GS1 - Global User Manual

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Foreword

The objective of the GS1 Global User Manual (GUM) is to provide an introductory "user-friendly" and simple document describing the GS1 System with particular focus on the GS1 Bar Codes and Identification Keys. This document is not exhaustive and does not replace the GS1 General Specifications, which remains the standard reference document.

Disclaimer

Please note that the bar code symbols used in this manual are only examples and are not intended to be scanned or used as references.
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1. Introduction

Rapid evolution of roles in the value chain, new channels of distribution, shifting demand patterns and increased service expectations have raised the critical importance of information technology in business processes.

The GS1 Standards facilitate national and international communication between all trading partners participating in that must be identified and demand chains, including raw material suppliers, manufacturers, wholesalers, distributors, retailers, hospitals and final clients or consumers.

Many businesses are expanding their distribution channels towards markets and clients that may not be traditional for them, into other sectors of industry or are required to meet traceability requirements. A business that chooses an industry-specific standard will face the potentially high costs of maintaining multiple systems if it wants to sell its products or services or simply communicate outside its "closed-world".

Many operations which are essential for the efficiency of trade and the optimisation of the supply and demand chains depend on the accuracy of identification of the products exchanged, services rendered, and/or locations involved.

The GS1 System is a set of standards enabling the efficient management of global, multi-industry supply chains by uniquely identifying products, shipping units, assets, locations and services. It facilitates electronic commerce processes including full tracking and traceability.

The identification numbers can be represented in bar code symbols to enable electronic reading at point of sale, when being received at warehouses, or at any other point where it is 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 more responsive to customers.

These identifying numbers are also used in electronic commerce (eCom) and Global Data Synchronisation to improve the speed and accuracy of communication. This manual only provides information about the numbering system, bar codes, and scanning. For information about eCom or GDSN, please refer www.gs1.org.

As well as providing unique identifying numbers, the system also provides for additional information such as best before dates, serial numbers and batch numbers to be shown in a bar coded form. These are particularly important to achieve traceability.

Following the principles and design of the GS1 System means that users can design applications to process GS1 data automatically. The system logic guarantees that data captured from bar codes produces unambiguous electronic messages and the processing of them can be fully pre-programmed.

The system is designed to be used in any industry, trade or public sector, and any changes to the system are introduced so that they do not disrupt current users.
The application of the GS1 System can result in significant improvements in logistic operations, reduction of paperwork costs, shorter order and delivery lead times, increased accuracy and better management of the supply and demand chains. Enormous costs savings are realised daily by user companies who have adopted the GS1 System, because they apply the same solution for communicating with all their trading partners, while remaining entirely free to run internal applications at their own discretion.

2. Basics and Principles of the GS1 System

2.1. Areas of Applications

The GS1 System has different areas of application that include trade items, logistic units, assets and locations.

These applications rely on data structures by which all relevant items and their data can be identified. The numbers are the keys to access databases and to identify unambiguously items handled, in all messages of a transaction. The data structures are used to ensure globally unique identification and do not give any meaning in the number. 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 first transaction either by using standard messages or by consultation of electronic catalogues.
The numbers are represented in bar codes to allow automatic data capture at each point where an item leaves or enters a premises.
Bar codes are usually included in the production process at the producer site; they are either pre-printed with other information present in the packaging, or a label is affixed to the item on the production line.
The same numbers are also used in eCom messages to allow all information on the transaction of the item to be transferred to the relevant trading partners. The data structures that are provided guarantee world-wide uniqueness within the relevant area of application.

2.2. GS1 Identification Keys

The GS1 identification system provides the world a globally unique and unambiguous identification system through the GS1 Identification Keys. All GS1 standards shall incorporate at least one of the GS1 Identification Keys as mandatory identifiers. The GS1 Identification Keys are:

- Global Trade Item Number (GTIN)
- Global Location Number (GLN)
- Serial Shipping Container Code (SSCC)
- Global Returnable Asset Identifier (GRAI)
- Global Individual Asset Identifier (GIAI)
- Global Service Relation Number (GSRN)
- Global Document Type Identifier (GDTI)
- Global Shipment Identification Number (GSIN)
- Global Identification Number for Consignment (GINC)

Only the three most widely used GS1 Identification Keys are explained in any detail in this manual namely: Global Trade Item Number, Serial Shipping Container Code and Global Location Number. For full information on all the GS1 Identification Keys, please consult the GS1 General Specifications.

2.2.1. Global Trade Item Number (GTIN)

The GTIN is a number used for the unique identification of trade items world-wide.

Note: 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 for trade between participants at any point in any supply chain.

The identification and symbol marking of trade items enables the automation of the retail point-of-sale (through price look up files), of products receiving, inventory management, automatic re-ordering, sales analysis, and a wide range of other business applications.
Examples: A can of paint sold to a final consumer, a box of 6 cans of paint, a case containing 24 boxes of one kilo of lawn fertiliser, a multi-pack consisting of one shampoo and one conditioner.

2.2.2. Serial Shipping Container Code (SSCC)

The SSCC (Serial Shipping Container Code) is a number, which is used for the unique identification of logistic (transport and/or storage) units.

Note: A Logistic Unit is an item of any composition established for transport and/or storage which needs to be managed throughout the supply chain.

SSCC can be encoded in a GS1-128 bar code. Scanning the SSCC marked on each Logistic Unit allows the physical movement of units to be individually tracked and traced by providing a link between the physical movement of items and the associated information flow. It also provides the opportunity to implement a wide range of applications such as cross docking, shipment routing, automated receiving, etc.
Examples: A box containing 12 skirts and 20 jackets in various sizes and colours is a Logistic Unit as is a pallet of 40 cases each containing 12 cans of paint.

2.2.3. Global Location Number (GLN)

The GLN is a number used to identify a company or organisation as a legal entity. GLNs are also used to identify physical locations.
The use of location numbers is a pre-requisite for efficient eCom.

Note: The GS1 Identification Key used to identify physical locations or legal entities. The key is comprised of a GS1 Company Prefix, Location Reference, and Check digit.

2.3. Bar Code Symbologies

Five bar code symbologies are very widely used in the GS1 System:

- EAN/UPC
- ITF-14
- GS1-128
- GS1 DataMatrix
- GS1 DataBar

The General Retail Consumer Trade Item must carry a bar code from the EAN/UPC Symbology family and in limited circumstances a symbol from the GS1 DataBar Retail POS Family. In other applications, such as back-door receiving or in warehouses any of the three different symbologies can be used, EAN/UPC, ITF-14 GS1 DataBar or GS1-128.

GS1 DataBar – By the target date of 2014, GS1 DataBar standards including attribute information (using AI's) can be used by all trading partners in an open environment.

The global adoption of GS1 DataBar is an ongoing process and detailed information can be found on:

http://www.gs1.org/productssolutions/barcodes/databar/

GS1 DataMatrix – which can encode all GS1 Application Identifiers and is considered key to emerging usage of GS1 Standards in Healthcare Supply Chains.

There is a repository of reference information that can support the implementation of GS1 DataMatrix and detailed information can be found on:

http://www.gs1.org/docs/barcodes/GS1_DataMatrix_Introduction_and_technical_overview.pdf

Advice on choosing between them is given in Section 6.4 , Choosing Between Bar Codes

2.3.1. EAN/UPC

The EAN and UPC symbols can be read omnidirectionally. They must be used for all items that are scanned at the Point-of-Sale and may be used on other trade items.

Figure Figure 2-1 EAN/UPC Symbols

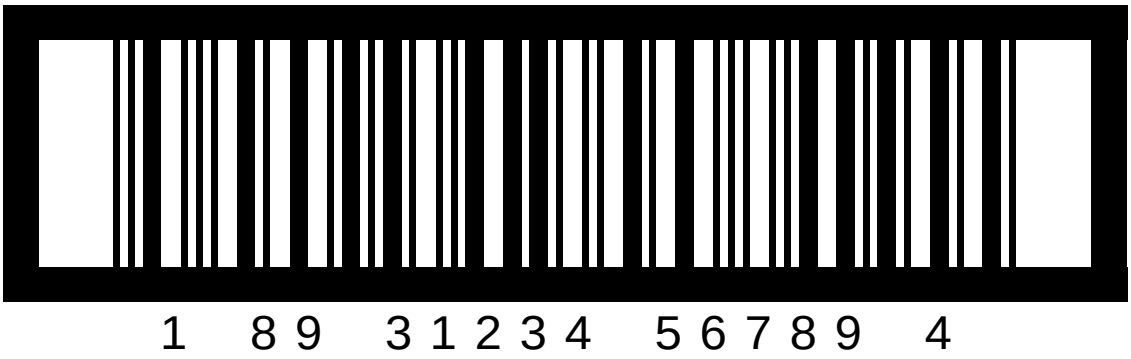
EAN-8

UPC-E

2.3.2. ITF-14

The use of the **ITF-14 (Interleaved 2 of 5) Symbology** is restricted to the bar coding of identification numbers on trade items NOT passing through retail checkouts. This symbology is better suited for direct printing onto corrugated fibreboard.

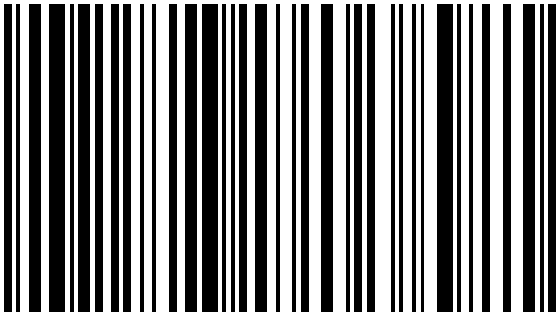
Figure 2-2 ITF-14 Symbol



2.3.3. GS1-128

The ***GS1-128 Symbology*** is a variant of Code 128 Symbology. Its use is exclusively licensed to GS1. It is not intended to be read on items passing through retail checkouts. GS1-128 can encode the GTIN and additional data using the GS1 Application Identifiers.

Figure 2-3 GS1-128 Symbol



2.3.4. GS1 DataBar

GS1 DataBar is a family of linear symbologies. Its use is exclusively licensed to GS1 and by 2010, GS1 DataBar standards will be available for bilateral agreement between trading partners for all trade items. The specific focus will be on Fresh Products scanned at POS. By the target date of 2014, GS1 DataBar standards including attribute information (using AI's) can be used by all trading partners in an open environment.

Figure 2-4 GS1 DataBar Omnidirectional

2.3.5. GS1 DataMatrix

GS1 DataMatrix is a variant of Data Matrix ISO version ECC 200. The Function 1 Symbol Character in the first position ensures GS1 System compatibility. GS1 DataMatrix can encode the GTIN and additional data using the GS1 Application Identifiers. It is currently being implemented for the bar coding a GTIN (and additional data) on small medical / surgical instruments and healthcare items.

Figure 2-5 GS1 DataMatrix Symbol encoding a GTIN and Serial Number (AI (21))

(21) ABCDEFG123456789

(01) 04012345678901

There is a repository of reference information that can support the implementation of GS1 DataMatrix and detailed information can be found on:

http://www.gs1.org/docs/barcodes/GS1_DataMatrix_Introduction_and_technical_overview.pdf

3. Identification of Trade Items

A trade item is defined as 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 raw materials through to end-user products and also includes services, all of which have pre-defined characteristics.

The trade items are numbered by a GTIN using four data structures: GTIN-8, GTIN-12, GTIN-13 and GTIN-14. The choice of data structure depends on the nature of the item and on the scope of the user's applications.

A major application of the GS1 System is the identification of items intended for scanning at the retail point of sale – retail items. These are to be identified with a GTIN-13 or GTIN-12 Number. If they are very small a GTIN-8 Number (or a zero-suppressed GTIN-12) is used.

Since January 2005, North American users accept GTIN-13 Identification Numbers and EAN-13 Bar Codes. Prior to this time, companies selling goods in the American and Canadian markets were required to use a GTIN-12 data structure represented in a UPC-A or UPC-E Symbol.

A trade item which can be sold in different measures is known as a Variable Measure Trade Item, for example pre-packed fruit and vegetables or meat products sold by weight, and such trade items are subject to specific rules described in Section 10, Variable Measure Trade.

Specific rules also exist for books, serial publications or products that are not sold in open environments. These special cases are treated in Section 11, Special Cases.

Trade items not sold through retail outlets may be packaged in a wide variety of ways such as a fibreboard case, a covered or banded pallet, a film-wrapped tray, a crate with bottles, etc.
Such items can be identified in different ways:

- By allocating a specific GTIN-13, or GTIN-12 Number.
- Alternatively, by allocating a GTIN-14 Number. This is formed by taking the number allocated to the trade item contained, and preceding the number by an indicator, which can take the value 1 to 8. This solution is only available for homogeneous groupings of standard trade items, where all units contained in the group are identical.

Figure 3-1 GTIN Numbering Examples

GTIN-13: 5412150000154

either:
GTIN-14: **1**5412150000151
or:
GTIN-13: 5412150000161

either:
GTIN-14: **2**5412150000158
or:
GTIN-13: 5412150000178

Note: These examples show both numbering solutions. The GTINs for outer cases and logistic pallets are explained in more detail in Section 8 and Section 9

3.1. GTIN Numbering Structures

There are four numbering structures exist for GTIN. They're described below.

GTIN-13 Data Structure

GS1 Company Prefix →	← Item Reference	Check Digit
N_1 N_2 N_3 N_4 N_5 N_6 N_7 N_8 N_9 N_{10} N_{11} N_{12}		N_{13}

GTIN-12 Data Structure

U.P.C. Company Prefix →	← Item Reference	Check Digit
N_1 N_2 N_3 N_4 N_5 N_6 N_7 N_8 N_9 N_{10} N_{11}		N_{12}

GTIN-8 Data Structure

GTIN-8 Prefix →	← Item Reference	Check Digit
N_1 N_2 N_3 N_4 N_5 N_6 N_7		N_8

GTIN-14 Data Structure

Indicator	GTIN of the items contained (without Check Digit)	Check Digit
N_1	N_2 N_3 N_4 N_5 N_6 N_7 N_8 N_9 N_{10} N_{11} N_{12} N_{13}	N_{14}

3.1.1. GS1 Company Prefix

The first two or three digits N_1, N_2, N_3 constitute the GS1 Prefix allocated by GS1 Global Office to each GS1 Member Organisation. It does not mean that the item is produced or distributed in the country to which the prefix has been allocated. The GS1 Prefix only denotes the Member Organisation that allocated the Company Number.
The U.P.C. Company Prefix is the subset of GS1 Company Prefix.
The GS1 Company Number that follows the GS1 Prefix is allocated by the Member Organisation.
The GS1 Prefix and the Company Number form the GS1 Company Prefix. In general it comprises six to ten digits depending on the needs of the company. The GS1 Company Prefix may not be sold, leased, or given, in whole or in part, for use by any other company. This restriction applies to all GS1 Identification Keys even those which are constructed without a GS1 Company Prefix. This requirement applies to GS1 Identification Keys which have been assigned individually by a GS1 Member Organisation to an individual user company. See section 3.4 for additional guidelines in the following sections apply when a company changes legal status as a result of an acquisition, merger, partial purchase, split or spin-off.

