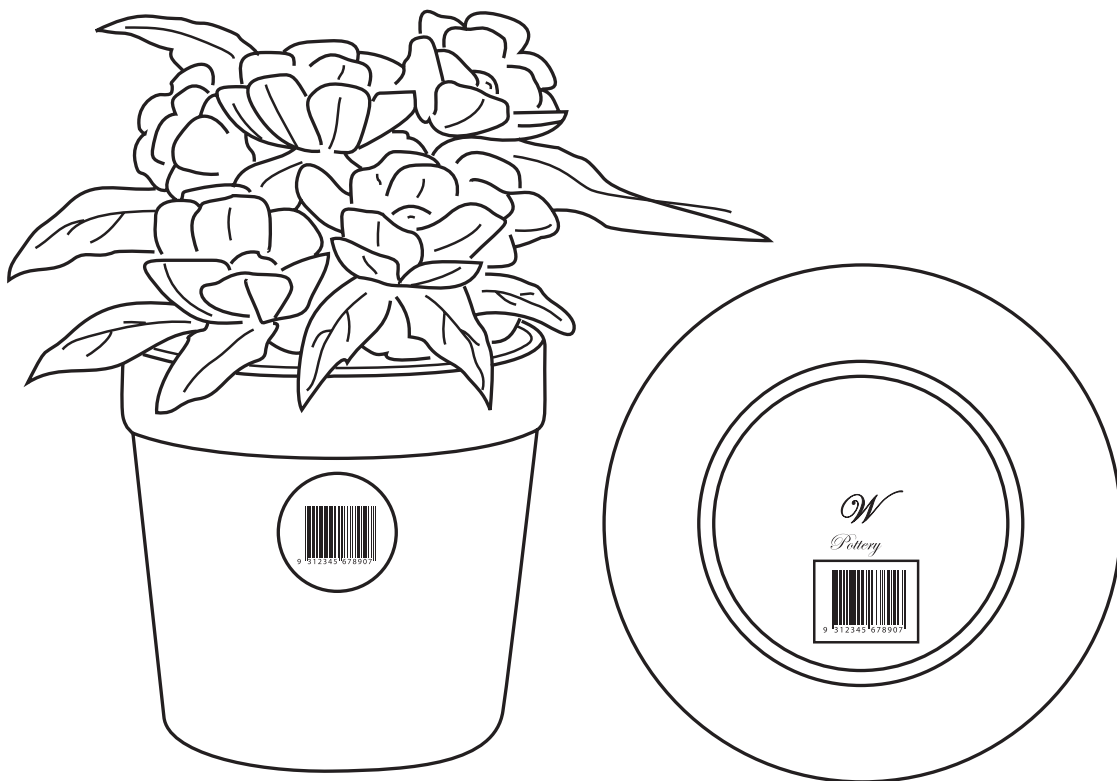


Figure 36 Symbol Placement with a Spot Label





11.4 Location Guidelines for Specific Packaging Types

11.4.1 Egg Cartons

Moulded pulp, foam, or plastic egg cartons come in sizes according to the count of the eggs contained.

The preferred location is near the edge, on the right half of the back, above the hinge on the lid, respecting the proper Quiet Zones (Light Margins) and the edge rule.

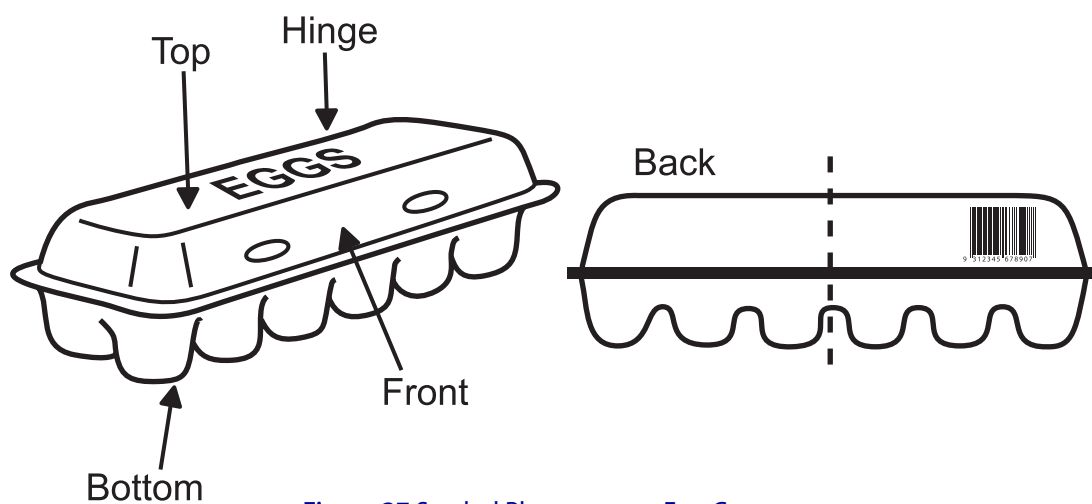


Figure 37 Symbol Placement on Egg Cartons





11.4.2 Tubes

Tubes are cylindrical shaped trade 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.

The preferred location is on the lower right quadrant of the back, near the edge, respecting the proper Quiet Zones (Light Margins) and the edge rule.

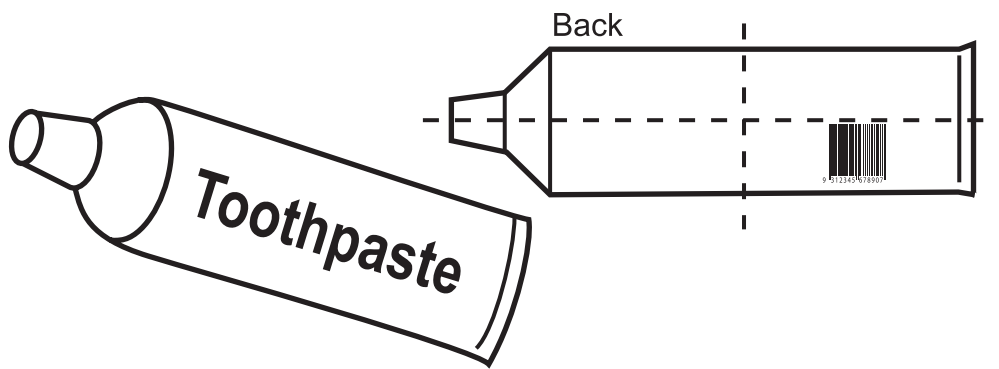


Figure 38 Symbol Placement on Tubes





11.4.3 Multipacks

Single trade items are sometimes packaged together as one unit or trade item. This is referred to as a multipack. Multipacks provide convenience to the consumer, and/or may represent a price reduction compared to purchasing trade items individually. Typical multipacks contain bottles, cans, jars and tubs.

As a general rule, a bar code symbol should be placed on every consumer package traded through the supply chain. Consequently, trade 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 POS, the multipack bar code symbol should be the only visible symbol when both the multipack and individual trade items are bar coded. The binder of the multipack acts as a screen to obscure the bar code symbols on the individual trade items.

The preferred location is on the lower right quadrant of the back, near the edge, respecting the proper Quiet Zones (Light Margins) and the edge rule.

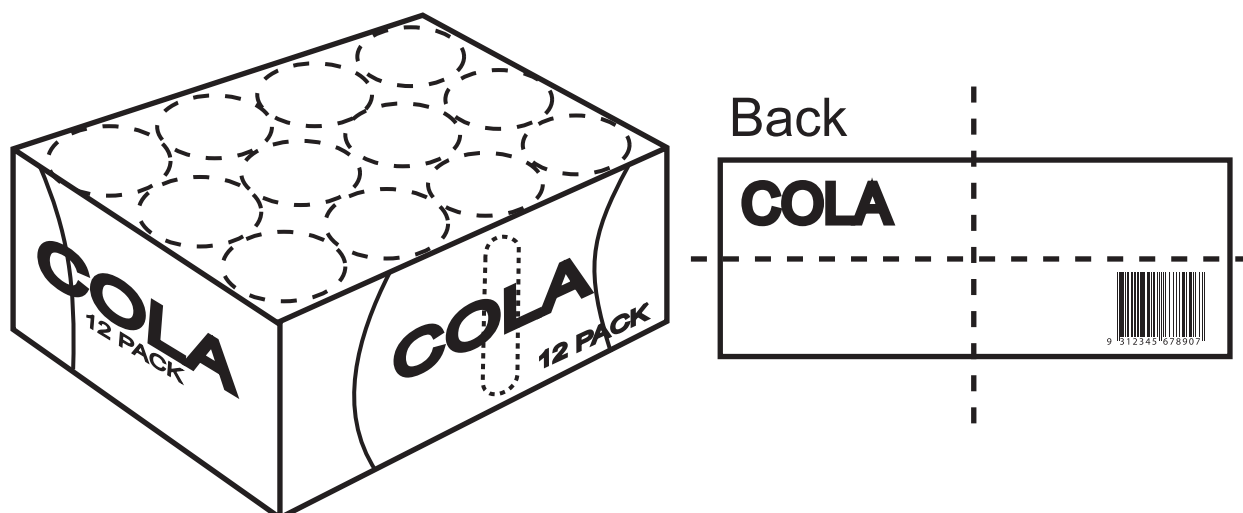
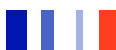


Figure 39 Symbol Placement on Multipacks





11.4.4 Books

The preferred location for the bar code symbol on a book is on the lower right quadrant of the back, near the spine, respecting the proper Quiet Zones (light Margins) and the edge rule.

Note: An additional bar code symbol (with the same GTIN) may appear on the inside cover for books which are subject to return.

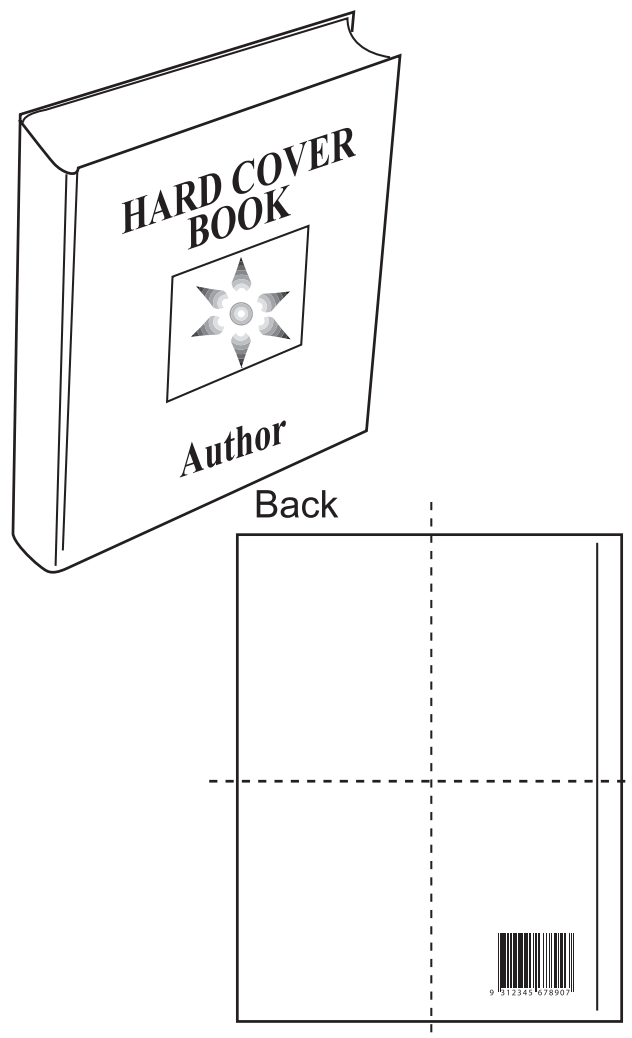


Figure 40 Symbol Placement on Books





11.4.5 Magazines

The preferred location for the bar code symbol on a magazine is on the lower left quadrant of the front, near the edge, respecting the Quiet Zones (Light Margins) and the edge rule.

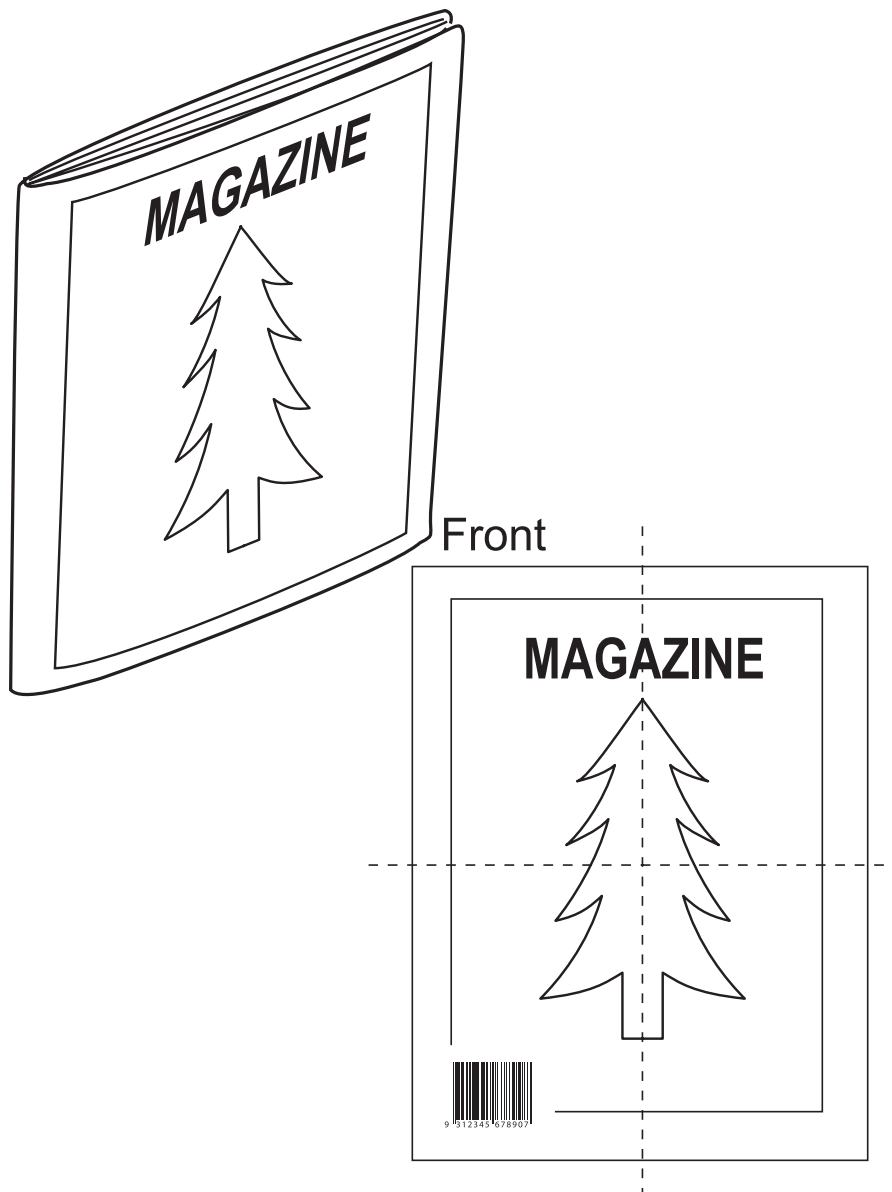


Figure 41 Symbol Placement on Magazines





11.4.6 Newspapers

The preferred location when displayed for sale folded is on the lower left quadrant of the front, near the edge, respecting the proper Quiet Zones (Light Margins) and the edge rule.

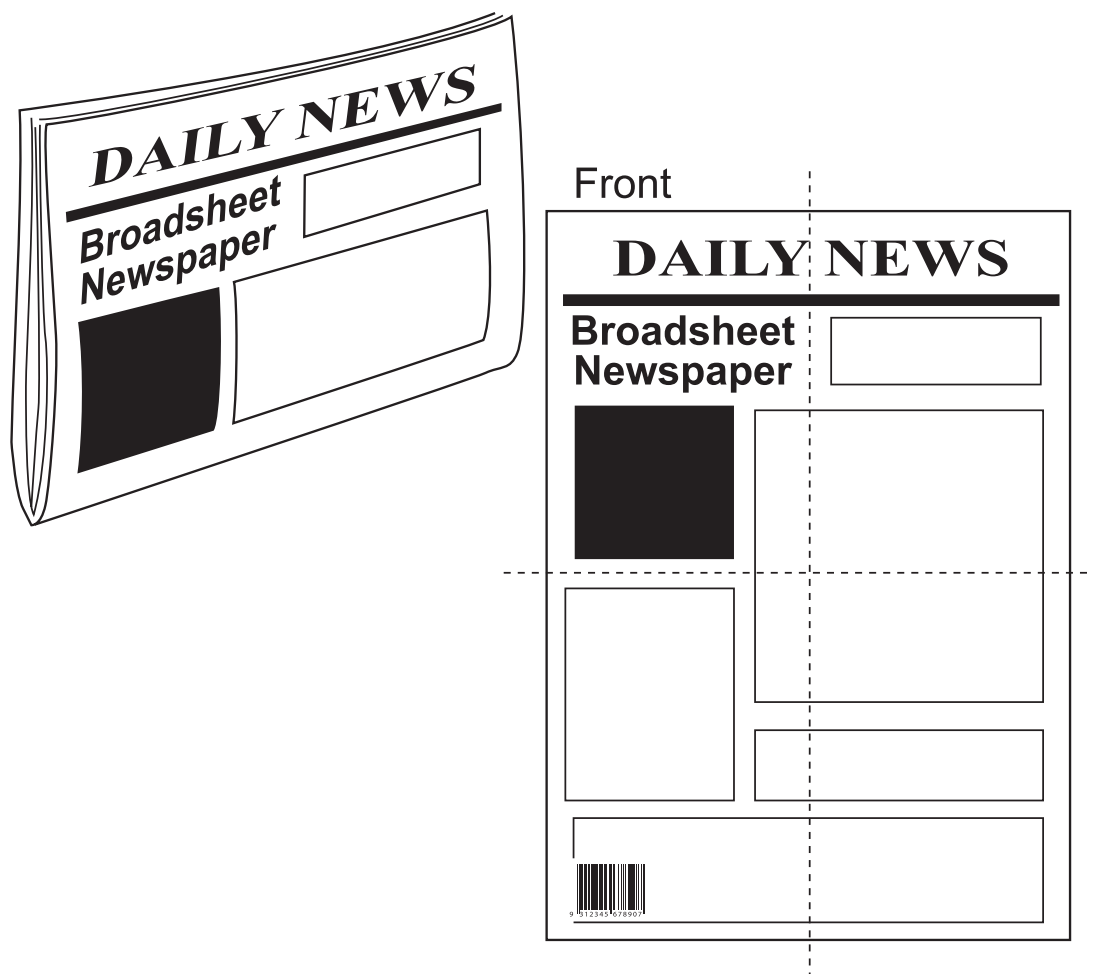


Figure 42 Symbol Placement on Newspapers Displayed for Sale Folded





The preferred location when displayed for sale as open/flat is on the lower right quadrant of the back, near the edge, respecting the proper Quiet Zones (Light Margins) and the edge rule.