3.1.2. Item Reference

The Item Reference is composed typically of one to six digits. It is a non-significant number, which means that the individual digits in the number do not relate to any classification or convey any specific information.
The simplest way to allocate Item References is sequentially, that is 000, 001, 002, 003, etc.

3.1.3. Check Digit

The Check Digit is the last digit (rightmost) of the GTIN. It is calculated from all other digits in the number, in order to ensure that the bar code has been correctly scanned or that the number is correctly composed.

3.1.4. Indicator

This is only used in the GTIN-14 Data Structure. It takes the value 1 to 8 for fixed quantity trade items. The value 9 has a special usage for variable quantity trade items (see Section 010,

Variable Measure Trade) and the value 0 is considered a filler digit that does not change the number itself.

The simplest way to allocate the indicator is sequentially that is 1, 2, 3… to each grouping of a trade unit. (see section 8 for outer cases)

Important: The number must always be used as a whole. No processing of data should be based on any part of a GTIN.

To be written by each Member Organisation:

The local structures of GS1 Company Prefixes and Item References

3.2. Who Is Responsible For Numbering Trade Items?

3.2.1. The general rule

The brand owner, the organisation that owns the specifications of the product regardless of where and by whom it is manufactured, is normally responsible for the allocation of the GTIN. On joining a GS1 Member Organisation the brand owner receives a GS1 Company Prefix, which is for the sole use of the company to which it is assigned.. The brand-owner is the organisation that owns the trade item specifications and may be:

- **The manufacturer or supplier:** The company that 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 that has the trade item manufactured, in any country and sells it under its own brand name or the importer or wholesaler that changes the trade item (for example by modifying the packaging of the trade item)
- **The retailer:** The retailer that has the trade item manufactured, in any country, and sells it under its own brand.

3.2.2. Exceptions

- If an item is not given a GTIN at source, the importer or intermediary may, at the request of its clients, assign it a *temporary* GTIN. However, it is preferable for the manufacturer to assign the number. On the other hand, the retailer can assign an *internal* number to an item that does not yet have a GTIN assigned to it, for use within the store. This method is

described in the section dealing with company internal numbering and is found in Section 11, Special Cases.

- Items that are non-branded - have no brand name or are 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 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 plasterboard, candles, drinking glasses, etc.

Important: Some companies produce the same article in several countries, or in several plants. In this case the GTIN should be allocated centrally and managed by one of the companies in the group or one of its production facilities.

3.3. What to Consider When Numbering a Trade Item?

A separate unique GTIN is required whenever any of the pre-defined characteristics of an item are different in any way that is relevant to the trading process. This implies that each variant must be assigned a different number whenever the variation is, in any way, apparent and significant to any partner in the supply chain, to the final user or to the retail customer.
What is understood to be an apparent and significant variation may differ from industry to industry. Therefore these rules should be respected.
The basic 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 product
- If the trade item is a grouping, the number of elementary items contained, and their sub-division in sub-packaging units, the nature of the grouping (carton, pallet, box-pallet, flat-pallet...)

This list is not exhaustive.
The company responsible for allocating the numbers must ensure that each trade item corresponds to one and only one GTIN. Once it has been defined, the GTIN of the trade item must not change as long as the characteristics of the trade item do not change.
A major modification of one of the basic elements which characterises the trade unit will generally lead to the allocation of a new GTIN. Examples:

- Allocate a new GTIN: the net volume of mineral water has increased from 0.25 litre to 0.33 litre;
- Maintain the same GTIN: the colour of a juice bottle label has been changed from pale pink to darker pink.

In general, for products where the date is important, different trade item numbers are required. Examples would be the various vintages of wine, successive editions of a road map, annual guides, diaries or appointment books. These all constitute different trade items.

If a new GTIN is allocated to an item, the GTIN assigned to any grouping containing that item should also be assigned a new GTIN.
However, it should be noted that:

- Price is not a relevant criterion for changing a GTIN except when the price is printed directly on the trade item.
- National, federal or local regulations may apply and take precedence over these rules. For example, in some industries such as healthcare, regulations or other requirements may dictate that any trade item changes require a new GTIN.

For allocating numbers to outer cases please refer to the section 8. The detailed rules for GTIN Allocation in various business situations can be found on the website www.gs1.org/gtinrules. It also gives a detailed rationale and consequence of not following the given rule.

3.3.1. The uses of the GTIN

Whatever the country where the item is sold, its GTIN will remain valid. It is independent of prices and methods of supply.
The GTIN is the number which appears in catalogues, product sheets, price lists and on documents or messages exchanged for the transaction to take place (orders, despatch advice or delivery notes and invoices).
A GTIN can also be allocated to services that may be invoiced, such as transport or storage for the account of a customer, etc.

3.3.2. Pre-priced items

Pre-pricing is discouraged as a trade practice as it introduces complexity for trade item file maintenance throughout the supply chain. If however, the price is marked on the item, the GTIN should be changed when the price marked on the item changes (except for variable measure items, where other rules apply).

Note: See Section 10, Variable Measure Trade Items for information on variable measure items

Variable Measure Trade for information on variable measure items.

3.4. What if the Legal Status of a Brand Owner Changes?

Although National, federal or local regulations may apply and take precedence over these rules, the guidelines below should be followed as long as they are compatible with the local laws.

Important: If a company changes legal status, or the "ownership" of the GS1 Company Prefix changes, as the result of an acquisition or merger, the Member Organisation must be notified within one year.

3.4.1. Acquisition or Merger

The Member Organisation has to be notified of the acquisition or merger within one year. The rule for an acquisition or merger is that the merged company acquires the numbers of the old company.
Products that the acquired company produced under its GS1 Company Prefix can still be produced using the same prefix after the merger, since the acquiring company has control of the acquired company's GS1 Company Prefix. If it so desires, the acquiring company can label all acquired products using their existing GS1 Company Prefix. The importance of ensuring trading partners are informed of any changes, in a timely manner, cannot be overemphasised.

3.4.2. Partial Purchase

If a company purchases a division of a company whose GS1 Company Prefix is used in divisions not purchased, then the acquiring company must change the GTINs for products in the purchased division, as well as any related GLNs, within one year.
The rules concerning the use of the seller's GTINs, and other GS1 Identification Keys, should be taken into consideration when drawing up the purchase contract.
At the earliest opportunity, the buyer should phase in new numbers, from its own range of numbers, for items whose brand name it has acquired. The buyer will be able to do this, for example, when packaging is redesigned or reprinted.

3.4.3. Split or Spin-Off

When a company splits into two or more separate companies it is necessary that the GS1 Company Prefix assigned to the original company be transferred to one, and only one, of the new companies. Any company left without a GS1 Company Prefix will need to apply to a Member Organisation to obtain a new one. The decision on which of the new companies should take the old or new GS1 Company Prefix should be made so as to minimise the number of changes to GTINs 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 stocks of items to be renumbered. However, when any of the spin-off companies has trade items that are numbered from a GS1 Company Prefix that it no longer holds, then it should renumber those items using its own GS1 Company Prefix when new labelling or packaging is produced. Customers should be notified well in advance of the changes.
Spin-off companies that retain a GS1 Company Prefix must keep a record of the GTINs created from their prefix that have been allocated to items they no longer own.

They must not reuse these GTINs for a period of at least four years after the company that split away who owns those items last supplied the goods identified by those GTINs. Therefore the company that did not retain the Company Prefix has to keep the company that did maintain the prefix informed. This is particularly important in regard to the dates on which the goods were last supplied with the original GTIN and they should guarantee a date by which the GTIN will be changed.

3.5. Lead Time in Re-Using a GTIN

A GTIN allocated to a trade item that has become obsolete must not be re-used for another trade item until at least 48 months have elapsed after:

- The expiration date of the last original trade items produced with that number

-or-

- The last original trade items produced with that number have been supplied to the customer.

In the case of clothing the minimum retention period is reduced to 30 months.
Brand Owners should consider a longer period depending upon the type of goods and/or any regulatory framework. For example, steel beams may be stored for many years before entering the supply chain, and processes should be put in place to ensure that the GTIN is not reallocated for a significant period of time. Another example is found with very specific products within the healthcare sector, such as prescription drugs, implants, etc., where steps should be taken by the assigning company to ensure that the issued GTINs are not reallocated for a period well beyond the lifetime of the product or beyond the end of treatment.

4. Small Products

4.1. EAN-8 and UPC-E bar codes

The allocation of GTIN-8 Identification Numbers is restricted to items that genuinely cannot accommodate an EAN-13 or UPC-A Bar Code and are assigned individually upon request.

Before deciding to use a GTIN-8 Identification Number, the user should first consider (usually jointly with their printer) all possible options for using a GTIN-13 Identification Number. These may include:

- Whether the symbol can be reduced in size, i.e. printed at a lower magnification, taking into account the minimum bar code print quality requirements.
- Whether the label can reasonably be changed (label means the total printed design surface, whether or not affixed separately). This would enable the printer's recommended size of standard EAN/UPC Symbol to be included. This could be achieved by redesigning the label, by increasing the label size, (especially where the existing label is small in comparison with the pack area) or by the use of an additional label.
- Whether a truncated symbol can be used. A truncated symbol (a symbol of normal length, but of reduced height) may only be used if there is absolutely no possibility of printing a symbol in full size. Truncation removes the symbol's omnidirectional scanning capability. A symbol with excessive truncation will not be of any practical use. Users considering this option are advised to consult their customers to see if an acceptable compromise can be reached.

4.2. A GTIN-8 Number may only be used

If the EAN-13 Bar Code Symbol, in the size required as a result of print quality studies, exceeds either 25% of the largest side of the printed label area or 12.5% of the total printable area.
If either the largest side of the printed label is less than 40 cm² or the total printable area is less than 80 cm².
On cylindrical products with diameter less than 3 cm.

U.P.C. Company Prefixes beginning with zero can be used to construct GTINs that can be used in UPC-E Symbols for small products. Distribution of these Company Prefixes is restricted to demonstrated need only (e.g. for items whose packaging does not include enough available space to permit the use of another symbol). Companies with these prefixes are encouraged to manage their finite resources carefully.
Technical details of UPC-E representation of GTIN-12 Numbers are described in Appendix A.2, GTIN-12 Identification Numbers in a UPC-E Symbol.

5. Processing the GTIN

5.1. The Content of the Database

The GTIN is a unique identification number for a trade item. This uniqueness is achieved whichever of the four data structures (described in Section 3.1, GTIN Numbering Structures) is used. The GTIN structure may require fix length and leading 0s depending on the exact usage. One example is shown below.

Figure Figure 5-1 GS1- 128 Symbol

The GTIN is an access key to all data related to the particular trade item as it is identified, that is stored in the data files or in transaction messages.

Links have to be created between hierarchies of trade items. Such links are those between each unit and all the trade items within this particular unit. An example would be the links between a can of paint, a box of ten cans of paint, and a pallet of 24 boxes of ten cans of paint.

This will enable customers to control their stock-keeping and ordering processes, and allow customers to compare sales at the check out with the number of units they have received or still have in stock.

5.2. Transmission of Product Information

Transmission of information concerning the item is a very important step in the relationship between supplier and customer, and all third parties.

This information is used in a wide range of processes in demand and supply chains. Most processes cannot be carried out correctly if the proper item information is not available, an example would be when a cashier scans an item but the cash register displays the message "'unknown item". However, there are many other processes such as ordering, invoicing and stockroom operations when it is essential to have the correct item information. Therefore, in addition to the flow of goods, there is a flow of information necessary between trading partners.

Comprehensive information should be transmitted:

- Name of the supplier and the GLN of the company
- Date of application (date from which the trading partners may use the information)
- GTIN of the trade item
- A full product description for eCom messages or for the documents relating to the transaction and an abbreviated description for the point of sale
- The physical characteristics of the trade item including dimensions, net weight
- Description of the various standard groupings of the trade item, including the number of single trade items contained in larger trade units
- GTINs allocated to these items description of the pallet or the palletisation pattern (for automatic picking up)
- The GTIN and the quantity of units for the lower level (if any).

5.3. How Should the Information be Exchanged?

The preferred methods are eCom messages sent from the suppliers to all its customers or alternatively by way of a central electronic catalogue (data synchronisation).
If either of these methods are used the data should be structured in standard messages sent automatically. If these alternatives are not possible, a floppy disk with standard messages could be used. If that is not an option, then a paper document containing the different characteristics and conditions of purchase of the product would suffice.

5.4. When Should Communication Occur?

A number of actions are vital to ensure that GTINs are accurately communicated within the Supply Chain. These ensure that the data associated with any scanned bar code can be associated with accurate, up to date, data. This is particularly essential for items scanned at the Point of Sale where the absence of accurate data may have legal implications.
Trading partners should make an agreement about the appropriate time period within which the information will be communicated.
Communication about a GTIN is essential in cases listed below. In any situation, the information must be sent well ahead of time in order to give the trading partner a chance to process it.

1. New trade relationship. All the GTINs of products involved in a new trade relationship should be sent to the trading partner with the associated data.
2. New item in the assortment. The GTIN should be passed on as a matter of course during the first contact between the account manager and the buyer.
3. New GTIN allocated. If a change in the product demands a new number, the new GTIN must be notified immediately to the partner when they are being notified of the item change. The information must be given to the trading partner in ample time before the goods concerned are supplied.
4. Promotions with a different GTIN. Many retailers plan promotional special offers well in advance. The special offers are often preceded by a registration procedure, which makes it essential that the GTINs are notified well in advance. It is recommended that this should be done as early as possible when the initial contact relating to a special offer is being made.
5. Temporary *replacement* item with a different GTIN from the normal item. If for whatever reason, a manufacturer supplies an item with a different GTIN from the one expected by the trading partner, it is essential that the new GTIN is forwarded and entered into the database in time.
6. Rack jobbing (also known as vendor refill). It may be possible that a rack jobber restocks an item on the shelf that has a different GTIN, which has not yet been entered in the database. Rack jobbers should therefore always check whether the GTIN on the item is the same as that usually present on the shelf. If not, then the person responsible for the database in the store must be notified of the change.

6. Symbol Marking Trade Items

6.1. Features of Bar Codes

There are several ways to apply a bar code to an item:

- Integrating the bar code into the packaging design
- On-line direct printing onto packaging
- Affixing a pre-printed label

6.1.1. Sizes

Bar codes can be printed in various sizes. The size to be selected, besides of the scanning environment, depends also on the printing conditions. A small bar code can be used if good quality printing is coupled with a good quality substrate. It is not possible to select an arbitrary symbol size to fit a predetermined space on the package.

For each type of bar code, the size may vary between a minimum size and a maximum size. For direct printing, it is determined by the printer after tests. Equipment that constructs bar codes from pixels or dots will not be able to produce bar codes in the full range of sizes.

Another factor that should always be taken into account when deciding about the bar code symbol size should be the environment in which it is to be scanned. Symbols intended for retail applications may be as small as the print quality permits, whereas the bar codes for warehouse environment should be as large as it is necessary to allow scanning from a considerable distance, i.e. by an operator of a truck.

Prior to 1999, the size of a bar code in GS1 System had been expressed as a Magnification Factor (multiplication of a theoretical, ideal width and height values).

It assumed a fixed ratio between the X-dimension of a symbol (its narrowest element) and its height, which did not hold true for some symbologies.

For this reason, the Magnification Factor term was removed from the *GS1 General Specifications* and the bar code size has been defined by setting the minimum, target & maximum X-dimension for each symbology, depending on the application in which the given symbol is to be used. The minimum symbol height must be respected. It should be noted, however, that increased symbol height results in improved scanning rates. The sizes for all GS1 endorsed symbologies are defined in *GS1 General Specifications*, GS1 System Symbol Specification Tables.

However, as a legacy after the previous specification, a lot of printing devices producing GS1 bar code symbols still use the Magnification Factor for specifying the size of a symbol. Therefore, in Section 6.2, Bar Code Types Used In GS1 System, the Magnification Factor method is still used, along with minimum and maximum size of each bar code (including min. and max. height).

6.1.2. Quiet Zones

All types of bar codes must have Quiet Zones, before the first bar and after the last bar.

This Quiet Zone is extremely important and must be respected. The size of the Quiet Zone area varies depending on the symbol size and type of the bar code. Any print within Quiet Zones can prevent the reading of the bar code symbol.

6.1.3. Colours and Contrast

Scanners work by measuring reflectance. There must be sufficient contrast between dark bars and light spaces. There must be sufficient density of ink in the bars not to create voids.
Typical scanners use a beam of red light. A contrast that seems to be satisfactory for human eyes may be insufficient for scanners.
Bar codes can be printed in various colours. A general indication is that light colours including red and orange are suitable for the light bars (spaces) and quiet zones. Dark colours including black, blue, and green are suitable for the bars. Composite colours are not adequate to print bar codes. It is best to use solid colours.
High-gloss substrates may change the reflectance and checks must be made before printing. Transparent over-wraps may also reduce contrast and checks on the completed package should be made if over-wrapping is used.

6.1.4. Print Quality

The printing conditions must be checked regularly throughout the print run to ensure they have not deteriorated since the initial assessment was made. There are various means to assess the quality of a bar code. Your GS1 Member Organisation can advise you on this point. Simple visual ways can be used. An example is the printing of an H of given dimensions inside the bearer bar of an ITF-14.
When determining which orientation to print the bar code, the print process involved should be taken into account. For example, when using a flexographic process, it is essential to print the bar code in the print direction because of the ink "spread" associated with this printing process. When using a lithography process, spread is usually insignificant. In all cases the printer should be consulted.
For more information on print quality see the *GS1 General Specifications* and the *GS1 Bar Code Verification for Linear Symbols* brochure available from: www.gs1.org/docs/barcodes/GS1_Bar_Code_Verification.pdf

6.1.5. Symbol Placement Guidelines

Productivity and scanning accuracy improve considerably when the bar code location is predictable. Consistency in the location of the bar code achieves maximum productivity in any scanning environment.

6.1.5.1. Symbol Placement Guidelines for Retail Items

The bar code, including the human readable digits underneath (identification number) must be visible and free of any obstacles preventing it from scanning.

Never allow two bar codes encoding different GTINs to be visible on a package. This is particularly relevant to multi-packs, especially those with clear wrapping. Therefore, multi-packs must carry a separate GTIN, with all internal bar codes obscured.

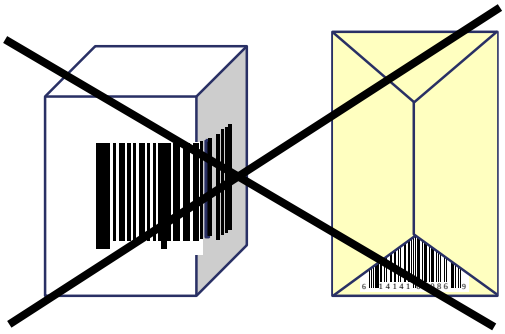
Figure 6-1 Example of GTINs on Multi-Packs

If the item is **random wrapped**, the same bar code can be printed more than once on the wrapping. This ensures that one complete bar code is always visible.

Figure 6-2 Example of Random Wrapped GTINs

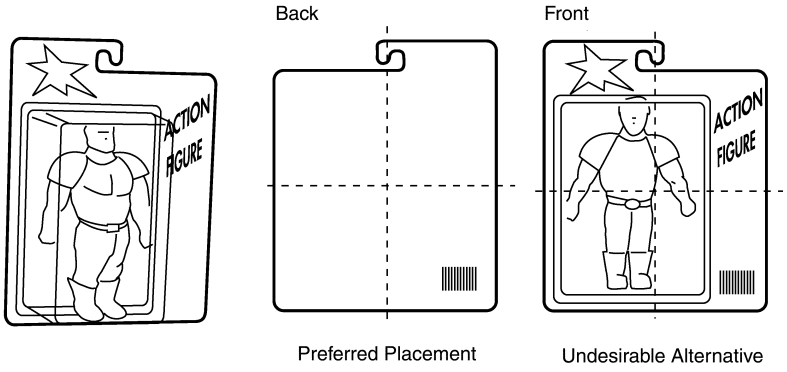
Scanning is most successful when the bar code is printed on a reasonably **smooth** surface. Avoid printing around the corners or on folds, creases, seams, and any other uneven packaging area.

Figure 6-3 Incorrect Bar code Surface Examples



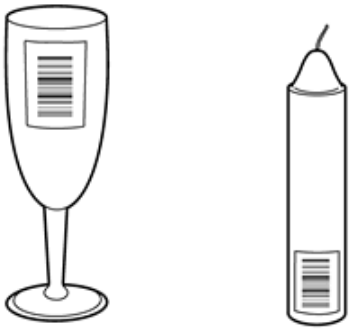
Sometimes the **irregular shape** of packaging prevents the bar code from flat (parallel) contact with the scanning surface of slot scanners. This applies in particular to carded, blister-packed, or concave items.

Figure 6-4 Additional Bar code Surface Examples



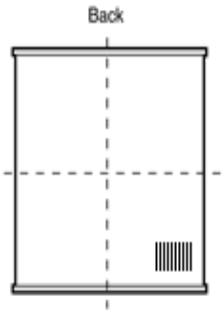
On cylindrical products, where the printing direction allows, it is generally desirable that the bars are perpendicular to the axis of the cylinder (ladder style), so that a scan line can pass through the symbol on as near a flat plane as possible. This caters for the problems associated with curves on items such as cans and bottles. The ladder orientation is imperative for curved surfaces with a small radius.

Figure 6-5 Cylindrical Bar code Surface Examples



The preferred placement for a bar code is on the lower right quadrant of the back, respecting the proper Quiet Zone areas around the bar code symbol and the edge rule. The alternative is on the lower quadrant of another side of the container.

Figure 6-6 Bar code on the Lower Right Quadrant



Edge rule: The bar code symbol must not be closer than 8 mm or farther than 100 mm from any edge of the package / container.

For symbol placement guides on non retail items see section 8

6.2. Bar Code Types Used In GS1 System

6.2.1. EAN/UPC Symbols

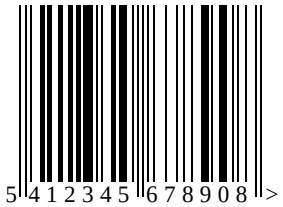
Trade items that are sold through retail outlets must be bar coded with one of the EAN/UPC Symbols: EAN-13, UPC-A or EAN-8 or UPC-E. These symbols may also be used for trade items not for retail sale.
These symbols may represent GTIN-12s or GTIN-13s and when they are used on outer cases they must be used at a size of at least 150% (equal to an x-dimension of 0.495 mm or greater). This is because they may be scanned on automatic scanning systems at goods inward that require larger symbols.If printing conditions and/or the quality of substrate are not adequate to print the bar code symbol directly on the package, the symbol may be printed on a label affixed to it.
The following bar code symbols are shown here in nominal dimensions (magnification factor 100%), including Quiet Zones. The minimum and maximum sizes are given for each type of bar code. See Appendix A.3, Dimensions of Modules and Symbols at Different Magnification Factor for a detailed table of dimensions of EAN/UPC Symbols.

6.2.1.1. EAN-8 Symbol

Min. size: 21.38 mm x 17 mm
Max. size: 53.46 mm x 43 mm
Nominal dimensions: 26.73 mm x 21 mm
X-dimension at nominal size: 0.330 mm

- **Note:** Bar code height has been rounded.
- **Note:** The X-dimension is the specified width of the narrow element in a bar code symbol. This width varies from one symbology to another.
- **Note:** Minimum sizes are stated only for retail POS

6.2.1.2. EAN-13 Symbol



Min. size: 29.83 mm x 21 mm

Max. size: 74.58 mm x 52 mm

Nominal dimensions: 37.29 mm x 26 mm

X-dimension at nominal size: 0.330 mm

Note: Bar code height has been rounded.

Note: Minimum sizes are stated only for retail POS

6.2.1.3. UPC-A Symbol

Min. size: 29.83 mm x 21 mm

Max. size: 74.58 mm x 52 mm

Nominal dimensions: 37.29 mm x 26 mm

X-dimension at nominal size: 0.330 mm

Note: Bar code height has been rounded.

Note: Minimum sizes are stated only for retail POS

6.2.1.4. UPC-E Symbol

Min. size: 17.69 mm x 21 mm

Max. size: 44.22 mm x 52 mm

Nominal dimensions: 22.11 mm x 26 mm

X-dimension at nominal size: 0.330 mm

Note: Bar code height has been rounded.

Note: Minimum sizes are stated only for retail POS

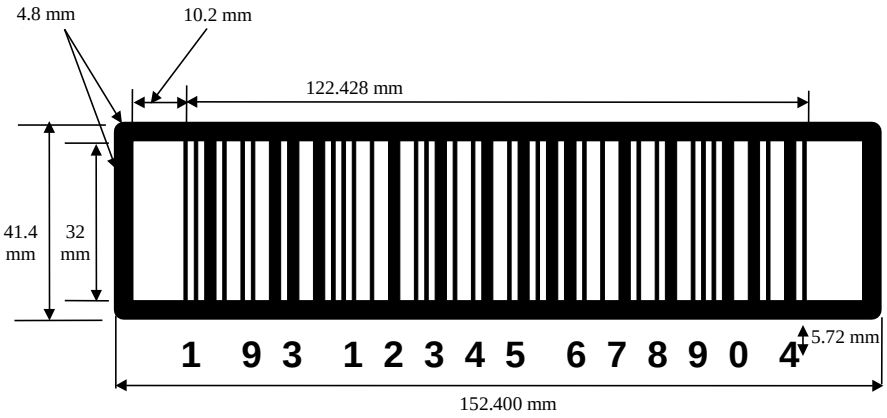
Based on their nominal dimensions, the EAN/UPC Symbols can be printed with a magnification factor ranging from 80% to 200%. If the symbol is intended for conveyorised scanning, a minimum magnification factor of 150% should be used.

The symbol is designed to be read omnidirectionally.

Truncation, (reducing the height of the symbol) removes the omnidirectional capability. Truncation should be a last resort when there is only space for a truncated bar code.

A useful device to help maintain the Quiet Zone in some production processes is to include a "less than" (<) and/or "greater than" (>) characters in the human readable field aligned with the edge of the Quiet Zone. Those marks are referred to as the "Quiet Zone Indicators".

6.2.2. ITF-14 Symbol



For companies wishing to print the bar code directly on the carton, particularly on corrugated cardboard, the ITF-14 Symbol is more suitable because the printing requirements are less demanding. Pre-printing or direct print by thermal transfer or ink-jet may be possible.
These symbols may be used to represent the GTIN when there is no need to provide any extra information such as the product's best before date, net weight or serial number. These symbols were introduced to help users print scannable bar codes directly onto corrugate packaging as they are larger than EAN/UPC symbols and have a simpler pattern of bars and spaces that is easier for scanners to decode.
The range of sizes allowed for an outer case is from an x-dimension of 0.495 mm to 1.016 mm (equal to magnifications of 48.7% to 100%). The smallest size may only be used on labels, so if corrugated packaging is being used, a size of at least 62.5% must be used.
Whichever size of symbol is used, the height of the bars must be at least 32 mm, as this makes scanning the bar codes much easier.

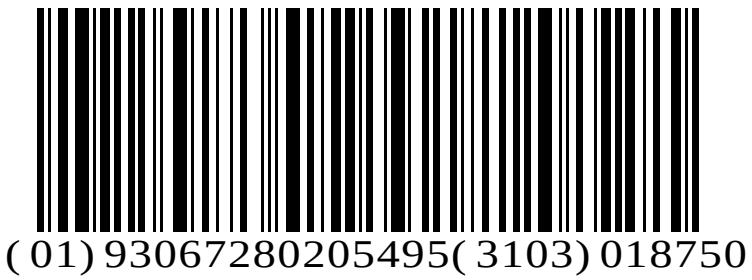
Note: This diagram is not intended for use as a basis for measurement.