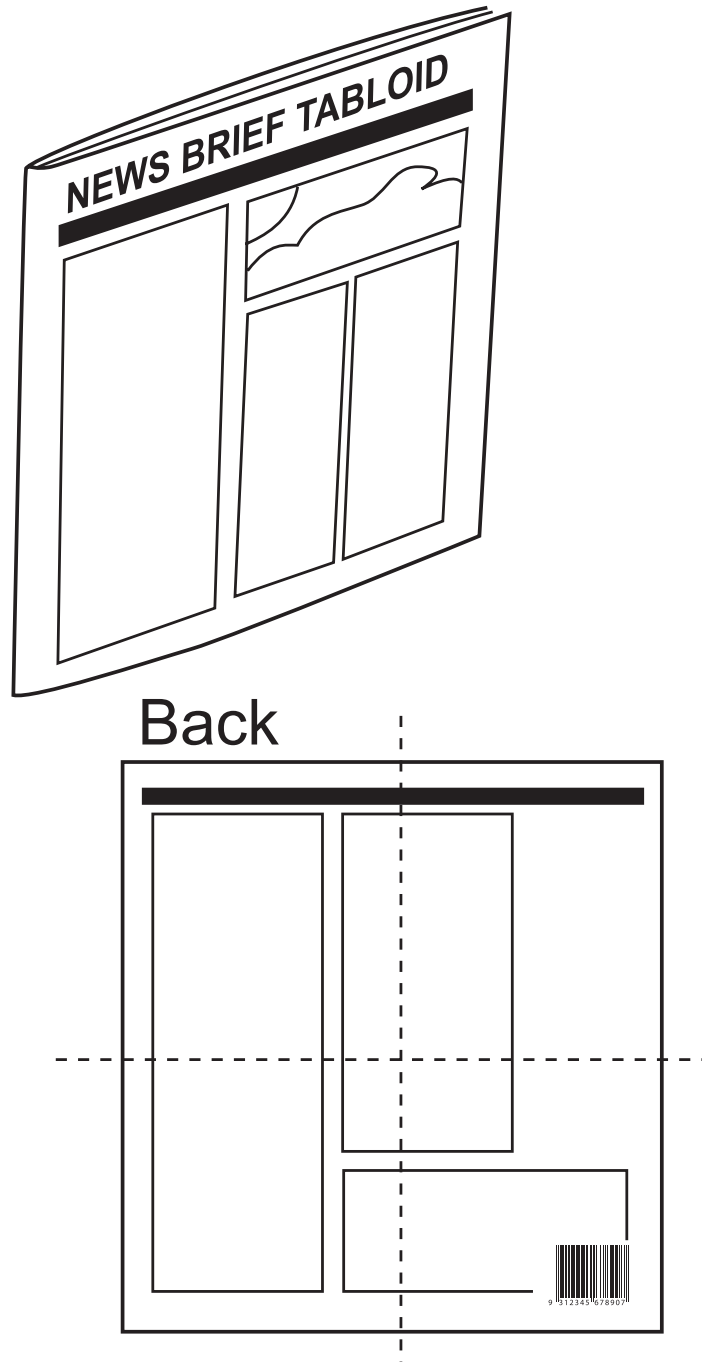


Figure 43 Symbol Placement on Newspapers Displayed for Sale Open/Flat





11.4.7 Pharmaceutical Items

If pharmaceutical trade items are too small to permit the printing of a full height bar code symbol, as a last resort, print the bar code symbol at a reduced height. Maintain as much of the bar code height as the package allows. Consider this option only after consultation with GS1 Australia.

11.4.8 Hi-Cone Packs

Hi-cones are plastic rings used to attach cans together. When using hi-cone packaging, it is not possible to obscure the bar code symbols on the individual trade items. Each can in the pack should carry an individual bar code symbol. Do not attempt to bar code the multipack separately.

11.4.9 Horticultural Items

Firmly attach the label to the trade item, for example, using a lock-in rigid label. This is also preferable for security reasons.

Lock-in rigid labels. Suitable positions for the bar code symbol (in order of preference) are on the:

- Lower part of the front of the label
- Upper part of the back of the label

Pre-printed self-adhesive labels for punnets. The preferred location for the bar code symbol is as high as possible on one of the narrow sides of the punnet. For all other trade items, the preferred location for the bar code symbol is towards the lower part of the pot, avoiding any areas of excessive moisture.

Pre-printed pots or punnets. The preferred location is on the lower part of the punnet.

Trays for carrying punnets or tubs are a separate retail trade item. They must carry a separate bar code symbol.

Pictorial tie-on labels. Suitable positions for the bar code symbol (in order of preference) are on the:

- Removable perforated section
- Area left clear on the label for the addition of a bar code symbol

11.4.10 Other Retail Trade Items

For more information on location of specific packaging types for items not mentioned in this section, such as apparel, please contact GS1 Australia.





11.1 Location for General Distribution Scanning (Non-Retail Trade Items)

11.1.1 Introduction

Items for General Distribution Scanning include any items handled as a single unit in the transport and distribution process. This definition covers a wide variety of package types, such as pallets, cartons, cases, and bins. These items can be trade items and/or logistic units.

11.1.2 General Rule

The bar code symbols on units intended for a General Distribution Scanning environment should be upright (i.e. in picket fence orientation) and placed on the sides of the unit. Each item shall have at least one bar code symbol, and two are highly recommended. The bar code symbols should be kept away from any vertical edges so that they are less likely to be accidentally damaged in transit.





11.1.3 Cartons and Outer Cases

Whilst the absolute minimum requirement for non-retail trade items is one bar code symbol, for efficiency of scanning it is highly recommended that a minimum of two symbols be printed/applied to the sides of the carton.

Ensure that:

- The lower edge of the vertical bars (not the bottom of the surrounding horizontal bearer bar of an ITF-14 Bar Code Symbol) are exactly 32mm from the lower edge of the base of the carton
- No part of the bar code symbol (including the Bearer Bars on an ITF-14 Bar Code Symbol, and Quiet Zones(Light Margins)) is closer than 19mm to any vertical edge.

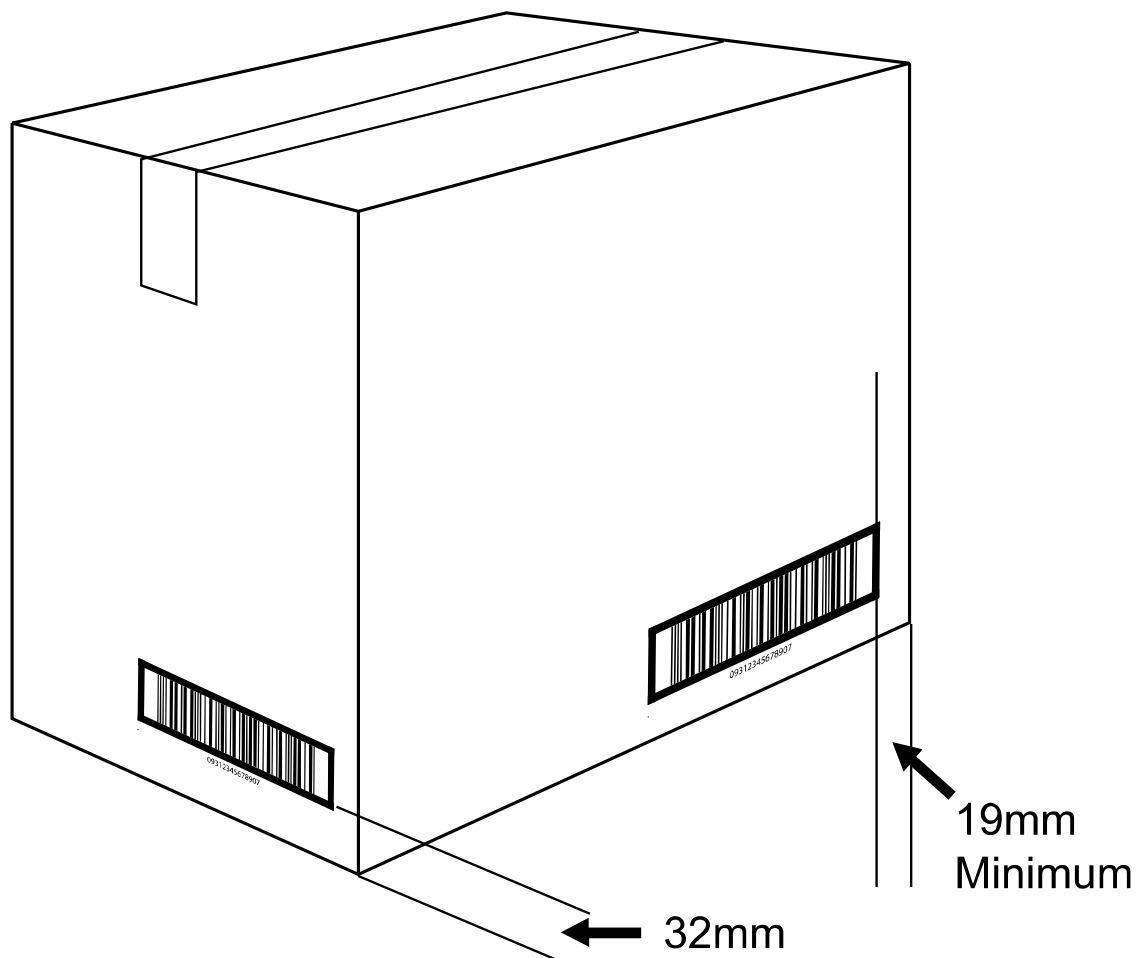


Figure 44 Symbol Placement on Cartons and Outer Cases





11.1.4 Shallow Trays

If the height of the non-retail unit is less than 50mm, making it impossible to print a full height bar code symbol with the Human Readable Interpretation below the bars, or if the construction of the unit is such that the full height bar code symbol cannot be accommodated, the following options should be considered (in order of preference):