Dimensions below do not include the bearer bar:
Min. size (50%): 71.40 mm x 12.70 mm
Max. size (100%): 142.75 mm x 32.00 mm
Nominal dimensions: 142.75 mm x 32.00 mm
X-dimension at nominal size: 1.016 mm

Note: Minimum sizes are stated only for retail POS

To ensure efficient reading in any environment, including conveyorised scanning, ITF-14 symbols should be printed close to 100% magnification, with a minimum of 50%.

6.2.3. GS1-128 Symbol:



These bar codes were introduced to allow users to provide extra information about the product alongside the GTIN that identifies it, and so are often used for products with short product life, or that need to be tracked individually with serial numbers. These are the symbols that must be used for variable measure trade items as they need to encode the GTIN for the product and its measure, usually net weight for foods. These bar codes will usually be printed on-demand and most users will use thermal transfer printers to do this, although other techniques may be used. These symbols are similar to the EAN/UPC bar codes in that they cannot be printed directly onto brown corrugate packaging, and most users will print these onto white labels.

The GS1-128 is of variable length, depending on the number of characters encoded, the types of character encoded and the X-dimension (resulting in overall symbol size) achieved. For a given length of data, the symbol size is variable between limits, to accommodate the ranges in quality achievable by the various printing processes. The symbol is designed to be read bi-directionally by fixed or portable scanners.

Based on their nominal dimensions (X-dimension: 1 mm), the GS1-128 Symbols can be printed with a magnification factor ranging from 25% to 100%. To ensure efficient reading in any environment, including conveyorised scanning, a minimum magnification factor of 50% should be used.

The range of sizes allowed on outer cases is the same as that for ITF-14 symbols, so the x-dimension range is from 0.495 mm to 1.016 mm (equal to a magnification range of 48.7% to 100%), and as with ITF-14 symbols, the height of the bars must always be at least 32 mm.

6.2.4. GS1 DataBar Stacked Omnidirectional Symbol

The GS1 DataBar Stacked Omnidirectional Bar Code is a full height, two-row version of the GS1 DataBar Omnidirectional Bar Code that is designed to be read by an omnidirectional scanner, such as a retail slot scanner. For loose produce being weighed at the point of sale (POS) using GS1 DataBar Stacked Omnidirectional is permitted.

(01)00034567890125

Minimum x-dimension 0.264 mm (0.0104′ inches)

Target x-dimension: 0.33 mm (0.013′ inches)

Maximum x-dimension: 0.41 mm (0.016′ inches)

Note: Minimum sizes are stated only for retail POS

6.2.5. GS1 DataMatrix

For healthcare companies wishing to print bar codes on their regulated healthcare products (e.g. sold at pharmacies) . The technical description of GS1 DataMatrix contained in GS1 General Specification provides additional information based on ISO technical specification 16022, and it is provided as a further aid in the development of specific applications.

Note: GS1 DataMatrix Symbol shown above has been magnified to show detail

Minimum x-dimension 0.396 mm (0.0156' inches)
Target x-dimension: 0.495 mm (0.0195' inches)
Maximum x-dimension: 0.990 mm (0.0390' inches)

Note: Minimum sizes are stated only for retail POS

6.3. Considerations on the Use of the Symbologies

The GS1-128 Symbology can be used to encode data beyond the GTIN.
If, for any reason, there is a need to print additional information besides the GTIN (serial number, etc...), and the trade unit is already marked with a GTIN encoded in an EAN-13, ITF-14, or GS1-128 with Application Identifier (01) Symbol, then it is possible either:

- To apply a label with the additional information in a GS1-128 Symbol in addition to the previously marked symbol. All the symbols should then be horizontally aligned.
- To apply a label covering the existing symbols. The GTIN represented in the original symbol must then be printed on the label, with the other chosen attribute data, preferably using a concatenated GS1-128 symbol.

6.4. Choosing Between Bar Codes

Numbering items and the physical application of the bar code are two separate operations. It is quite usual that different companies carry them out at separate sites. The source – the brand name holder – usually assigns the number to the item and the manufacturer applies it to the packaging.
It is also possible to number an item without applying a bar code. This could occur when it is virtually impossible to apply a bar code, for example on a very small cosmetic, or on a unit of electricity, a load of sand etc. It would then be possible to use the number, for example in eCom messages.
Users should take the following considerations into account when choosing between the different symbologies:

- Space available on the item to be bar coded
- Type of information to be bar coded; GTIN only or GTIN and additional information (attributes)
- Operational environment in which the bar code symbol is to be scanned; retail point of sale or general distribution (e.g. in a warehouse racking)

Various GS1 identification numbers can be represented in specific bar code symbols:

Table 6-1 GS1 Identification Numbers Represented in Specific Bar Code Symbols

Number		Can be represented with symbols
GTIN-8	→	EAN-8 GS1 DataMatrix
GTIN-12	→	UPC-E* UPC-A ITF-14 GS1-128 GS1 DataBar GS1 DataMatrix *Certain numbers only, (see Section4, Small Products).

Number		Can be represented with symbols
GTIN-13	→	EAN-13 ITF-14 GS1-128 GS1 DataBar GS1 DataMatrix
GTIN-14	→	ITF-14 GS1-128 GS1 DataBar GS1 DataMatrix

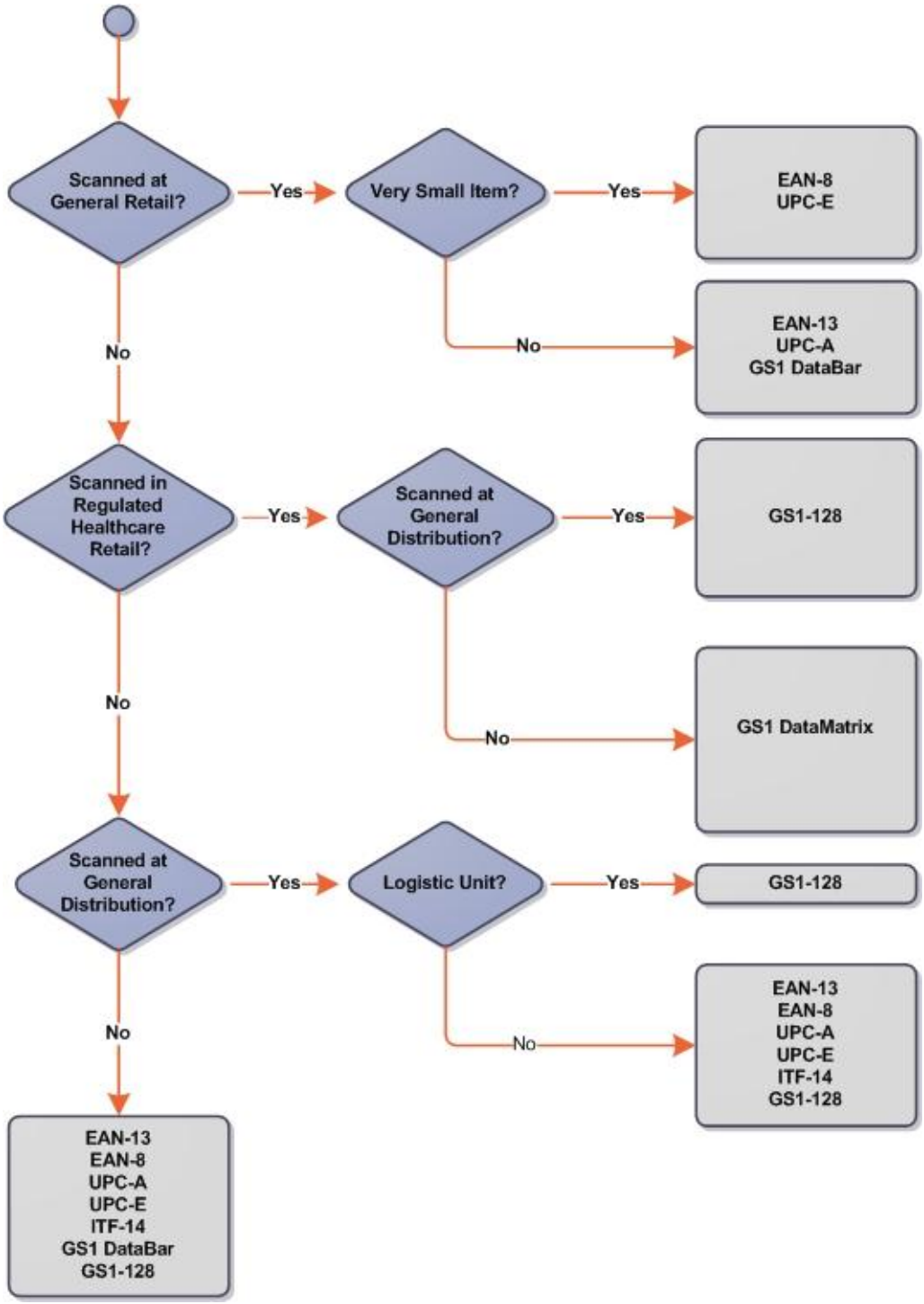
Certain symbols can be used only to mark some types of items, i.e.:

Small retail items	General retail items	Non-retail items
EAN-8	UPC-A	ITF-14
UPC-E	EAN-13	GS1-128

See for details: http://www.gs1.org/docs/barcodes/GS1_DataMatrix_Introduction_and_technical_overview.pdf
http://www.gs1.org/productssolutions/barcodes/databar/

The figure below will help users to choose between options.

Figure 6-7 Option Diagram



7. Application Identifiers (AIs)

GS1-128 is an extremely flexible symbology. It allows representation of data of variable length and makes it possible to encode several pieces of information in one bar code symbol. This is called concatenation.
An Application Identifier is the field of two or more characters at the beginning of an Element String. AIs are prefixes that uniquely identify the meaning and the format of the data field following the AI.
The data following the AI may comprise alphabetic and/or numeric characters, of any length up to thirty characters. The data fields are either of fixed or variable length, depending on the AI.
Attribute data are associated with a trade item or a logistic unit and have no meaning if isolated. Attribute data may be represented in GS1-128 using AIs. There is a range of AIs for attributes such as weight, area or volume. The measure attributes that can be used on trade items are called trade measures (these are always net measures) and attributes for Logistic Units are called logistics measures (these are always gross measures).
The following table is extracted from the complete list (see AppendixA.4 , A.4 GS1 Application Identifiers in Numerical Order,for the complete list of Application Identifiers).

AI	Content	Format*
00	SSCC	N2+ N18
01	Global Trade Item Number	N2+ N14
02	GTIN of trade items contained in a logistic unit	N2+ N14
10	Batch number	N2+ X..20
11	Production date	N2+ N6
15	Best Before Date (YYMMDD)	N2+ N6
17	Expiration Date (YYMMDD)	N2+ N6
21	Serial number	N2+ X..20
310(**)	Net weight (kilograms)	N4+ N6
37	Count of trade items contained in a logistic unit	N2+ N..8
401	Consignment number	N3+ X..30
420	Ship to (deliver to) postal code	N3+ X..20

* The format symbols denote:

- N = numeric characters
- X = alpha-numeric characters
- .. = variable length field
- figures = number of characters

** The fourth digit of this GS1 Application identifier indicates the implied decimal position point

Figure 7-1 Example of a GS1-128 Representing a GTIN, a Best Before Date, and a Batch Number

The use of AIs is governed by certain rules. Some must always be used with others: for example AI (02) must be followed by AI (37). Some AIs must never be used together, for example AI (01) and AI (02). Companies are not free to pick as they wish from the list of AIs and must respect these basic rules which are fully explained in the *GS1 General Specifications*.

8. Identification and Barcoding of Outer Cases

Users of the GS1 System have agreed that different types of trade item need to be identified separately from one another to make sure that any automatic handling systems can be designed to deal with them accurately and efficiently.

Trade items are products and pre-defined groupings of products that may be ordered, priced or invoiced at any point in the supply chain. They include individual items typically sold at a retail point of sale or scanned at point of use, and groupings of these items that are packaged together for ease of distribution and handling.

Examples of general retail consumer trade items (the name given to them in the GS1 General Specifications) include a single bar of chocolate and a single radio. Examples of trade item groupings or outer cases include a case containing 12 packets of breakfast cereal or six oil filters; the cases will not normally be sold at the retail point of sale but the items inside will be sold individually to the consumer.

Manufacturers of products sell their items by the trade item grouping or outer case to their customers which may be retailers, and the retailers generally sell trade items individually to their customers at the retail point of sale. It is important to be able to distinguish between single items and outer cases containing these items automatically so they must be identified with different numbers that are then represented in bar codes for scanning purposes.
Here we explain how to make sure that outer cases are allocated different identification numbers from general retail consumer trade items, how to choose the right bar code to use, and some of the common problems to avoid.

8.1. Identification (numbering)

Outer cases can be identified in different ways:

- By allocating a specific GTIN-13, or GTIN-12 Number. The most commonly used number is the GTIN-13 which is 13 digits long and is created as shown below as an example:

GS1 Company Prefix example	Item reference example	Check digit	Complete GTIN-13	Number of GTINs that can be created from the prefix
95012345	1700	3	9501234517003	10,000
950987654	123	1	9509876541231	1,000
9503333333	01	8	9503333333018	100

Each user allocates the item reference element of the complete GTIN to follow the GS1 Company Prefix they have been allocated and calculates the final check digit from the first 12 digits. The check digit is calculated from the first twelve digits and is used by scanning equipment to ensure that the number has been correctly composed. The modulo-10 algorithm that is used to work this number out is available in the GS1 General Specifications, and a check digit calculator is also provided at the GS1 website.

Although GTINs are formed from three components, the complete GTINs should always be processed as one number and should never be broken down into their component parts.

- Alternatively, by allocating a GTIN-14 Number. These numbers incorporate the GTIN used to identify the single item as explained below. The indicators have no explicit meaning – they simply create different numbers with different check digits that will identify the different levels of packaging for the same item. The indicators 1 to 8 may be used in any order, and some may not be used at all.

  These 14-digit numbers cannot be used for outer cases that are also general retail consumer trade items because they cannot be encoded in a bar code that can be scanned at the retail point of sale. These GTIN-14s may only be encoded in either ITF-14 or GS1-128 bar codes when used on outer cases.

  Companies, especially retailers, should be able to record these 14-digit numbers in their databases even if they decide they do not want to use these numbers on their own products.

GTIN-14 number structure			
Indicator	GTIN-13 number for the single item less its check digit	Check digit for 14-digit number	Complete GTIN-14
1	950123456700	3	19501234567003
2	950123456700	0	29501234567000
3	950123456700	7	39501234567007
4	950123456700	4	49501234567004
5	950123456700	1	59501234567001
6	950123456700	8	69501234567008
7	950123456700	5	79501234567005
8	950123456700	2	89501234567002

GTIN-14s beginning with 9 are also created in a similar way to identify outer cases that have a variable measure. (see section 10 for variable measure trade items)

8.1.1. Allocating numbers to Outer Cases

A unique number is allocated to each product that needs to be uniquely identified for pricing, ordering or invoicing purposes. Any new product, variant, or grouping should be allocated a new number.
For example, a product that has three sizes and seven different colours, and is available individually, in boxes of 12, and boxes of 24 will require 63 different GTINs to identify each combination uniquely.
If a change is made to the product which is important to the customer or end user, then a new number must be allocated. If the GTIN on the individual item changes, all the GTINs used to identify all the different levels of packaging will also need to be changed.
The basic rules for the creation of new numbers are as follows:

Essential	Unnecessary
✓ New product	X Minor description or ingredients change
✓ New product variant	X Undeclared weight change
✓ Change of name	X Competition offer
✓ Major product description change	X Money off next purchase
✓ Declared changed contents	X 'Send for' offer
✓ New packaging type	X Change of label or packaging artwork
✓ Declared changed weight or volume	
✓ Free gift attached	
✓ Price flash	

Parentheses shall surround AIs in Human Readable Interpretation but are not encoded in the GS1 AIDC data carrier. The GS1 GTIN Allocation Rules provide full details of the normal requirements and these are available for downloading or using online at the GTIN Allocation Rules website.

8.1.2. Packaging Configuration

One trade item package/container may be contained in another trade item package/container. Each level of a trade item must have its own GTIN-13, GTIN-12, GTIN-8, or GTIN-14 primarily depending on whether it is retail item or not. Companies should take into consideration the channels where the products are sold and what the requirements are. The following decision tree may help.

Figure 8-16 Simplified decision tree for GTIN type selection

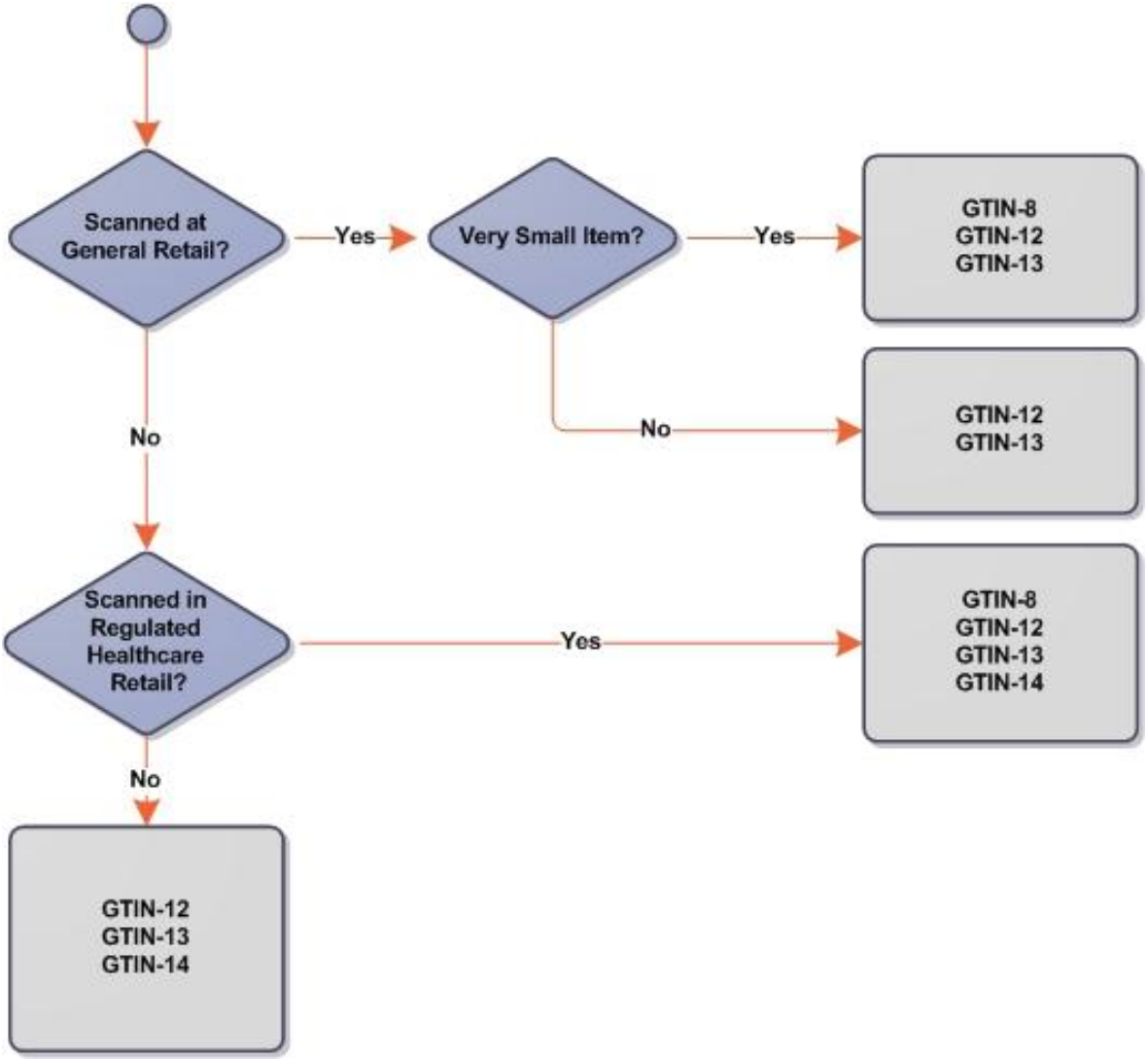
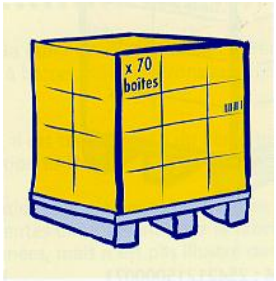


Figure 8-17 GTIN Numbering Examples

GTIN-13: 5412345000013

GTIN-13: 5412345000433

GTIN-13: 5412345000693



GTIN-13: 5412345000259

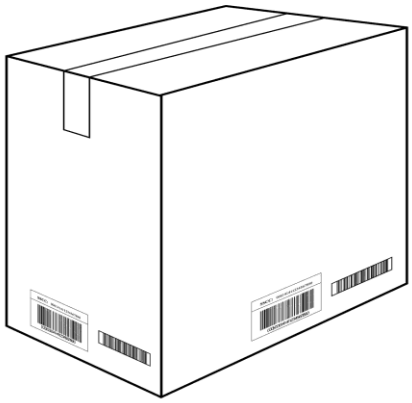
8.2. Symbol Placement Guidelines on Outer Cases

The minimum requirement is to place at least one bar code symbol on each trade item or logistics unit. However, the best practice is to fix two labels to adjacent sides of items packaged for transport.

On Cartons and Outer Cases

The lower edge of bar should be located 32 mm from the natural base of the item. Including Quiet Zones, the symbol should be at least 19 mm from the vertical edges. When using an ITF-14 Bar Code, the outer edges of the bar code's left or right bearer bar should be a minimum of 19 mm from the vertical edges of the side of the item.

Figure 8-3 Bar codes on Cartons and Outer Cases



On Shallow Trays and Cases

If the height of a case or tray is less than 50 mm and printing a full height bar code with the human readable interpretation below the bars is impossible, or if the construction of the unit prevents accommodation of the full symbol height, the following options should be considered in this order of preference:

1. Place the Human Readable Interpretation adjacent to (obviously associated with) the symbol, outside the compulsory Quiet Zones.

Figure 8-4 Bar codes on Shallow Trays and Cases

2. When the height of the unit is less than 32 mm, the symbol may be placed on the top of the package. The symbol should be placed with the bars perpendicular to the shortest side, no closer than 19 mm (0.75 inch)from any edge.

8.3. Common Problems to Avoid

8.3.1. The same GTIN on two different items

When using ITF-14 or GS1-128 symbols on an outer case, it is not sufficient to place a leading zero before the GTIN-13 of the single item and encode this number in one of these different bar codes. Any leading zeroes before a GTIN only act as filler characters and do not change the GTIN.
If GTIN-13s are to be shown in ITF-14 or GS1-128 symbols to identify an outer case, they must be different 13-digit numbers which are then prefixed with a zero to allow them to be encoded in either of these symbols.

8.3.2. Two GTINs on one item

If the product may be sold at a retail point of sale as well as being scanned in a warehouse or at goods inward, one EAN/UPC symbol at a size of at least 150% (equal to an x-dimension of 0.495 mm) is sufficient. If any extra symbol were provided, it should represent the same GTIN as the product is still the same.
These are two examples of wrong unit marking. Such practice causes confusion for all the companies that deal with these items.

Figure 8.5 - 1

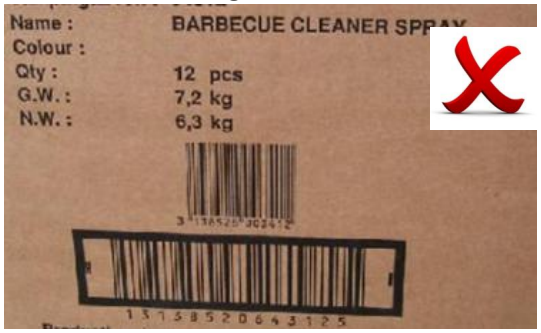


Figure 8.5 - 2

Figure 8.5-1 shows a GTIN in an EAN-13 symbol and just below another GTIN in a ITF-14 symbol. In the second example, Figure 8.5-2 shows the same GTIN in two different symbols EAN-13 and GS1-128 additionally there are two candidates for Human Readable information with two different GTIN printed.

8.3.3. Use of AIs (02) and (37) without SSCC

GS1 System users have decided that pre-defined groupings of trade items (outer cases) should be allocated their own unique GTINs and that no-one should use the GS1 Application Identifier standards to count up the number of single items contained within an outer case.
This is because a product may be sold in outer cases that contain six, 12 or 24 items, and these will have different dimensions and prices. If a customer asks for 48 single items, how does the supplier know whether the customer expects eight boxes of six, four boxes of 12 or two boxes of 24? The supplier never sells single items so it is important to give every pre-defined outer case its own GTIN.
Users may only count up the number of items contained in a logistic unit. Each logistic unit is not always regarded as a trade item but has its own identifier, a Serial Shipping Container Code or SSCC. Only when the SSCC is provided using the Application Identifier (00), may a supplier choose to describe and count the contents using the AIs (02) and (37).

Figure 8.6

Figure 8.6 shows an usage of AI (02) without SSCC. Additionally this label has insufficient left quite zone.

8.3.4. Poor print quality

All the bar codes being printed onto packaging or labelling should be verified to ensure that they will be scannable. This is particularly important when bar codes are being printed on-demand as the print process is more variable and needs to be checked more often.

Some basic rules to follow are:

- Ensure the print supplier guarantees the minimum quality of the printed bar codes by using an ISO/IEC compliant verifier
- Don't print EAN/UPC and GS1-128 symbols directly onto brown board
- Ensure the bar codes meet the minimum size requirements
- If using on-demand printing equipment, consider using online scanners to check the presence of scannable bar codes, as well as using bar code verifiers to confirm the quality expected from the particular printing process.

9. Logistic Unit

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 of Logistic Units in the supply chain is a major application of the GS1 System. For this purpose, a standard Identification Number known as the SSCC identifies Logistic Units.

This number is unique to each specific Logistic Unit, and is, in principle, sufficient for all logistic applications.If, in addition to being a logistic unit, the item is regarded as a trade item by the brand owner, it may additionally be identified with a GTIN. The combination of a GTIN and a serial number must not replace the SSCC as the identifier of a logistic unit.

If trading partners, including carriers and third parties, all read SSCCs, exchange eCom messages between them that give full descriptions of the Logistic Units and have the relevant file on-line when reading the SSCC to access these descriptions, then no other information would be needed besides the SSCC.But all these conditions are still rarely met, so it is recognised that a few attributes in addition to the SSCC are useful in bar coded form on the logistic units.

As each Logistic Unit **must** be assigned its own unique SSCC, the pre-printing of the bar code symbol containing the SSCC on the packaging of the Logistic Unit is not practical. A label must be created, which will be attached to the Logistic Unit, at the time that it is generated.

Further, a Logistic Unit may also be a unit of trade and hence be subject to the GS1 specifications for "Trade Items". If this is the case, it is logical to generate a single label containing all the bar-coded information required.

GS1 Global Office along with representatives of manufacturers, retailers, transporters and GS1 Member Organisations have developed a voluntary standard for bar code label applications: the GS1 logistics label. The SSCC, and its application on Logistic Units, is the most important element of the GS1 logistics label.

9.1. The SSCC

SSCC identifies all Logistic Units, whether they are homogeneous or mixed.
A company wishing to differentiate its production plants within the SSCC can do so by allocating blocks of SSCCs to each production plant.
The SSCC is declared in the despatch advice or the delivery note and in all transportation messages.

Application Identifier	SSCC			
	Extension digit	GS1 Company Prefix	Serial Reference	Check Digit
0 0	N_1	N_2 N_3 N_4 N_5 N_6 N_7 N_8 N_9 N_{10} N_{11} N_{12} N_{13} N_{14} N_{15} N_{16} N_{17}		N_{18}

The **Extension digit** is used to increase the capacity of the SSCC. It is assigned by the company that allocates the SSCC.
The **GS1 Company Prefix** is assigned by a GS1 Member Organisation to the system user which is normally the company assembling the Logistic Unit. It makes the number unique world-wide but does not identify the origin of the unit.
The **Serial Reference** is a serial number that the company that has been assigned the GS1 Company Prefix chooses to complete the string of digits N_2 to N_{17}. The simplest way to allocate the Item Reference is sequentially that is 000, 001, 002, 003, ...

To be written by each Member Organisation:
The local structure of GS1 Company Prefixes and Item References

9.2. The Logistics Label

9.2.1. Representation of information

The information presented on logistics labels takes two basic forms; human oriented information to be read by people, which is comprised of text and graphics; machine-readable information designed for automatic data capture. Bar codes, as machine-readable symbols, are a secure and efficient method for conveying structured data. They, as well as human readable text allow general access to basic information at any point in the supply chain. Both methods of presenting information add value to logistics labels, and often co-exist on the same label. The GS1 logistics label is structured in three sections. The top section of the label contains free format information. The middle section contains text information and human readable interpretations of the bar codes. The bottom section includes the bar codes and associated information.