- Place the Human Readable Interpretation to the left of the bar code symbol, outside the Quiet Zones (Light Margins)
- When the height of the unit is less than 32mm, the bar code symbol may be placed on the top of the package, with the bars perpendicular to the shortest side, no closer than 19mm from any edge

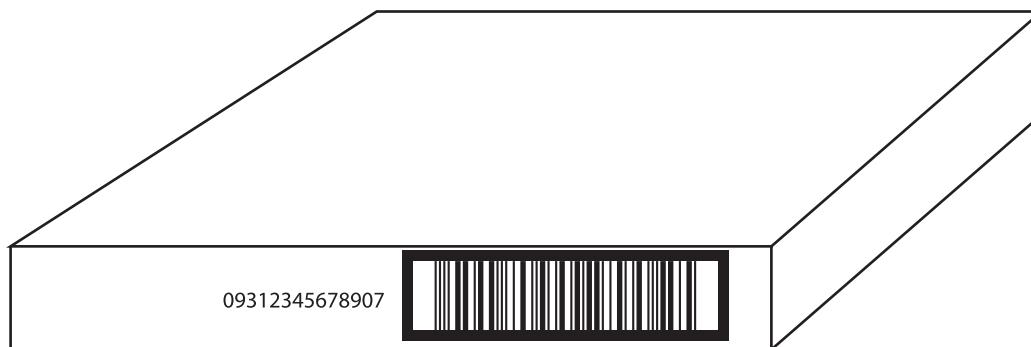


Figure 45 Symbol Placement on Shallow Trays

11.1.5 Film-Wrapped Items

If individual trade items in a film-wrapped (shrink-wrapped or stretch-wrapped) package all have bar code symbols, and the film-wrapped package also has a bar code symbol, the danger exists of a scanner reading the symbols on the trade items within the non-retail package.

Make every possible effort to obscure the bar code symbols on the trade items inside the film-wrapped package. Place the retail trade item symbols close to the base of the item, in ladder orientation. This allows tray sides to obscure whole bar code symbols, not just reduce the height of (truncate) them.

If possible, place all retail trade items in the film-wrapped non-retail package with the bar code symbols facing inwards. You can also use film-wrap that has obscuring patterns on it that hide the symbols on the inside of the wrapper.



11.1.6 Attribute Data (Add-On Symbols)

The preferred location for attribute data is aligned with and to the right or left of the main bar code symbol so that a consistent horizontal location is maintained. It should be as close as possible to the main bar code symbol whilst respecting the Quiet Zones (Light Margins) and ensuring that it does not obscure the pre-existing bar code symbol. If data can be concatenated and one bar code symbol produced, this option should be pursued.

Bar code symbols containing data essential for complete item identification (trade measurements for example) should be aligned with and to the right of the bar code symbol containing the GTIN (the main symbol).

11.1.7 Pallets

For all types of pallets, including full pallets containing individual trade items and single trade items, (such as a fridge or washing machine), bar code symbols should be placed at a height between 400mm and 800mm from the base of the unit. Including Quiet Zones (Light Margins), the bar code symbols should be no closer than 50mm from any vertical edge to avoid damage.

For pallets less than 400mm high, the bar codes should be placed as high as possible while protecting the logistics label.

For more information on numbering and bar coding pallets refer to Chapter 5 Numbering and Bar Coding Logistic Units on page 62



12 Bar Code Verification



12.1 Introduction

To maintain scanning efficiency, bar code symbols need to be printed correctly and be of a high quality. Verification equipment can assist in providing an indication of the print quality of bar code symbols.

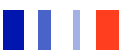
Previously, GS1 Australia analysed bar code symbol quality based on two parameters – average bar growth and print contrast. This was known as Traditional Verification. In recent years, GS1 Australia's verification service has adopted the globally used ISO/IEC 15416 method for the quality analysis of bar code symbols, which takes into account seven main parameters covering various aspects of print quality. The ISO method is fully compatible with the ANSI standards that were released by the American National Standards Institute (ANSI). This verification method can provide a standard means of reporting between printers, brand owners and trading partners.

Unlike traditional verification, the ISO method of verification looks at a bar code symbol in a similar way to the way a scanner sees it. It assesses the quality of the symbol compared to a perfect symbol, and grades the symbol with a grade ranging from 4-0 (A-F) based on how closely the symbol is to perfect. The ISO grade is intended to provide an indication, based on the print quality, of the likely scanning performance of the bar code symbol in the market place. The lower the ISO grade, the higher the possibility of scanning difficulties.

Please note that the use of a verifier should be supplemented with other appropriate checks such as visual checks in order to perform a total verification process.

When interpreting the results from a verifier it is also important to remember that:

- Verifiers do not measure bar height
- Without additional software linking the decoded data to a database, it cannot be confirmed that the data content of a bar code symbol is what it should be
- Verifiers cannot confirm the bar code symbol's dimensions are what are intended
- A verifier cannot check that the human readable translation corresponds to the encoded data
- Even a perfect bar code symbol at the time of production can be damaged or otherwise affected in its passage through the supply chain
- A Verifier cannot confirm whether the correct bar code symbology has been used for the intended scanning environment





12.2 Testing to the ISO method

GS1 utilise the ISO method of verification, and specify the minimum grade necessary for every bar code symbol, as well as specifying the verifier aperture width (size of hole in the testing equipment) and wavelength of the light source.

For example, an EAN-13 Bar Code Symbol will always be verified using a 6 mil aperture (0.15mm), a 670nm +/- 10 wavelength of light, and require a minimum ISO grade of 1.5 (C). This is typically expressed on a verification report as 1.5/06/670.

Verifiers have a menu to adjust the aperture and wavelength according to the type of bar code symbol being assessed and the magnification of the symbol.

The table below provides you with a quick reference guide to the minimum grades for each bar code symbol type, and the appropriate aperture sizes and wavelengths that should be used.

Symbology	ISO (ANSI) Passing Grade	Aperture	Wavelength (nanometers)
EAN/UPC	1.5 (C)	6 mils (0.150mm)	670nm
ITF-14 < 62.5% Magnification	1.5 (C)	10 mils (0.250mm)	670nm
ITF-14 >= 62.5% Magnification	0.5 (D)	20 mils (0.500mm)	670nm
GS1-128	1.5 (C)	10 mils (0.250mm)	670nm

TABLE 114 Required ISO Grades for GS1 Bar Code Symbols

There are several steps involved in arriving at an overall symbol grade.

Where as traditional verification relies on a single scan across a bar code symbol, the ISO verification process involves the bar code symbol being assessed based on number of scans in both directions evenly throughout the entire height of the symbol.

The requirement is for 10 scans to be taken. However, if the first 3 scans are in excess of the pass grade required and there is general consistency in the results, it is not necessary to complete the full 10 scans.

For each scan across the bar code symbol a Scan Reflectance Profile is obtained. This is simply an analogue plot of the reflectance values measured along a single line across the entire width of the bar code symbol. The x-axis of the plot shows linear distance across the symbol, while the y-axis shows the reflectance values. Light areas show as high reflectance values; dark areas show low values. The profile therefore consists of a series of peaks and valleys, the widths of which are proportional to those of the bars and spaces.



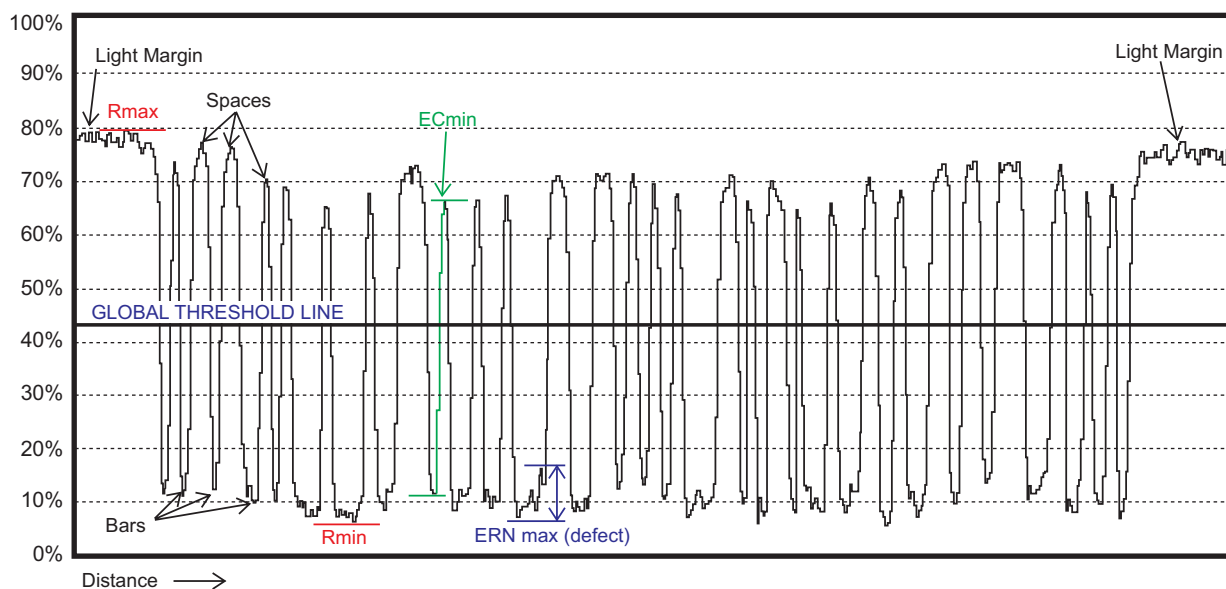


Figure 46 Scan Reflectance Profile

The Scan Reflectance Profile is then used to measure and grade the following parameters:

Decode, Symbol Contrast, Minimum Reflectance, Edge Contrast, Modulation, Defects and Decodability.