9.2.2. Label Design

The layout of the logistics label supports the supply chain process by grouping information into three logical sections for the supplier, customer, and carrier. Each label section may be applied at a different point in time as the relevant information becomes known. Additionally, within each section bar codes are segregated from text information to facilitate separate processing by machines and people.

The labeller, which is the organisation responsible for the printing and application of the label, determines the content, format, and dimensions of the label.

The SSCC is the single mandatory element for all GS1 logistics labels. Other information may be added, when required, in order to comply with the *GS1 General Specifications*.

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

9.2.2.1. Supplier Section

Information contained in this section is generally known at the time of packaging by the supplier. The mandatory SSCC is applied here as the unit identifier. Trade item identification (GTIN) would also be applied here when used. Other information that may be of primary interest to the supplier, but might also be useful for customers and carriers, can be applied.

This includes product related information such as product variant; dates such as production, packaging, expiration, and best-before dates; as well as lot, batch and serial numbers.

9.2.2.2. Customer Section

Information contained in this section is generally known at the time of order and order processing by the supplier. Typical information includes the ship-to-location, purchase order number, and customer-specific routing and handling information.

9.2.2.3. Carrier Section

Information contained in this section is generally known at the time of shipment, and is typically related to transport. Typical information includes ship-to postal codes, consignment numbers, and carrier-specific routing and handling information.

9.2.2.4. Label Examples

Figure 9-1 A Basic Label: an SSCC

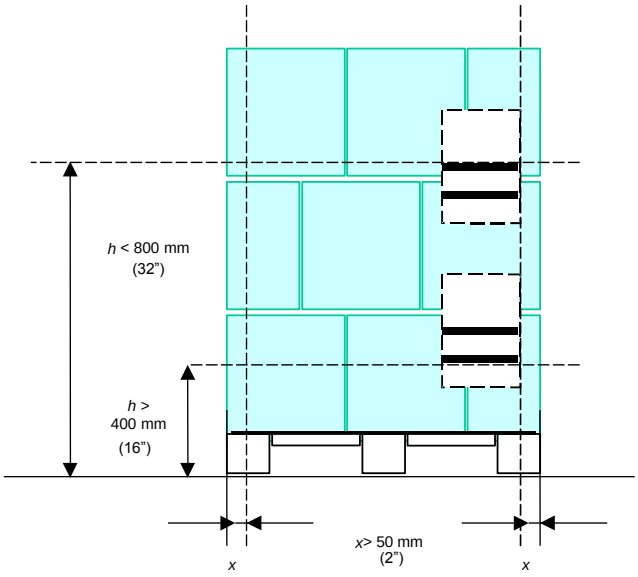
Figure 9-2 A Logistic Label

9.3. Symbol Placement Guidelines on Logistic Pallets

On Pallets

For pallets labels should be placed so that all the bar code symbols are at a height of between 400 mm and 800 mm from the base of the unit, and no closer than 50 mm from the vertical edge.

Figure 9-3 Bar codes on Pallets



10. Variable Measure Trade items

A product whose price is dependent on a measurement which is continuously variable can be either identified with GTINs encoded in a GS1 DataBar or they should be identified following local national guidelines.

The term "Variable Measure Trade Items" is used to describe products that are sold, ordered or produced in quantities which can vary continuously, such as fruit and vegetables, meat, cheese, rope, chain, fabric, carpets on a roll, etc.

10.1. Variable Measure Fresh Food Trade Items Scanned at Point of Sale Using GTIN

Unlike a Fixed Measure Trade Item, a Varigable Measure Trade item has one measure that varies continuously while other characteristics remain the same. The variable measure may be weight, length, number of items contained or volume. If GTIN will be used for identifying the item, carrier choices are only GS1 DataBar Expanded and GS1 DataBar Expanded Stacked.

10.2. Retail Variable Measure Trade Items

In this scenario the weight, quantity or price must be included in the bar code to be read at the checkout. In the EAN/UPC Symbols, there is no room left for a GTIN, so a shorter number must be used to identify the product.

The measure or price may be of 4 or 5 digits, depending on the currency, and may include a special Verifier Digit for price. The exact structure is determined by the GS1 Member Organisation for their respective territories.

The short number may be allocated by:

- The retailer (from the capacity made available by MO)
- The supplier from a range of numbers allocated to him by the GS1 Member Organisation
- The GS1 Member Organisation in case a national generic number has been defined for a particular type of item.

The GS1 Prefix is selected by the Member Organisation from the range 02 and 20 to 29.

To be written by each Member Organisation:

The solutions for bar coding variable measure products are national solutions. They are not to be used when trading across borders. Companies which export must adopt the solutions in force in the country of destination: details are available at the respective GS1 Member Organisation.

10.3. Non Retail Variable Measure Trade Items

These are items sold and distributed between trading partners. Examples include:

- Items ordered in bulk (products sold by kilo such as vegetables and fruit; or by length such as carpets or cables),
- Items sold by piece such, such as a round of cheese or a carcass of meat.
- Pre-defined groupings of variable measure general retail consumer trade items, for example an outer case containing ten chickens and an outer case containing six cheeses.

The GTIN-14 Identification Number with the indicator "9" is used to identify non-retail Variable Measure Trade Items. To complete the identification of a trade item the presence of the specific measure of the item is mandatory.
When several non retail Variable Measure Trade Items exist for a specific retail Variable Measure Trade Item, each one must be allocated its own GTIN starting with a 9.
The following is an example of a complete identification number in bar coded form, configured for measuring an item in kilograms. For other measures, see the full list of AIs in AppendixA4 or consult the *GS1 General Specifications*.

Figure 10-1 Example using GS1 Application Identifiers to identify a Variable Measure Trade Item

AI	GTIN	AI	Measure
0 1	9 N_1 N_2 N_3 N_4 N_5 N_6 N_7 N_8 N_9 N_{10} N_{11} N_{12} C	3 1 0 X	M_1 M_2 M_3 M_4 M_5 M_6

There are two ways to translate this information into a bar code.

- Preferably with a GS1-128, to encode the identification number and the measure in a single symbol, using Application Identifier (01) for the GTIN, and one of the AIs from (3100) to (3169), or AI (8001) for the measure.
- Or it is possible to have the GTIN encoded in an ITF-14 Symbol and the measure in a GS1-128 Symbol.

The measure is always expressed in six digits in the unit of measure defined by the AI. The position of the decimal point is indicated by the last digit (*x) of the AI. If it has the value 0 it means that there is no decimal point, if it has the value 2 it means that there are two decimal digits.
For example, 005250 preceded by the AI (3103) signify 5,25 kilograms.

10.3.1. GS1 DataBar

Combining GS1 DataBar and GS1 Application Identifiers provides potential for a global solution for variable measure products. The global adoption of GS1 DataBar is an ongoing process and detailed information can be found on:
http://www.gs1.org/productssolutions/barcodes/databar/

11. Special Cases

11.1. Serial Publications, Books and Printed Sheet Music

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

- A solution for published material should address the requirement to process returns (sorting and counting) to wholesalers and publishers. This implies the reading of a supplementary number that is not required for item identification.
- The international systems, ISSN, ISBN and ISMN already handle the numbering of publications, books and printed sheet music respectively.

11.1.1. Serial Publications

When identifying serial publications (e.g., newspapers, magazines, annual reports, etc) a company may identify them in the same manner as any other retail trade item (see Section 3, Identification of Trade Items). However, the GS1 Prefix 977 has been allocated to the International Standard Serial Number (ISSN numbering system). ISSN (http://www.issn.org/) allocates identification numbers to Serial Publications using this prefix. Typically the number is structured as:

Figure 11-1 ISSN number encoded into a GTIN-13 structure

GS1 Prefix	ISSN (without its Check Digit)	Variant	Check Digit
9 7 7	N_4 N_5 N_6 N_7 N_8 N_9 N_{10}	N_{11} N_{12}	N_{13}

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

Serial Publications should be marked with an EAN-13, UPC-A, or UPC-E Bar Code Symbol that complies with the print quality specifications applicable to all GS1 System bar code symbols. The EAN/UPC 2-digit or 5-digit Add-On symbols are options used with the above EAN/UPC symbols and GS1 Global Office recommends the use of the following number assignment using the 2-digit Add-On:

- 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 the EAN-13, UPC-A or UPC-E Symbol. The two-digit serial number should only be used to represent the applicable week, which, together with the GTIN-13 or GTIN-12, establishes the day within the year.
- Weeklies: Number of the week (01 – 53)
- Bi-weeklies: Number of the first week of the respective period (01 – 53)
- Monthlies: Number of the month (01 – 12)
- Bi-monthlies: Number of the first month of the respective period (01 – 12)
- Quarterlies: Number of the first month of the respective period (01 – 12)
- Seasonal period: First digit = last digit of the year; second digit = 1 spring, 2 summer, 3 autumn, 4 winter
- Bi-annual period: First digit = last digit of the year; second digit = number of the first season of the respective period
- Annuals: First digit = last digit of the year; second digit = 5
- Special intervals: Consecutively numbered from 01 to 99

The two-digit Add-On Symbol must be placed to the right of the main symbol and parallel to it. The Add-On Symbol must comply with the print quality specifications applicable to all GS1 System bar code symbols. For example, the X-dimension applied to the main bar code symbol must also be applied to the Add-On Symbol.

11.1.2. Books

When identifying books and paperbacks a company may identify them in the same manner as any other retail trade item (see Section 3, Identification of Trade Items). However, the recommended option is to use the International Standard Book Number (ISBN numbering system). The GS1 Prefixes 978 and 979 have been allocated to ISBN (http://www.isbn-international.org/), who allocates identification numbers from this 'Bookland' prefix.
Books and paperbacks should be marked with an EAN-13, UPC-A, or UPC-E Bar Code Symbol that complies with the print quality specifications applicable to all GS1 System bar code symbols. The EAN/UPC 2-digit or 5-digit Add-on symbols are options used with the above EAN/UPC symbols.

11.2. Company Internal Numbering in a Store or Warehouse

Companies may need to number items for their own internal use. They may do this using GTIN-13 Numbers starting with one of the prefixes reserved for this purpose by the MO in the range: 02, 04, or 20 to 29. These numbers cannot be used outside the company that has allocated them and can only be used for scanning internally. They cannot be used for eCom purposes, as they are not allocated uniquely to the supplier. The use of internal numbering may cause confusion in the event of mergers between companies.

11.3. The Numbering of Coupons

Coupon identification is organised at national level and therefore, the numbers cannot be used world-wide. The structure is defined by each MO.
Coupons are numbered using a GTIN-13 Number starting with prefix 99. For U.P.C. Symbols, GS1 US has allocated prefix 05 and 99 to coupons. Prefixes 981, 982 and 983 have been released for coupons issued in a currency common to several countries (e.g. euro).

To be written by each Member Organisation:
There are different national solutions for identifying coupons, in a similar way that there are national solutions for variable measure items

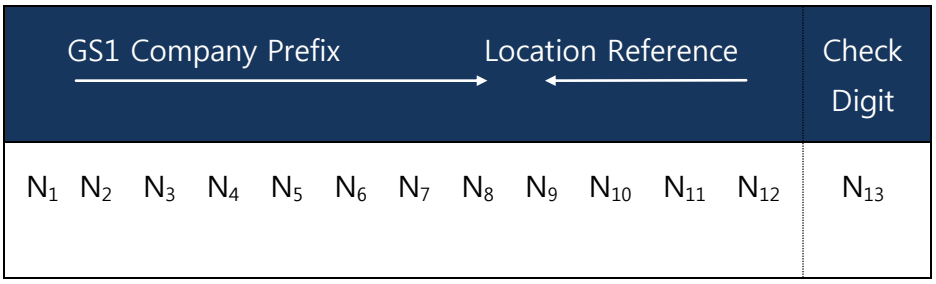
11.4. Other Special Solutions

To be written by each Member Organisation:
There are local solutions for other areas of applications i.e. for identification of payment slips, pharmaceutical products etc. Each Member Organisation that has developed such local solutions should present them at the necessary level of detail.

12. Global Location Numbers

The Global Location Number (GLN) makes possible the unique and unambiguous identification of physical locations or legal entities.
A trade relationship may involve several companies; suppliers, customers and possibly a logistic service provider. In each company, several departments may be involved.
Trade partners need to identify in their own files, all the locations that are relevant to this relationship.
The GLN uses a similar data structure as the GTIN-13 data structure and the numbers are non-significant. The same digits can be used for GTIN-13 and a GLN. No confusion arises because the applications are totally separate.

Figure 12-1 GLN Data Structure



Each company or organisation holding a GS1 Company Prefix may assign Global Location Numbers to its own locations. Each different location that needs to be distinguished must be allocated a separate number.

Important: In some countries GTIN and GLN numbers are allocated from separate pools – different numbers for each of them. Therefore, in order to avoid confusion and number clash, it is strongly advised to always contact your GS1 Member Organisation before assigning GLNs.

It is the responsibility of a company using GLNs to keep business partners informed of all the numbers it has issued, together with the corresponding details.
The GLN can be used in many ways. For example in eCom communications the GLN can be used to identify all relevant physical locations and in bar coded form with Application Identifiers that have been defined for GLNs:

- "Deliver to" location AI (410)
- "Invoice to" location AI (411)
- "Purchased from" location AI (412)
- "Ship for - Deliver for - Forward to" location AI (413)
- Physical Location AI (414)
- Location Number of the Invoicing Party AI (415)

Refer to www.gs1.org/glnrules for more details on GLN.

13. eCom

Every day, businesses generate and process a staggering volume of paper documents. These documents, ranging from purchase orders and invoices, to product catalogues and sales reports, provide the vital information that will precede, accompany or follow the physical goods in a commercial transaction.
eCom provides trading partners with an efficient business tool for the automatic transmission of commercial data from one computer application directly to another. In eCom, all paper business documents sent previously between companies have been replaced by messages, suitable for exchange by electronic means, between computer applications.

> **Note:** eCom 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.

This interchange concerns trade transactions, and the associated commercial, logistics and financial implications. For every organisation the successful implementation of eCom will be a multi-disciplinary project requiring a high level of commitment not only from senior management but also from a broad spectrum of functional managers responsible for different areas of activity. Corporate policies and procedures will need to be examined. Current functional procedures may require revision and new business relationships could be established and managed. At the centre of the system lies the better use and sharing of information, both internally and between trading partners, so that inter-dependency can be more informed and reliable.
There are two major areas in which the eCom is standardised in GS1 System: EANCOM® and XML. EANCOM® is a detailed implementation guideline of the UN/EDIFACT standard messages. It comprises business messages with clear definitions and explanations on how to use all the data fields. This allows trading partners to exchange commercial documents in a simple, accurate and cost effective manner.

There are various types of messages to answer all business requirements at the various stages of a trade relationship:

- Master data messages describe relevant parties and products.
- Commercial transactions start with the ordering and end with the debit multiple advice or a credit multiple advice messages, following the logical sequence of the trading cycle.

- Report and planning messages are used for informing the trading partner on the trading activity or to plan ahead for future requirements, thus allowing a streamlining of the supply chain.
- General messages which are used to send general application support information to one or multiple addresses.

EANCOM® is not only a set of standard messages; it is also based on the use of GS1 international numbers rather than numbers agreed bilaterally between two trading partners. The use of GS1 Identification keys will naturally simplify implementations with future trading partners.
The GTIN described in this manual for identifying trade items is the only international and multi-sector numbering system that provides a unique and unambiguous identification number for every item and its variants, regardless of its place of origin and destination. Its use in EANCOM® messages is particularly important in open environments. Companies do not have to maintain complex cross-references of trading partner's internal numbers.
The GLN (Global Location Number) provides the most efficient means of communicating location or company identification. As well as being used in the EANCOM® messages they can also be used by networks to route eCom messages to the designated mailbox, workstation or application.
EANCOM® messages have been designed to take full advantage of the associated standards, such as product and location numbering and bar coding, in order to provide maximum efficiency and benefits to the user. The use of such messaging and standards is increasing throughout the world.
The eCom performed by means of EANCOM® messages requires using specially dedicated connections – Value Added Network. VANs are very reliable, yet quite expensive and require special service. That is the reason why mainly it was the biggest companies that were able to invest in such infrastructure. The SMEs continued using the old paper-based and error prone exchange of business documents.
Along with the rapid development of the Internet, enterprises expressed the need to use this medium also for exchange of business documents. A response to that need was XML – eXtensible Mark-up Language, used for automatic exchange of business information between applications, over the Internet.
There have been several standard XML messages developed by GS1. All of them use the standard reference numbers, like GTIN or GLN. For further information about those new standards, interested users should contact their local GS1 Member Organisation.
See eCom website for more information:

http://www.gs1.org/productssolutions/ecom/

14. Frequently Asked Questions

Detailed information can be found either at the website: www.gs1.org, or by contacting the local GS1 Member Organisation.
The contact list can be accessed at www.gs1.org/contact.
The frequently asked questions are posted at www.gs1.org/helpdesk.
Detailed information about GTIN allocation rules are posted at www.gs1.org/gtinrules.
Detailed information about GLN allocation rules are posted at www.gs1.org/glnrules.
Contact information about member companies holding a given GS1 Identification Key (GTIN, GLN, etc.) can be found at http://directory.gs1.org/.

15. Glossary

The following glossary was updated for the Feb-2011 publication of this document. Please refer to the GDSN glossary in the GS1 GDD (http://gdd.gs1.org/GDD/public/searchableglossary.asp) for the latest version.

Term	Definition
Add-On Symbol	A bar code used to encode information supplementary to that in the main bar code.
alphanumeric (an)	Describes a character set that contains alphabetic characters (letters), numeric digits (numbers), and other characters, such as punctuation marks.
Attribute	An Element String that provides additional information about an entity identified with a GS1 Identification Key, such as Batch Number associated with a Global Trade Item Number (GTIN).

Term	Definition
Bearer Bars	Bar abutting the tops and bottoms of the bars in a bar code or a frame surrounding the entire symbol, intended to equalize the pressure exerted by the printing plate over the entire surface of the symbol and/or to prevent a short scan by the bar code reader.
brand owner	The party that is responsible for allocating GS1 System Identification Keys. The administrator of a GS1 Company Prefix.
Carrier	The party that provides freight transportation services or a physical or electronic mechanism that carries data.
Check Digit	A final digit calculated from the other digits of some GS1 Identification Keys. This digit is used to check that the data has been correctly composed. (See GS1 Check Digit Calculation.)
Company Number	A component of the GS1 Company Prefix.
concatenation	The representation of several Element Strings in one bar code.
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 titles	Data titles are the abbreviated descriptions of Element Strings which are used to support manual interpretation of bar codes.
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).
EAN/UPC Symbology	A family of bar codes including EAN-8, EAN-13, UPC-A, and UPC-E Bar Codes. Although UPC-E Bar Codes do not have a separate symbology identifier, they act like a separate symbology through the scanning application software. See also EAN-8 Bar Code, EAN-13 Bar Code, UPC-A Bar Code, and UPC-E Bar Code.
EAN-13 Bar Code	A bar code of the EAN/UPC Symbology that encodes GTIN-13, Coupon-13, RCN-13, and VMN-13.
EAN-8 Bar Code	A bar code of the EAN/UPC Symbology that encodes GTIN-8 or RCN-8.

Term	Definition
EANCOM	The GS1 standard for Electronic Data Interchange (EDI) that is a detailed implementation guideline of the UN/EDIFACT standard messages using the GS1 Identification Keys.
Electronic Commerce	The conduct of business communications and management through electronic methods, such as Electronic Data Interchange (EDI) and automated data collection systems.
Electronic Message	A composition of Element Strings from scanned data and transaction information assembled for data validation and unambiguous processing in a user application.
Element String	The combination of a GS1 Application Identifier and GS1 Application Identifier Data Field.
Extension digit	The first digit within the SSCC (Serial Shipping Container Code) which is allocated by the user and is designed to increase the capacity of the SSCC.
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.
Function 1 Symbol Character (FNC1)	A symbology character used in some GS1 data carriers for specific purposes.
General Distribution Scanning	Scanning environments that include bar coded trade items packaged for transport, logistic units, assets, and location tags.
Global Location Number (GLN)	The GS1 Identification Key used to identify physical locations or legal entities. The key comprises a GS1 Company Prefix, Location Reference, and Check Digit.
Global Returnable Asset Identifier (GRAI)	The GS1 Identification Key used to identify Returnable Assets. The key comprises a GS1 Company Prefix, Asset Type, Check Digit, and optional serial number.
Global Service Relation Number (GSRN)	The GS1 Identification Key used to identify the relationship between a service provider and service recipient. The key comprises a GS1 Company Prefix, Service Reference, and Check Digit.
Global Trade Item Number (GTIN)	The GS1 Identification Key used to identify trade items. The key comprises a GS1 Company Prefix, an Item Reference and Check Digit.

Term	Definition
GS1 Application Identifier	The field of two or more digits at the beginning of an Element String that uniquely defines its format and meaning.
GS1 Application Identifier data field	The data used in a business application defined by one application identifier.
GS1 Check Digit Calculation	An algorithm used by the GS1 System for the calculation of a Check Digit to verify accuracy of data. (e.g. Modulo 10 check digit, Price check digit).
GS1 Company Prefix	Part of the GS1 System identification number consisting of a GS1 Prefix and a Company Number, both of which are allocated by GS1 Member Organisations. See also U.P.C. 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 a GS1 Company Prefix are set by the GS1 Member Organisations.
GS1 DataBar	A family of bar codes, including GS1 DataBar Omnidirectional; GS1 DataBar Stacked Omnidirectional; GS1 DataBar Expanded; GS1 DataBar Expanded Stacked GS1 DataBar Truncated, GS1 DataBar Limited, and GS1 DataBar Stacked symbols.
GS1 DataMatrix	GS1 implementation specification for use of Data Matrix
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	Based in Brussels, Belgium, and Princeton, USA, it is the organisation that manages the GS1 System. Its members are GS1 Member Organisations.
GS1 Identification Key	A numeric or alphanumeric data field defined 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, consignment, shipments and more. Any identification number that combines GS1 member company identifiers (GS1 Company Prefix) with standards based rules for allocating reference numbers is a key.

Term	Definition
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 brand owners 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 GS1 that is allocated to GS1 Member Organisations or for Restricted Circulation Numbers.
GS1 Symbologies using GS1 Application Identifiers	All GS1 endorsed bar code symbologies that can encode more than a GTIN namely GS1-128, GS1 DataMatrix, GS1 DataBar and Composite).
GS1 System	The specifications, standards, and guidelines administered by GS1.
GS1 XML	The GS1 standard for Extensible Markup Language schemas providing users with a global business messaging language of e-business to conduct efficient Internet-based electronic commerce.
GS1-128 Symbology	A subset of Code 128 that is utilised exclusively for GS1 System data structures.
GS1-8 Prefix	A one-, two-, or three-digit index number, administered by GS1, that is allocated to GS1 Member Organisations for the creation of GTIN-8s or for Restricted Circulation Numbers (see RCN-8).
GSIN	See Global Shipment Identification Number.
GTIN Application Format	A format for a GTIN-8, GTIN-12, or GTIN-13 used when a GTIN application requires a fixed field length, for example, when a GTIN-13 is encoded in GS1-128 Symbology using the Application Identifier (01).
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 Prefix, Item Reference, and Check Digit used to identify trade items.
Indicator	A digit from 1 to 9 in the leftmost position of the GTIN-14.

Term	Definition
Item Reference	A component of the Global Trade Item Number (GTIN) assigned by the brand owner to create a unique GTIN.
ITF Symbology	See Interleaved 2 of 5 Symbology.
ITF-14 Bar Code	ITF-14 (A subset of Interleaved 2-of-5) Bar Codes carry GTINs only on trade items that are not expected to pass through the Point-of-Sale.
Local Assigned Code	A particular use of the UPC-E Bar Code for restricted distribution.
Location Reference	A component of a Global Location Number (GLN) assigned by the brand owner to create a unique GLN.
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 an SSCC.
Magnification	Different sizes of bar codes based on a nominal size and a fixed aspect ratio; stated as a percentage or decimal equivalent of a nominal size.
Modulo 10	The name of the algorithm - a simple checksum formula in the public domain - used to create a check digit for those GS1 Identification Keys that require one.
Point-of Sale (POS)	Refers to the retail checkout where omnidirectional bar codes must be used to enable very rapid scanning or low volume checkout where linear or 2D matrix bar codes are used with image-based scanners.
Quiet Zone	A clear space which precedes the Start Character of a bar code 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, 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.

Term	Definition
Radio Frequency Identification (RFID)	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-8	An 8-digit Restricted Circulation Number (see Restricted Circulation Number) beginning with GS1-8 Prefix 0 or 2.
RCN-12	A 12-digit Restricted Circulation Number (see Restricted Circulation Number).
RCN-13	A 13-digit Restricted Circulation Number (see Restricted Circulation Number).
Refund Receipt	A voucher produced by equipment handling empty containers (bottles and crates).
Regulated Healthcare Retail Consumer Trade Item	A regulated healthcare trade item to be sold to the end consumer at a regulated healthcare retail Point-of Sale (Pharmacy). They are identified with a GTIN-13, GTIN-12 or GTIN-8 utilizing linear or 2D matrix bar codes that can be scanned by image-based scanners.
Restricted Circulation Number (RCN)	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).
Scanner	An electronic device to read bar code and convert them into electrical signals understandable by a computer device.
Serial Shipping Container Code	The GS1 Identification Key used to identify logistics units. The key comprises an Extension digit, GS1 Company Prefix, Serial Reference, and Check Digit.
Substrate	The material on which a bar code 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.

Term	Definition
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 Contrast	An ISO/IEC 15416 parameter that measures the difference between the largest and smallest reflectance values in a Scan Reflectance Profile (SRP).
Symbology	A defined method of representing numeric or alphabetic characters in a bar code; a type of bar code.
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.
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 UPC-A Bar Code.
U.P.C. Prefix	A special representation of the GS1 Prefixes '00 – 09' with the leading zero removed. Used when representing the GTIN-12, Coupon-12, RCN-12, and VMN-12 in a UPC-A Bar Code.
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	A bar code of the EAN/UPC Symbology that encodes GTIN-12, Coupon-12, RCN-12, and VMN-12.
UPC-E Bar Code	A bar code of the EAN/UPC Symbology representing a GTIN-12 in six explicitly encoded digits using zero-suppression techniques.
Variable Measure Number (VMN)	A Restricted Circulation Number used 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).

Term	Definition
Variable Measure Trade Item	A trade item which may be traded without a pre-defined measure, such as its weight or length.
VMN-12	The 12-digit Restricted Circulation Number encoded in UPC-A Symbols to allow scanning of variable measure products at Point of Sale. It is defined per target market specific rules that are associated with U.P.C. Prefix 2.
VMN-13	The 13-digit Restricted Circulation Number encoded in EAN-13 Symbols to allow scanning of variable measure products at Point of Sale. 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 that has two different element widths.
X-dimension	The specified width of the narrowest element of a bar code.