Firstly, an edge determination test is performed, which is basically whether the correct number of bars and spaces have been encountered in the Scan Reflectance Profile for the type of bar code symbol being assessed (for example an EAN-13 Bar Code Symbol should have 30 bars and 29 spaces or a total of 59 elements).

In order for all the ISO parameters to pass, all the elements need to cross an imaginary line called the global threshold. This is half way between the highest reflectance value and the lowest reflectance value. This can be seen in the above example of a Scan Reflectance Profile, Figure 46.





12.3 Parameters Assessed Using ISO Method

12.3.1 Decode - (Pass 4 or Fail 0)

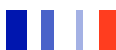
Decode uses the algorithm for decoding the bar code symbol. If the symbol can be decoded the parameter is given a pass (4). If it cannot be decoded it is given a fail (0). This parameter also assesses whether or not the correct number of elements cross the global threshold. If the correct number of elements are found a 4 is given, if not then a global threshold failure has occurred and the parameter receives a 0 grade.

Grade	Threshold
4	Passes
0	Fails

TABLE 115 Decode Grades and Tresholds

Possible causes of a Decode failure and possible remedies are:

- Symbol incorrectly encoded: Re-originate symbol; over-label with correctly encoded symbol
- Bars and spaces being out of specification due to excessive print gain or loss: Apply correct bar width reduction (BWR) when originating symbol; adjust press or printer settings
- One or more elements did not cross the global threshold. If global threshold failure occurs, this also results in a Decodability grade of 0
- Too many elements detected due to defect: Correct cause of defect; adjust press (relief printing processes) to reduce haloing (a double line impression where there should only be a single line impression); replace or clean the print head (thermal/ink-jet printing)
- Incorrect Check Digit: Correct software error in origination system; re-originate symbol; over-label with correctly calculated symbol
- Quiet Zone (Light Margin) infringement that crosses the global threshold: Enlarge box surrounding bar code symbol; ensure symbol registration to other print allows adequate Quiet Zones; reposition symbol farther from edge of label; use larger size label





12.3.2 Symbol Contrast - (4, 3, 2, 1 or 0)

This is a measure of the contrast between the bar and background colours. A bar code symbol printed in black ink on white paper will achieve the best result. Coloured backgrounds or coloured inks will affect the result. Highly glossy materials may also appear to have a lower background reflectance than expected.

The formula for calculating this measure is:

$$\text{Symbol Contrast} = \text{Reflectance Max } (R_{\text{max}}) - \text{Reflectance Min } (R_{\text{min}})$$

Grade	Threshold
4	≥70%
3	≥55%
2	≥40%
1	≥20%
0	< 20%

TABLE 116 Symbol Contrast Grades and Tresholds

Possible causes of low or failed symbol contrast and possible remedies are:

- Background too dark: Use lighter or less glossy material, or change background colour (if printed) to a lighter colour which will provide higher reflectance
- Show through from contents: Use more opaque material for package, or print opaque white underlay prior to printing symbol
- Bars too light: Change bar colour for a darker colour with lower reflectance, and increase ink weight or print head temperature (thermal printing). Watch for consequential increase in bar widths.





12.3.3 Minimum Reflectance - (Pass 4 or Fail 0)

In this assessment the reflectance value for at least one bar must be half or less than the highest reflectance value for a space. For example if the highest reflectance value is 80%, then at least one bar must register a reflectance value of 40% or less.

The formula for calculating this is:

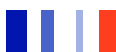
$$\text{Reflectance Max (R}_{\text{max}}) - \text{Reflectance Min (R}_{\text{min}})$$

Grade	Threshold
4	$\leq 0.5 R_{\text{max}}$
0	$> 0.5 R_{\text{min}}$

TABLE 117 Minimum Reflectance Grades and Tresholds

The cause and solution for failed Minimum Reflectance is:

- The bar colour is too light: Change bar colour to a darker colour with lower reflectance, and increase ink weight or print head temperature (thermal printing) (Note: watch for consequential increase in bar widths)





12.3.4 Minimum Edge Contrast - (Pass 4 or Fail 0)

This is the measure of the contrast between adjacent bars and spaces. The reflectance value of the bar is deducted from the reflectance value of the space. If any of these measurements is less than 15%, this parameter fails. While this grade may be acceptable, low edge contrast values may still cause low Modulation grades.

Minimum Edge Contrast is calculated according to the following formula:

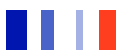
Space Reflectance (min) - Bar Reflectance (max) of the worst pair.

Grade	Threshold
4	$\geq 15\%$
0	$< 15\%$

TABLE 118 Minimum Edge Contrast Grades and Tresholds

Possible causes of failed Minimum Edge Contrast and possible remedies are:

- Variations in ink weight in different parts of a symbol (uniformity of ink spread, ink viscosity): Adjust press settings to ensure even inking
- Show through of contents: Use more opaque material for package, or print white underlay prior to printing symbol
- Fluctuations in the background reflectance (for example areas of darker material in recycled corrugated substrates) : Use a more consistent substrate or one with higher reflectance
- Excessive ink spread: Apply correct bar width reduction (BWR) when originating symbol





12.3.5 Modulation - (4, 3, 2, 1 or 0)

Modulation is a measure of Edge Contrast as a proportion of Symbol Contrast. The closer the Edge Contrast is to the overall Symbol Contrast the better as this implies that overall the differences between the bar and space reflectance values are consistent.

The formula for assessing this is:

Minimum Edge Contrast / Symbol Contrast

Grade	Threshold
4	≥ 0.70
3	≥ 0.60
2	≥ 0.50
1	≥ 0.40
0	< 0.40

TABLE 119 Modulation Grades and Tresholds

Modulation will be reduced for the same reasons as when Minimum Edge Contrast is low. A scanner will tend to see spaces as narrower than bars and also to see narrow elements as less distinct than wider ones. Consequently, if there is significant bar gain, Modulation will be reduced. Measuring with an aperture that is larger than specified will also reduce Modulation.

Possible causes of low or failed Modulation and the possible remedies are:

- Fluctuations in the background reflectance (for example areas of darker material in recycled corrugated substrates) :
Use a more consistent substrate or one with higher reflectance
- Show through of contents: Use more opaque material for package, or print white underlay prior to printing symbol
- Excessive ink spread: Apply correct bar width reduction (BWR) when originating symbol





12.3.6 Defects - (4, 3, 2, 1 or 0)

In this instance the equipment is looking for defects in the bar code symbol, either in the form of flaws in the substrate being printed onto or in the bar code symbol printing.

The verifier looks at the uniformity of the reflectance throughout each individual element of the bar code symbol. If this varies significantly then there is some defect within the symbol

The formula for assessing this is:

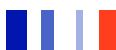
Element Reflectance Non-Uniformity (ERN) / Symbol Contrast

Grade	Threshold
4	≤0.15
3	≤0.20
2	≤0.25
1	≤0.30
0	> 0.30

TABLE 120 Defects Grades and Tresholds

Possible causes of low or failed Defects and possible remedies are:

- Defective print head elements (thermal printing or ink-jet printing), which will tend to produce an unprinted line running through the symbol in the direction of printing: Clean or replace print head
- Satellite (ink droplets in the white area surrounding the printed bars): Clean head; change ink formulation
- Haloing (e.g. a double line impression where there should only be a single line impression): Adjust impression pressure and/or ink viscosity
- Incorrect matching of thermal transfer ribbons and substrate (poor adhesion of ink to surface): Use correct ribbon for substrate; use smoother substrate
- Insufficient Quiet Zones (Light Margins) where the infringement does not cross the global threshold: Enlarge box surrounding bar code symbol; ensure symbol registration to other print allows adequate Quiet Zones; reposition symbol farther from edge of label; use larger size label





12.3.7 Decodability – (4, 3, 2, 1 or 0)

This parameter is the measure of how close the Scan Reflectance Profile is to approaching Decode failure. Each symbology has published dimensions for element widths and provides margins or tolerances for errors in the printing and reading process. Decodability measures the amount of margin left within these tolerances before decode failure will occur.

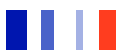
Grade	Threshold
4	≥ 0.62
3	≥ 0.50
2	≥ 0.37
1	≥ 0.25
0	< 0.25

TABLE 121 Decodability Grades and Tresholds

Decodability grades are influenced by bar gain or loss in most symbologies and by distortion of the symbol. Distortion can occur with relief printing processes, such as flexography, when the printing plate is stretched around the press cylinder with the bars parallel to the cylinder axis (e.g. at right angles to the print direction). A common reason for distortion with digitally-originated images is that they have been rescaled in graphics software, resulting in uneven addition or removal of pixels to or from the element widths. Print processes that tend to produce irregular bar edges, such as ink-jet and photogravure, will also likely give lower Decodability grades.