A. Appendices

A.1 Standard Check Digit Calculations of GS1 Data Structures

	Digit positions																	
GTIN-8											N_1	N_2	N_3	N_4	N_5	N_6	N_7	N_8
GTIN-12						N_1	N_2	N_3	N_4	N_5	N_6	N_7	N_8	N_9	N_{10}	N_{11}	N_{12}	
GTIN-13					N_1	N_2	N_3	N_4	N_5	N_6	N_7	N_8	N_9	N_{10}	N_{11}	N_{12}	N_{13}	
GTIN-14				N_1	N_2	N_3	N_4	N_5	N_6	N_7	N_8	N_9	N_{10}	N_{11}	N_{12}	N_{13}	N_{14}	
SSCC	N_1	N_2	N_3	N_4	N_5	N_6	N_7	N_8	N_9	N_{10}	N_{11}	N_{12}	N_{13}	N_{14}	N_{15}	N_{16}	N_{17}	N_{18}
Multiply value of each position by																		
x3	x1	x3	x1	x3	x1	x3	x1	x3	x1	x3	x1	x3	x1	x3	x1	x3		
Accumulated results = ***Sum***																		
Subtract ***sum*** from nearest multiple of ten = ***Check Digit***																		

Example of a Check Digit calculation for the 18 digit field																		
Positions	N_1	N_2	N_3	N_4	N_5	N_6	N_7	N_8	N_9	N_{10}	N_{11}	N_{12}	N_{13}	N_{14}	N_{15}	N_{16}	N_{17}	N_{18}
Number ***without*** Check Digit	3	7	6	1	0	4	2	5	0	0	2	1	2	3	4	5	6	
Step 1: Multiply	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
by	3	1	3	1	3	1	3	1	3	1	3	1	3	1	3	1	3	
Step 2: Add up	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	
results to ***sum***	9	7	18	1	0	4	6	5	0	0	6	1	6	3	12	5	18	= 101
Step 3: Subtract ***sum*** from nearest multiple of ten (110) = Check Digit (9)																		
Number ***with*** Check Digit	3	7	6	1	0	4	2	5	0	0	2	1	2	3	4	5	6	**9**

Note: An online check Digit calculator is available on:
http://www.gs1.org/barcodes/support/check_digit_calculator

A.2 GTIN-12 Identification Numbers in a UPC-E Symbol

GTIN-12 item Identification Numbers beginning with the ***U.P.C. Prefix 0*** may be represented in a small bar code symbol named UPC-E. The GTIN-12 Item Number is condensed into a bar code symbol consisting of six symbol character positions. For application processing, the item number must be transformed into its full length by the bar code reader software or by the application software. ***There is no UPC-E six-digit trade item number.***

Table A-1 UPC-E Option for the Identification of Trade Items (GTIN)

GTIN-12 Identification number of trade													Represented in UPC-E symbol positions					
Company prefix							Item reference number					Check digit						
	N_1	N_2	N_3	N_4	N_5	N_6	N_7	N_8	N_9	N_{10}	N_{11}	N_{12}	1	2	3	4	5	6
(0)	0	0	0	0	0	1	0	0	0	0	5	4	0	0	0	0	1	'5'
(0)	0	9	9	9	9	9	0	0	0	0	9	2	9	9	9	9	9	'9'
= 5 UPC-E Applications																		
(0)	0	0	0	0	1	0	0	0	0	0	0	7	0	0	0	1	0	'4'
(0)	0	9	9	9	9	0	0	0	0	0	9	1	9	9	9	9	9	'4'
= 10 UPC-E Applications																		
(0)	0	0	0	3	0	0	0	0	0	0	0	7	0	0	3	0	0	'3'
(0)	0	9	9	9	0	0	0	0	0	9	9	5	9	9	9	9	9	'3'
= 100 UPC-E Applications																		
(0)	0	0	0	0	0	0	0	0	0	0	0	9	0	0	0	0	0	'0'
(0)	0	9	9	2	0	0	0	0	9	9	9	9	9	9	9	9	9	'2'
= 1000 UPC-E Applications																		

Note: Company prefixes showing 000000 and 001000 to 007999 in positions N_1 to N_6 are not available in this UPC-E option (see Table A-2).

Table A-2 UPC-E Option for the Identification of Trade Items for Company Internal Distribution

GTIN-12 Identification number of trade												Check digit	Represented in UPC-E symbol positions					
	N_1	N_2	N_3	N_4	N_5	N_6	N_7	N_8	N_9	N_{10}	N_{11}	N_{12}	1	2	3	4	5	6
(0)	0	0	1	0	0	1	0	0	0	0	5	2	0	1	0	0	0	'5'
(0)	0	0	7	9	9	9	0	0	0	0	9	7	0	7	9	9	9	'9'
LAC Version = 35000 UPC-E																		
(0)	0	0	1	0	0	0	0	0	1	0	0	4	0	1	1	0	0	'0'
(0)	0	0	5	0	0	0	0	0	9	9	9	2	0	5	9	9	9	'0'
RZSC Version = 4500 UPC-E																		
(0)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	'0'
(0)	0	0	0	0	0	0	0	0	9	9	9	7	0	0	9	9	9	'0'
Velocity version = 1000 UPC-E																		

Table A-2 shows the construction principle of UPC-E for trade item numbering for ***restricted distribution*** (company internal). These Identification Numbers are not unambiguous when leaving the applying company.

Remarks concerning Table A 1 and Table A-2

Each number position must only contain the digits shown in the upper and lower lines of each section and those in-between. On decoding, the extension to full length is determined by the value of the number in single quotes in the column ***Represented in UPC-E symbol positions***.

The ***Check Digit***, calculated as described in Appendix A.1, Standard Check Digit Calculations of GS1 Data Structures, applies to the entire Identification Number. In the UPC-E bar code symbol it is implicitly represented by the parity combination of the six symbol characters which are actually encoded.

A.3 Dimensions of Modules and Symbols at Different Magnification Factor

Magnification	Module Width	EAN-13/UPC-A Dimensions		EAN-8 Dimensions	
		Width	Height	Width	Height
0.80	0.264	29.83	20.73	21.38	17.05
0.85	0.281	31.70	22.02	22.72	18.11
0.90	0.297	33.56	23.32	24.06	19.18
0.95	0.313	35.43	24.61	25.39	20.24
1.00	0.330	37.29	25.91	26.73	21.31
1.05	0.346	39.15	27.21	28.07	22.38
1.10	0.363	41.02	28.50	29.40	23.44
1.15	0.379	42.88	29.80	30.74	24.51
1.20	0.396	44.75	31.09	32.08	25.57
1.25	0.412	46.61	32.39	33.41	26.64
1.30	0.429	48.48	33.68	34.75	27.70
1.35	0.445	50.34	34.98	36.09	28.77
1.40	0.462	52.21	36.27	37.42	29.83
1.45	0.478	54.07	37.57	38.76	30.90
1.50	0.495	55.94	38.87	40.10	31.97
1.55	0.511	57.80	40.16	41.43	33.03
1.60	0.528	59.66	41.46	42.77	34.10
1.65	0.544	61.53	42.75	44.10	35.16
1.70	0.561	63.39	44.05	45.44	36.23
1.75	0.577	65.26	45.34	46.78	37.29
1.80	0.594	67.12	46.64	48.11	38.36
1.85	0.610	68.99	47.93	49.45	39.42
1.90	0.627	70.85	49.23	50.79	40.49
1.95	0.643	72.72	50.52	52.12	41.55
2.00	0.660	74.58	51.82	53.46	42.62

A.4 A.4 GS1 Application Identifiers in Numerical Order

Notes: *: The first position indicates the length (number of digits) of the GS1 Application Identifier. The following value refers to the format of the data content. The following convention is applied:

- N numeric digit
- X any character in figure 7.12 - 1
- N3 3 numeric digits, fixed length
- N..3 up to 3 numeric digits
- X..3 up to 3 characters in figure 7.12 - 1

**: If only year and month are available, DD must be filled with two zeroes.

***: The fourth digit of this GS1 Application Identifier indicates the implied decimal point position.

Example:

- 3100 Net weight in kg without a decimal point
- 3102 Net weight in kg with two decimal points

FNC1: All GS1 Application Identifiers indicated with (FNC1) are defined as of variable length and shall be delimited unless this Element String is the last one to be encoded in the symbol. The delimiter shall be a Function 1 Symbol Character in GS1-128 Symbology, GS1 DataBar Expanded Versions and GS1 Composite Symbology and should be a Function 1 Symbol Character in GS1 DataMatrix Symbology.

AI	Data Content	Format*	FNC1 Required	Data Title
00	SSCC (Serial Shipping Container Code)	N2+N18		SSCC
01	Global Trade Item Number (GTIN)	N2+N14		GTIN
02	GTIN of Contained Trade Items	N2+N14		CONTENT
10	Batch or Lot Number	N2+X..20	(FNC1)	BATCH/LOT
11 (**)	Production Date (YYMMDD)	N2+N6		PROD DATE
12 (**)	Due Date (YYMMDD)	N2+N6		DUE DATE
13 (**)	Packaging Date (YYMMDD)	N2+N6		PACK DATE
15 (**)	Best Before Date (YYMMDD)	N2+N6		BEST BEFORE or SELL BY

17 (**)	Expiration Date (YYMMDD)	N2+N6		USE BY OR EXPIRY
20	Variant Number	N2+N2		VARIANT
21	Serial Number	N2+X..20	(FNC1)	SERIAL
22	Secondary Data Fields	N2+X..29	(FNC1)	QTY /DATE /BATCH
240	Additional Item Identification	N3+X..30	(FNC1)	ADDITIONAL ID
241	Customer Part Number	N3+X..30	(FNC1)	CUST. PART NO.
242	Made-to-Order Variation Number	N3+N..6	(FNC1)	MTO VARIANT
250	Secondary Serial Number	N3+X..30	(FNC1)	SECONDARY SERIAL
251	Reference to Source Entity	N3+X..30	(FNC1)	REF. TO SOURCE
253	Global Document Type Identifier (GDTI)	N3+N13+X..17	(FNC1)	GDTI
254	GLN Extension Component	N3+X..20	(FNC1)	GLN EXTENSION
30	Count of Items (Variable Measure Trade Item)	N2+N..8	(FNC1)	VAR. COUNT
310(***)-369(***)	(Trade And Logistic Measurements) *See next Tables*	N4+N6		*See next Tables*
337n	Kilograms per square metre	N4+N6		KG PER m²
37	Count of Trade Items	N2+N..8	(FNC1)	COUNT
390 (***)	Applicable Amount Payable, local currency	N4+N..15	(FNC1)	AMOUNT
391 (***)	Applicable Amount Payable with ISO Currency Code	N4+N3+N..15	(FNC1)	AMOUNT
392 (***)	Applicable Amount Payable, single monetary area (Variable Measure Trade Item)	N4+N..15	(FNC1)	PRICE
393 (***)	Applicable Amount Payable with ISO Currency Code (Variable Measure Trade Item)	N4+N3+N..15	(FNC1)	PRICE
400	Customer's Purchase Order Number	N3+X..30	(FNC1)	ORDER NUMBER
401	Global Identification Number for Consignment (GINC)	N3+X..30	(FNC1)	GINC

402	Global Shipment Identification Number (GSIN)	N3+N17	(FNC1)	GSIN
403	Routing Code	N3+X..30	(FNC1)	ROUTE
410	Ship to - Deliver to Global Location Number	N3+N13		SHIP TO LOC
411	Bill to - Invoice to Global Location Number	N3+N13		BILL TO
412	Purchased from Global Location Number	N3+N13		PURCHASE FROM
413	Ship for - Deliver for - Forward to Global Location Number	N3+N13		SHIP FOR LOC
414	Identification of a Physical Location - Global Location Number	N3+N13		LOC No
415	Global Location Number of the Invoicing Party	N3+N13		PAY TO
420	Ship to - Deliver to Postal Code Within a Single Postal Authority	N3+X..20	(FNC1)	SHIP TO POST
421	Ship to - Deliver to Postal Code with ISO Country Code	N3+N3+X..9	(FNC1)	SHIP TO POST
422	Country of Origin of a Trade Item	N3+N3	(FNC1)	ORIGIN
423	Country of Initial Processing	N3+N3+N..12	(FNC1)	COUNTRY - INITIAL PROCESS.
424	Country of Processing	N3+N3	(FNC1)	COUNTRY - PROCESS.
425	Country of Disassembly	N3+N3	(FNC1)	COUNTRY - DISASSEMBLY
426	Country Covering full Process Chain	N3+N3	(FNC1)	COUNTRY – FULL PROCESS
7001	NATO Stock Number (NSN)	N4+N13	(FNC1)	NSN
7002	UN/ECE Meat Carcasses and Cuts Classification	N4+X..30	(FNC1)	MEAT CUT
7003	Expiration Date and Time	N4+N10	(FNC1)	EXPIRY TIME

7004	Active Potency	N4+N..4	(FNC1)	ACTIVE POTENCY
703s	Approval Number of Processor with ISO Country Code	N4+N3+X..27	(FNC1)	PROCESSOR # s
8001	Roll Products (Width, Length, Core Diameter, Direction, Splices)	N4+N14	(FNC1)	DIMENSIONS
8002	Cellular Mobile Telephone Identifier	N4+X..20	(FNC1)	CMT No
8003	Global Returnable Asset Identifier (GRAI)	N4+N14+X..16	(FNC1)	GRAI
8004	Global Individual Asset Identifier (GIAI)	N4+X..30	(FNC1)	GIAI
8005	Price Per Unit of Measure	N4+N6	(FNC1)	PRICE PER UNIT
8006	Identification of the Components of a Trade Item	N4+N14+N2+N2	(FNC1)	GCTIN
8007	International Bank Account Number (IBAN)	N4+X..30	(FNC1)	IBAN
8008	Date and Time of Production	N4+N8+N..4	(FNC1)	PROD TIME
8018	Global Service Relation Number (GSRN)	N4+N18	(FNC1)	GSRN
8020	Payment Slip Reference Number	N4+X..25	(FNC1)	REF No
8100	GS1-128 Coupon Extended Code	N4+N6	(FNC1)	-
8101	GS1-128 Coupon Extended Code	N4+N1+N5+N4	(FNC1)	-
8102	GS1-128 Coupon Extended Code	N4+N1+N1	(FNC1)	-
8110	Coupon Code Identification for Use in North America	N4+X..70	(FNC1)	-
8200	Extended Packaging URL	N4+X..70	(FNC1)	INTERNAL
90	Information Mutually Agreed Between Trading Partners	N2+X..30	(FNC1)	INTERNAL
91 to 99	Company Internal Information	N2+X..30	(FNC1)	INTERNAL

A.4.1. Metric** trade measures

AI	Full title Data Format n6	Unit of Measure	Data title
310 (*)	Net weight	Kilograms	NET WEIGHT (kg)
311 (*)	Length or 1st dimension, trade	Metres	LENGTH (m)
312 (*)	Width, diameter or 2nd dimension, trade	Metres	WIDTH (m)
313 (*)	Depth, thickness, height or 3rd dimension, trade	Metres	HEIGHT (m)
314 (*)	Area, trade	Square Metres	AREA (m^2)
315 (*)	Net volume	Litres	NET VOLUME (l)
316 (*)	Net volume	Cubic Metres	NET VOLUME (m^3)

A.4.2. Metric** Logistic Measures

AI	Full title Data Format n6	Unit of Measure	Data title
330 (*)	Gross weight	Kilograms	GROSS WEIGHT (kg)
331 (*)	Length or 1st dimension, logistics	Metres	LENGTH (m), log
332 (*)	Width, diameter or 2nd dimension, logistics	Metres	WIDTH (m), log
333 (*)	Depth, thickness, height or 3rd dimension, logistics	Metres	HEIGHT (m), log
334 (*)	Area, logistics	Square Metres	AREA (m^2), log
335 (*)	Gross volume	Litres	VOLUME (l), log
336 (*)	Gross volume	Cubic Metres	VOLUME (m^3), log

Table Notes:

(*) Indicates the decimal point position.

** For non-metric logistic measures see the *GS1 General Specifications*