Possible causes of low or failed Decodability and possible remedies are:

- Excessive bar gain or loss (systematic): Apply correct bar width reduction (BWR) when originating symbol; adjust press settings
- Element width gain or loss (non-systematic): Correct missing pixels (burnt-out print head elements, blocked ink-jet nozzles); rectify cause of defects
- Distortion of symbol (uneven stretching of flexographic plate; non-linear disproportioning in plate-making process): Print symbol with height of bars parallel to direction of printing; do not disproportion bar code image in plate-making
- Rescaling of digitally-originated images: Ensure symbol is created in correct size; ensure software matches module widths to integer number of pixels after all adjustments
- Irregular element edges (ink-jet, photogravure, screen process printing): Change print technology; increase X-dimension/magnification factor; re-orient symbol relative to cylinder engraving angle/screen mesh
- Global Threshold failure. Refer to the Decode parameter on page 198
- Within the EAN/UPC Symbology, characters 1, 2, 7 and 8 may fail this parameter as they require an additional adjustment to their bar widths. Please refer to the Symbology Detail chapter in the GS1 Australia User Manual – Symbology and Printing for further details





12.3.8 Overall Symbol Grade

For each individual scan the lowest single grade of one of the seven assessed parameters (being the weakest link in the chain) becomes the symbol grade. After the required amount of scans have been taken, the symbol grades are averaged, and this becomes the Overall Symbol Grade.

- The target measurement for all bar code symbols is ISO Grade 4
- The minimum acceptable measurement is ISO Grade 1.5
- The only exception is for ITF-14 Bar Code Symbols with a magnification equal to or greater than 62.5% (X-dimension 0.64mm), for which it may be difficult to achieve better than a Grade 0.5
- For ITF-14 Bar Code Symbols that will be scanned in an automated scanning environment (fixed mount, conveyerised) an overall symbol grade of at least 1.0 is recommended
- The ISO grade achieved may provide a basis for acceptance of bar coded items by your trading partners. It is recommended that companies check with their trading partners for their specific minimum ISO grade requirements

ANSI to ISO Grade Conversion Table	
A	3.5 to 4.0
B	2.5 to 3.4
C	1.5 to 2.4
D	0.5 to 1.4
F	Less than 0.5

TABLE 122 ANSI to ISO Grade Conversion Table

Adherence to the GS1 guidelines outlined in this manual will aid in achieving an acceptable ISO grade.

GS1 Australia provides a bar code verification service, which utilises the ISO method and provides customers with a Bar Code Verification Report. Information on submitting samples or ISO verification can be obtained from www.gs1au.org or by contacting the Help Desk on 1300 366 033.



Appendix A



Manual Check Digit Calculation

Trade Item and Logistic Identification Numbers

Below is a detailed explanation on how to calculate the Check Digits for the different length GS1 Identification Keys.

Note: The Check Digit for a Zero Suppressed GTIN-12 (encoded in a UPC-E Bar Code Symbol) is calculated using the first eleven digits of the GTIN-12 in its expanded form.

Digit Positions																								
8-Digit ID Key											n_1	n_2	n_3	n_4	n_5	n_6	n_7	n_8						
12-Digit ID Key											n_1	n_2	n_3	n_4	n_5	n_6	n_7	n_8	n_9	n_{10}	n_{11}	n_{12}		
13-Digit ID Key											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}	
14-Digit ID Key											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}
18-Digit ID Key	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 = <i>Sum</i>																								
Subtract sum from the next highest multiple of ten = <i>Check Digit</i>																								

TABLE 123 Manual Check Digit Calculation

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}
Number <i>without</i> Check Digit	9	3	1	2	3	4	5	6	7	8	9	0	
Step 1: Multiply by	x	x	x	x	x	x	x	x	x	x	x	x	
	1	3	1	3	1	3	1	3	1	3	1	3	
Step 2: Add up results to <i>sum</i>	=	=	=	=	=	=	=	=	=	=	=	=	
	9	9	1	6	3	12	5	18	7	24	9	0	=103
Step 3: Subtract <i>sum</i> from next highest multiple of ten (110) = Check Digit (7)													
Number <i>with</i> Check Digit	9	3	1	2	3	4	5	6	7	8	9	0	7

TABLE 124 Example of a Manual Check Digit Calculation for a GTIN-13





Variable Weight Identification Numbers

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.

Digit	0	1	2	3	4	5	6	7	8	9
Weighted product	0	2	4	6	8	9	1	3	5	7

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.

TABLE 125 Check Digit Calculation Weighting Factor 2-

Digit	0	1	2	3	4	5	6	7	8	9
Weighted product	0	3	6	9	2	5	8	1	4	7

Calculation rule: The digit is multiplied by 3. The units digit of the result is the weighted product.

TABLE 126 Check Digit Calculation Weighting Factor 3

Digit	0	1	2	3	4	5	6	7	8	9
Weighted product	0	5	1	6	2	7	3	8	4	9

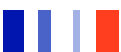
Calculation rule: The digit is multiplied by 5. The units digit and the tens digit of the result are added together. The result of this sum is the weighted product.

TABLE 127 Check Digit Calculation Weighting Factor 5+

Digit	0	1	2	3	4	5	6	7	8	9
Weighted product	0	5	9	4	8	3	7	2	6	1

Calculation rule: The digit is multiplied by 5. The tens digit is the result subtracted from the result. The units digit of the result of this subtraction is the weighted product.

TABLE 128 Check Digit Calculation Weighting Factor 5-





Five-Digit Price Field Calculation

Digit Position	1	2	3	4	5
Weighting Factor	5+	2-	5-	5+	2-

TABLE 129 Assigned Weighting Factors for a Five-Digit Price Field Calculation

Step 1: Determine the weighted product for each number in positions one to four according to the assigned weighting factors.

Step 2: Add the products of step 1.

Step 3: Subtract the result from the nearest equal or higher multiple of 10.

Step 4: Take the result and search for the same number in the weighted product row of figure – Weighting Factor 5. The check digit is the number in the digit row of the same column.

Position of the price field	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	+	+	+	+	+	= 33
Step 3: Result of subtraction (40-33)						= 7
Step 4: Weighted product 7 in the figure weighting factor 5- shows number 6 to be the check digit						

TABLE 130 Example of a Check Digit Calculation for a Five-Digit Price Field





Four-Digit Price Field Calculation

Digit Position	1	2	3	4
Weighting Factor	2-	2-	3	5-

TABLE 131 Assigned Weighting Factors for a Four-Digit Price Field Calculation

Step 1: Determine the weighted product for each number in positions one to four according to the assigned weighting factors.

Step 2: Add the products of step 1.

Step 3: Multiply the result of step 3 by the factor 3. The units digit of the result is the check digit.

Position of the 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	+	+	+	+	= 13
Step 3: Multiply by 3					= 39

The unit position of Step 3, in this case 9, is the Check Digit.

TABLE 132 Example of a Check Digit Calculation for a Four-Digit Price Field



Appendix B



How to Create a Zero Suppressed GTIN-12

Note: To establish a Zero Suppressed GTIN-12, first allocate a GTIN-12 according to the rules set below. The Zero Suppressed GTIN-12 Check Digit is calculated on the original GTIN-12 (the expanded number), not the number in its zero suppressed form.

If the company's number ends in 000, 100, or 200, there are 1,000 item numbers available between 00000 and 00999. Obtain the six characters from:

- the first two characters after the leading **0** of the company's number
- followed by the last three characters of the item number
- followed by the third character of the company's number

If a company's number ends in 300, 400, 500, 600, 700, 800, or 900, there are 100 item numbers available between 00000 and 00099. Obtain the six characters from:

- the first three characters (after the leading **0** of the company's number)
- followed by the last two characters of the item number
- followed by **3**

If a company's number ends in 10, 20, 30, 40, 50, 60, 70, 80, or 90, there are 10 item numbers available between 00000 and 00009. Obtain the six characters from:

- the first four characters (after the leading **0** of the company's number)
- followed by the last character of the item number
- followed by **4**

If a company's number does not end in 0, then five item numbers between 00005 and 00009 are available. Obtain the six characters from:

- all five characters (after the leading **0** of the company's number)
- followed by the last character of the item number





Decoding a Zero Suppressed GTIN-12

The UPC-E Bar Code Symbol is encoded in a special way that leaves out some zeros that can occur within the number. By suppressing these zeros, effectively the area needed for the bar code symbol can be halved.

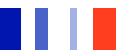
The decoding process returns the suppressed zeros to the number.

To decode a Zero Suppressed GTIN-12 into a full GTIN-12 use the value of the **second last** human readable digit (**not** the Check Digit) to determine the way in which to insert zeros. See TABLE 133

Note: Scanning equipment is normally programmed to decode the UPC-E Bar Code Symbol in accordance with the rules in this section.

GTIN-12 zero suppressed Human readable digits	Decoded into GTIN-12	
	UCC Company prefix	Item reference
0 X ₁ X ₂ X ₃ X ₄ X ₅ 0 C	0 X ₁ X ₂ 0 0 0	0 0 X ₃ X ₄ X ₅ C
0 X ₁ X ₂ X ₃ X ₄ X ₅ 1 C	0 X ₁ X ₂ 1 0 0	0 0 X ₃ X ₄ X ₅ C
0 X ₁ X ₂ X ₃ X ₄ X ₅ 2 C	0 X ₁ X ₂ 2 0 0	0 0 X ₃ X ₄ X ₅ C
0 X ₁ X ₂ X ₃ X ₄ X ₅ 3 C	0 X ₁ X ₂ X ₃ 0 0	0 0 0 X ₄ X ₅ C
0 X ₁ X ₂ X ₃ X ₄ X ₅ 4 C	0 X ₁ X ₂ X ₃ X ₄ 0	0 0 0 0 X ₅ C
0 X ₁ X ₂ X ₃ X ₄ X ₅ 5 C	0 X ₁ X ₂ X ₃ X ₄ X ₅	0 0 0 0 5 C
0 X ₁ X ₂ X ₃ X ₄ X ₅ 6 C	0 X ₁ X ₂ X ₃ X ₄ X ₅	0 0 0 0 6 C
0 X ₁ X ₂ X ₃ X ₄ X ₅ 7 C	0 X ₁ X ₂ X ₃ X ₄ X ₅	0 0 0 0 7 C
0 X ₁ X ₂ X ₃ X ₄ X ₅ 8 C	0 X ₁ X ₂ X ₃ X ₄ X ₅	0 0 0 0 8 C
0 X ₁ X ₂ X ₃ X ₄ X ₅ 9 C	0 X ₁ X ₂ X ₃ X ₄ X ₅	0 0 0 0 9 C

TABLE 133 Placement of Zeros When Decoding a Zero Suppressed GTIN-12





Differences Between UPC-A and EAN-13 Bar Code Symbols

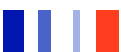
UPC-A and EAN-13 Bar Code Symbols are identical except for the following:

Quiet Zones (Light Margins): In the UPC-A Bar Code Symbol both the right and left light margin areas are $9x$, where X = X-dimension. (2.97mm at nominal size, 100% magnification)

First and Last Human Readable Digits: With UPC-A Bar Code Symbols the first and last human readable digits are smaller than the other digits. For more information on the human readable digits in a UPC-A Bar Code Symbol refer to page

Extended Bars: The start bars and the end bars of the UPC-A symbol characters, representing the first and last digits, extend down to the same level as the guard bars.

Variable Parity: With UPC-A Bar Code Symbols there is no variable parity. For more information refer to Variable Parity Encoding of the 13th Digit in the GS1 Australia User Manual – Symbology & Printing.



Appendix D



GS1 Country Prefixes

GS1 International issues country prefix values to member organisations.

As new prefixes are constantly being added, an up to date list can be viewed at the GS1 Global Office website – www.gs1.org

U.P.C. Prefixes

GS1 US has allocated U.P.C. Company Prefixes of varying lengths, and for a range of purposes.

UCC Prefix	
0, 6, 7	A five-digit U.P.C. Company Prefix for the creation of GS1 Identification Keys.
2	Random weight Point-of-Sale trade items for restricted circulation.
3	National Drug Code (NDC) and National Health Related Item Code (NHRIC). Note that the bar code symbol is not affected by the various internal structures possible with the NDC or NHRIC. Applicable only in the US.
4	For use without code format restriction and with check digit protection for internal company applications. Applicable only in the US.
5	For use on coupons.
1, 8	Variable Length U.P.C. Company Prefixes for the creation of GS1 Identification Keys.
9	Reserved for uses unidentified at this time.

Retailers in Australia can expect to encounter items carrying a GTIN-12 with U.P.C. Prefixes 0, 1, 6, 7 and 8. In the near future they can also expect to encounter items with the U.P.C. Prefix of 9.

TABLE 134 U.P.C. Prefixes



Appendix E



Contact Us

GS1 Australia

Axxess Corporate Park
Unit 100 / 45 Gilby Road
Mount Waverley Vic 3149

Locked Bag 2
Mount Waverley Vic 3149

Ph: 61 3 9558 9559
Fax: 61 3 9558 9551

Lakes Business Park
Building 4B, 2 - 4 Lord Street
Botany NSW 2019

Locked Bag 7002
Botany NSW 2019

Ph: 61 2 9700 0933
Fax: 61 2 9700 0820

National number: 1300 366 033
Website: www.gs1au.org
ABN 67 005 529 920



Glossary



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.

auxiliary guard patterns

Components of the EAN/UPC Symbology. The centre guard bar pattern, the left guard bar pattern, and the right bar patterns that are represented in some of the symbols are specific types of auxiliary guard pattern.





auxiliary pattern

See auxiliary guard pattern

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 GS1 System numbering and bar code symbols on a given trade item. The administrator of an GS1 Company Prefix.

carrier

The party that provides freight transportation services or 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 GS1 Check Digit Calculation)

Clear Area

See Quiet Zone.

Company Number

A component of the GS1 Company Prefix. GS1 Member Organisations assign GS1 Company Prefixes to entities that administer the allocation of GS1 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 GS1 Company Prefix are set by the GS1 Member Organisations.

Composite Component®

This term is used to refer to either a linear or 2D symbol component within a composite symbol.





Composite Symbology®

An GS1 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 Matrix

A standalone, two-dimensional matrix symbology that is made up of square modules arranged within a perimeter finder pattern. Data Matrix ISO version ECC 200 is the only version that supports GS1 System identification numbers, including Function Code 1. Data Matrix Symbols are read by two-dimensional scanners or vision systems.

Data Standard

The entirety of all GS1 System data standardised in meaning and structure.

data structure

GS1 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.

Default Front

The side of a consumer trade item that is used to capture dimensional attributes for the purpose of data alignment.

direct part marking

Direct part marking refers to the process of marking a symbol on an item using an intrusive or non-intrusive method.

direct print

A process in which the printing apparatus prints the symbol by making physical contact with a substrate (e.g. flexography, ink jet, dot peening).

Document Type

The part of the data structure allocated by the document issuer to identify a document for a given GS1 Company Prefix.

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 GTIN-13, Coupon-13, RCN-13, and VMN-13.

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 GTIN-8 and RCN-8.

EAN-8 Composite Symbology®

The Composite Symbology® that utilises an EAN-8 Bar Code Symbol as the linear component.

EANCOM®

The GS1 Standard for Electronic Data Interchange (EDI) is a detailed implementation guidelines of the UN/EDIFACT standard messages using GS1 Identification Keys.





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.

Electronic Product Code

An identification scheme for universally identifying physical objects (e.g. trade items, assets, and locations) via RFID tags and other means. The standardised EPC data consists of an EPC (or EPC identifier) that uniquely identifies an individual object, as well as an optional Filter Value when judged to be necessary to enable effective and efficient reading of the EPC tag.

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 GS1 System endorsed data carrier.

EPC Middleware

EPC Middleware is the component of the EPCglobal Network that manages real-time read events and information, provides alerts, and manages the basic read information for communication to EPC Information Services and a company's other existing information systems. EPCglobal is developing a software interface standard for services enabling data exchange between an EPC reader or network of readers and information systems.

EPC Object Naming Service

Business information systems need a way of matching the Electronic Product Code to information about the associated item. The ONS is an automated networking service that provides this service by pointing computers to sites on the World Wide Web.

EPC tag

RFID tag that complies with the EPCglobal standard and contains an Electronic Product Code.

EPCglobal Inc

A not-for-profit organisation entrusted by industry to establish and support the Electronic Product Code and the global adoption of the EPCglobal Network as the global standards for immediate, automatic and accurate identification of any item in the supply chain of any company, in any industry, in any country in the world.

EPCglobal Network

A set of technologies that enable immediate, automatic identification and sharing of information on items in the supply chain.





EPCglobal Tag Data Standard

A specification or set of guidelines that, after extensive consensus-building, has received the endorsement of EPCglobal members and the EPCglobal Board of Governors.

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.

FNC 1

Abbreviation for Function Code 1.

Full String

The data transmitted by the bar code reader from reading a data carrier, including Symbology Identifier and Element String(s).

Function Code 1 (FNC1)

A symbology element used to form the double start pattern of a GS1-128 (previously 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.

GDTI

The GS1 Identification Key comprising a GS1 Company Prefix, Document Type, and Check Digit used to identify documents.

General Distribution Scanning

Scanning environments that include bar coded trade items packaged for transport, logistic units, assets and location tags.

GIAI

The GS1 Identification Key comprising a GS1 Company Prefix and Individual Asset Reference used to identify assets.





GLN

The GS1 Identification Key comprising a GS1 Company Prefix, Location Reference, and Check Digit used to identify physical locations of legal entities.

Global Document Type Identifier

The GS1 Identification Key for a document type with an optional serial number.

Global Individual Asset Identifier

The GS1 Identification Key for an individual asset.

Global Location Number

The GS1 Identification Key to identify physical or legal entities.

Global Returnable Asset Identifier

The GS1 Identificaiton Key for returnable assets.

Global Service Relation Number

The GS1 Identification Key used to identify the relationship between a service provider and service recipient.

Global Trade Item Number®

The GS1 Identification Key for trade items.

GRAI

The GS1 Identification Key comprising a GS1 Company Prefix, Asset Type, Check Digit, and optional serial number used to identify returnable assets.

GS1 Check Digit Calculation

An GS1 System algorithm for the calculation of a Check Digit to verify accuracy of data.

GS1 Common Currency Coupon Code

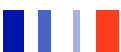
An identification number for coupons issued in a common currency area (e.g. the euro currency) that uses the Coupon-13 Data Structure.

GS1 Company Prefix

Part of the international GS1 System identification number consisting of a GS1 Prefix and a Company Number, both of which are allocated by a GS1 Member Organisation.

GS1 EANCOM

A component of GS1eCom. The GS1 standard for Electronic Data Interchange providing users with a global business messaging language of e-business to conduct effieicnt Internet-based electronic commerce.





GS1 General Specifications

Defines the GS1 System data and application standards related to the marking and automatic identification of trade items, locations, logistic units, assets, and more using bar code, RFID, and GS1 Identification Keys.

GS1 Global Data Dictionary

A repository tool used to record GS1 member standards agreements on business terms and definitions used by all business units.

GS1 Global Office

Based in Brussels, Belgium, and Princeton, USA, is an organisation of GS1 Member Organisations that manages the GS1 System,

GS1 Global Product Classification

A component of GS1 GDSN. It provides the required global framework for trade item categorisation supporting global data synchronisation.

GS1 Global Registry

A component of GS1 GDSN. It acts as a pointer (directory for the registration) to source data pools where catalogue item and party master data is housed. It also fulfils the role of matching subscriptions to registrations to facilitate the synchronisation process.

GS1 Global Standards Management Process

A component of GS1 Services. It is offered as an integral part of GS1's standards development and maintenance process. It allows for user members active involvement.

GS1 Identification Key

A numeric or alphanumeric field managed by GS1 to ensure the global, unambiguous uniqueness of the identifier in the open demand or supply chain.

GS1 Identification Keys

A globally managed system of numbering used by all GS1 Business Units to identify trade items, logistic units, locations, legal entities, assets, service relationships, and more. The Keys are built by combining GS1 member company identifiers (GS1 Company Prefix) with standards based rules for allocating reference numbers.

GS1 Member Organisation

A member of GS1 that is responsible for administering the GS1 System in its country (or assigned area). This task includes, but is not restricted to, ensuring user companies make correct use of the GS1 System, have access to education, training, promotion and implementation support, and have access to play an active role in GSMP.

GS1 Prefix

A number with two or more digits, administered by the GS1 global Office that is allocated to GS1 Member Organisations or for Restricted Circulation Numbers.



GS1 System

The specifications, standards, and guidelines administered by GS1.

GS1 XML

A component of GS1 eCom. It represents the GS1 standard for Extensible Markup Language schemas providing users with a global business messaging language of eBusiness to conduct efficient Internet-based electronic commerce.

GS1-128 Bar Code Symbology (previously UCC/EAN-128)

A subset of the Code 128 that is utilised exclusively for GS1 System data structures.

GS1-128 Composite Symbology

A composite symbology that utilises a GS1-128 Bar Code Symbol as the linear component.

GS1-8 Prefix

A one-, two-, or three-digit index number, administered by GS1, denoting the area of distribution of trade items identified by a GTIN-8 or a number used in internal applications (see RCN-8).

GSRN

Abbreviation for the 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.

GTIN-12

The 12-digit GS1 Identification Key composed of a U.P.C. Company Prefix, Item Reference, and Check Digit used to identify trade items.

GTIN-13

The 13-digit GS1 Identification Key composed of a GS1 Company Prefix, Item Reference, and Check Digit used to identify trade items.

GTIN-14

The 14-digit GS1 Identification Key composed of an Indicator digit (1-9), GS1 Company Prefix, Item Reference, and Check Digit used to identify trade items.

GTIN-8

The 8-digit GS1 Identification Key composed of a GS1-8, Item Reference, and Check Digit used to identify trade items.





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.

Hanging Item

Any consumer trade item that is normally presented in the store in a hanging position.

Header

Identifies the length, type, structure, version and generation of Electronic Product Code.

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 from 1 to 9 in the leftmost position of the GTIN-14.

Individual Asset

An entity that is part of the inventory of a given company. (See also Returnable Asset.)

Interleaved 2-of-5

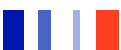
See ITF-14 Symbol.

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 GS1 Company Prefix.

Item Reference Number

See Item Reference.

ITF Symbology

The Interleaved 2-of-5 Symbology.

ITF-14 Bar Code Symbol

An ITF Symbol used by the GS1 System to carry GTINs.

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 Global Location Number.

Location Reference

A number within an 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. It is identified with SSCC.





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 GS1 Company Prefix.

Manufacturer's Number

See GS1 Company Prefix.

measure check-digit

A digit calculated from the measure field of an Element String encoded using the EAN/UPC Symbology. 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 10

Modulo 10 creates a Check Digit according to the Modulo 10 algorithm specified in the GS1 General Specifications.

Modulo 103 GS1-128 Symbol Check Character

A number that results from a modulo calculation that is encoded in the GS1-128 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.

Natural Base

The side of a non-consumer trade item package that is used as a reference point for capturing dimensional attributes for the purpose of data alignment.

Non-GTIN® Packs

A packaging level for trade items where there is no trading partner requirement for GTIN identification. If a GTIN is required, then this item becomes a retail consumer trade item or standard trade item grouping.





Number System Character

See UCC Prefix.

Numbering Organisation (NO)

See EAN Member Organisation.

Object Class

Similar to stock keeping unit SKU or trade item level.

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 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.

Primary bar code

The bar code containing the identification number of the item (e.g. GTIN®, SSCC, etc.). Used to determine the placement of any additional bar code information.

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.

radio frequency

Any frequency within the electromagnetic spectrum associated with radio wave propagation. When a radio frequency current is supplied to an antenna, an electromagnetic field is created that then is able to propagate through space. Many wireless technologies are based on radio frequency field propagation.

Radio Frequency Identification

A data carrier technology that transmits information via signals in the radio frequency portion of the electromagnetic spectrum. A Radio Frequency Identification system consists of an antenna and a transceiver, which read the radio frequency and transfer the information to a processing device, and a transponder, or tag, which is an integrated circuit containing the radio frequency circuitry and information to be transmitted.

RCN-12

A 12-digit Restricted Circulation Number (see Restricted Circulation Number).

RCN-13

A 13-digit Restricted Circulation Number (see Restricted Circulation Number).

RCN-8

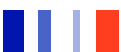
An 8-digit Restricted Circulation Number (see Restricted Circulation Number).

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 Circulation Numbers

Signifies a GS1 identification number used for special applications in restricted environments, defined by the local GS1 Member Organisation (e.g., restricted within a country, company, industry). They are allocated by GS1 for either internal use by companies or to GS1 Member Organisations for assignment based on business needs in their country (e.g., variable measure product identification, couponing).

retail consumer trade item

The trade item intended to be sold to the end consumer at retail Point-of-Sale. They are identified with a GTIN-13, GTIN-12 or GTIN-8 using an EAN/UPC Symbol.

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).

Returnable Asset

A reusable entity owned by a company that is used for transport and storage of goods.

RFID reader

Also known as an Interrogator or a reader, a Radio Frequency Identification reader communicates via radio waves with RFID tags and delivers the information in a digital format to a computer system.

RFID Tag

A microchip attached to an antenna that sends data to an RFID reader. The RFID tag contains a unique serial number, and can also contain additional data. RFID tags can be active, passive or semi-passiv tags.

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 y GTIN 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®

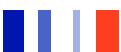
The RSS Composite Symbology® that utilises an RSS Expanded® Bar Code Symbol as the linear component.

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® Omnidirectional

The member of the Reduced Space Symbology family designed to be read in segments by Imnidirectional Scanners at retail Point-of-Sale: RSS-14; RSS-14 Stacked Omnidirectional; RSS Expanded; RSS Expanded Stacked.

RSS-14® Bar Code Symbol

A bar code symbol that encodes any of the GTIN data structures in a linear symbol that can be scanned omnidirectionally by suitably programmed POS 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 Code 1 used to separate certain concatenated Element Strings, dependent on their positioning in the GS1-128 Bar Code Symbol.





Serial Number

(1) a code, numeric or alphanumeric, assigned to an individual instance of an entity for its lifetime. Example: Microscope model AC-2 with Serial Number 1234568 and microscope model AC-2 with Serial Number 1234569. A unique individual item may be identified with the combined GTIN and Serial Number.

(2) Specific instance of the Object Class being tagged.

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 GS1 Company Prefix.

Serial Shipping Container Code

The GS1 Identification Key for logistic units.

Service Reference

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.

special characters

Special characters are designated by the symbology specification. For GS1-128 symbology the special characters are the last 7 characters of codes sets A and B or the last 3 characters for code set C.

SSCC

The 18-digit GS1 Identification Key comprising an Extension Digit, GS1 Company Prefix, Serial Reference, and Check Digit used to identify a logistic unit.

SSCC Serial Number

See Serial Reference.

standard numbering structures

See data structure.

standard trade item grouping

A standard composition for a trade item(s) that is not intended for Point-of-Sale scanning. They are identified with a unique GTIN-14, GTIN-13, or GTIN-12

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 GS1-128 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

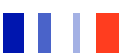
A sequence of characters transmitted with the decoded data that identifies the data carrier from which the data has been decoded.

tag

See RFID tag

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 GS1 System) denoting the particular operation in connection with which the scanned data has been captured.

transponder

Information (not part of the GS1 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.

U.P.C. Company Prefix

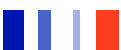
A special representation of a GS1 Company Prefix constructed from a U.P.C. Prefix and a Company Number. The U.P.C. Company Prefix is only used to create GTIN-12, Coupon-12, RCN-12 and VMN-12, which are encoded in a U.P.C. Bar Code Symbol.

U.P.C. Prefix

A special representation of the GS1 Prefixes '00 - 09' with the leading zero removed.

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.





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 GTIN-12, Coupon-12, RCN-12, and VMN-12.

UPC-A Composite Symbology®

The GS1 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 GTIN-12 in six explicitly encoded digits using zero-suppression techniques.

UPC-E Composite Symbology®

The GS1 Composite Symbology® that utilises a UPC-E Bar Code Symbol as the linear component.

Variable Measure Number (VMN)

A Restricted Circulation Number to identify variable measure products for scanning at Point-of-Sale. It is defined per GS1 Member Organisation rules in their country (see VMN-12 and VMN-13).

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.

VMN-12

The 12-digit Restricted Circulation Number encoded in UPC-A Symbols to allow scanning of variable measure products at POS. It is defined per target market specific rules that are associated with GS1 US Prefix 2.

VMN-13

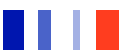
The 13-digit Restricted Circulation Number encoded in EAN-13 Symbols to allow scanning of variable measure products at POS. It is defined per target market specific rules that are associated with GS1 Prefixes 20 through 29.

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.



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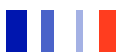


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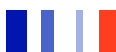


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