The Global Language of Business

Global User Manual

User guide to the main GS1 identification and barcoding standards

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GS1 MO to include any additional disclaimer here.

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About this guide

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 barcodes and identification keys. This document is not exhaustive and does not replace the *GS1 General Specifications*, which remains the standard reference document.

GS1 General Specifications: *http://www.gs1.org/barcodes-epcrfid-id-keys/gs1-general-specifications*

Note: Please note that the barcode symbols used in this manual are only examples and are not intended to be scanned or used as references.

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 supply 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 that 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 parties and locations involved.

The GS1 system is a set of standards enabling the efficient management of global, multi-industry value chains by uniquely identifying products, shipping units, assets, locations and services. It facilitates traditional and electronic commerce processes and helps to provide full visibility and traceability.

The GS1 identification keys are the foundation of the GS1 system of standards. They can be represented in barcode symbols or EPC/RFID tags to enable automatic scanning or reading at point of sale, when being received at warehouses, and at any other point where required in business processes.

The GS1 identification keys are also used in electronic communications such as EDI, Global Data Synchronisation, GS1 Source and EPCIS to improve the speed and accuracy of communication. The keys can also be embedded in webpages to enable better search results.

The GS1 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. As well as providing unique identifying numbers, the system also provides for the capturing and sharing of additional data attributes such as best before dates, serial numbers and batch numbers. 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 barcodes 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 in a way that does 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 are able to apply the same solution for communicating with all their trading partners, while remaining entirely free to run internal applications at their own discretion.

GS1 system architecture flyer:
http://www.gs1.org/sites/default/files/docs/architecture/AG_Flyer_final.pdf

2 Basics and principles of the GS1 system

2.1 Areas of application

The GS1 system has different areas of application, including applications for trade items, logistic units, assets and locations.

All applications rely on data structures by which all relevant items and their data can be identified, the GS1 identification keys. These keys guarantee world-wide uniqueness within the relevant area of application.

The sole purpose of the GS1 keys is to ensure globally unique identification. The GS1 keys do not contain any meaning, all related information, for example to describe a product or a service and its characteristics, are to be found in databases. They are communicated between trading partners before the first transaction, either by using standard messages or via electronic catalogues or registries.

The GS1 keys are represented in barcodes or RFID tags to allow automatic data capture in warehouses, at point-of-sale or point-of-care, and in any other process where the precise and automatic identification of items adds value.

The same keys are also used in electronic communication to allow accurate and efficient exchange of information related to supply chain transactions and physical events between trading partners.

GS1 discovery app: *http://discover.gs1.org/cpg*

2.2 GS1 identification keys

GS1 identification keys give companies efficient ways to access information about items and entities in their value chains, and share this information with trading partners. The keys enable organisations to assign standard identifiers to products, documents, physical locations, and more. Because GS1 ID keys are globally unique, they can be shared between organisations, increasing supply chain visibility for trading partners.

The GS1 identification keys are:

- Global Trade Item Number (GTIN)
- Global Location Number (GLN)
- Serial Shipping Container Code (SSCC)
- Global Coupon Number (GCN)
- 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)
- Component/Part Identifier (CPID)

The three most widely used GS1 identification keys are explained in detail in this manual namely: Global Trade Item Number, Serial Shipping Container Code and Global Location Number.

GS1 identification keys reference card:
http://www.gs1.org/sites/default/files/docs/idkeys/GS1_ID_Keys_Reference_Card.pdf

GS1 identification keys webpage: *http://www.gs1.org/id-keys*

2.2.1 Global Trade Item Number (GTIN)

The Global Trade Item Number (GTIN) can be used by a company to uniquely identify all of its trade items

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, or ordered, or invoiced at any point in any supply chain.* [GS1GLOS]

The GTIN can be encoded in a barcode or an EPC/RFID tag. By scanning the barcode or reading the EPC/RFID tag, companies can efficiently and accurately process products and related information; for example, at check out in a store, when receiving goods in a warehouse, and when administering medication in a hospital.

Examples of trade items: 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.

GTIN fact sheet: *http://www.gs1.org/docs/idkeys/GS1_GTIN_Executive_Summary.pdf*

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: *An item of any composition established for transport and/or storage that needs to be managed through the supply chain.* [GS1GLOS]

The SSCC enables companies to track each logistic unit for efficient order and transport management.

The SSCC can be encoded in a barcode or EPC/RFID tag, ensuring the logistic unit can be accurately and easily identified as it travels between trading partners, anywhere in the world.

When SSCC data is shared electronically via EDI or EPCIS, this enables companies to share information about the status of logistic units in transit, and reliably link it to related transport information such as shipment details.

Examples of logistic units: 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.

SSCC fact sheet: *http://www.gs1.org/docs/idkeys/GS1_SSCC_Executive_Summary.pdf*

2.2.3 Global Location Number (GLN)

The Global Location Number can be used by companies to identify their locations, giving them complete flexibility to identify any type or level of location required.

The GLN can identify a company's physical locations, for example a store, a warehouse, or a berth in a port. The GLN can be used to identify an organisation as a corporate entity. The GLN can also identify a company's legal and functional entities engaging as parties in a particular business transaction, for example as buyer, seller, or carrier.

The GLN can be encoded in either a barcode or EPC/RFID tag to automatically identify locations like storage places in a warehouse, the destination of a pallet, or the origin of a product.

The GLN can be used in electronic messages and registries to inform trading partners about companies and their corresponding GLNs and associated GLN information.

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

GLN fact sheet: *http://www.gs1.org/docs/idkeys/GS1_GLN_Executive_Summary.pdf*

GLN brochure: *http://www.gs1.org/docs/idkeys/GS1_Global_Location_Numbers.pdf*

2.3 GS1 Application Identifiers (AIs)

A GS1 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 *GS1 General Specifications* – section 3 for the complete list of Application Identifiers).

Figure 2-1 Frequently used 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 or lot number	N2+X..20
11	Production date (YYMMDD)	N2+N6
15	Best before date (YYMMDD)	N2+N6
16	Sell by date (YYMMDD)	N2+N6
17	Expiration date (YYMMDD)	N2+N6
21	Serial number	N2+X..20
310(**)	Net weight (kilograms)	N4+N6
320(**)	Net weight (pounds)	N4+N6
37	Count of trade items	N2+N..8
400	Customer's purchase order number	N3+X..30
401	Global Identification Number for Consignment (GINC)	N3+X..30
402	Global Shipment Identification Number (GSIN)	N3+N17
410	Ship to - Deliver to Global Location Number	N3+N13
413	Ship for - Deliver for - Forward to Global Location Number	N3+N13
414	Identification of a physical location – Global Location Number	N3+N13
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 2-2 Example of a GS1-128 barcode 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*.

GS1 Application Identifiers fact sheet:
http://www.gs1.org/sites/default/files/docs/barcodes/GS1%20Application%20Identifiers.pdf

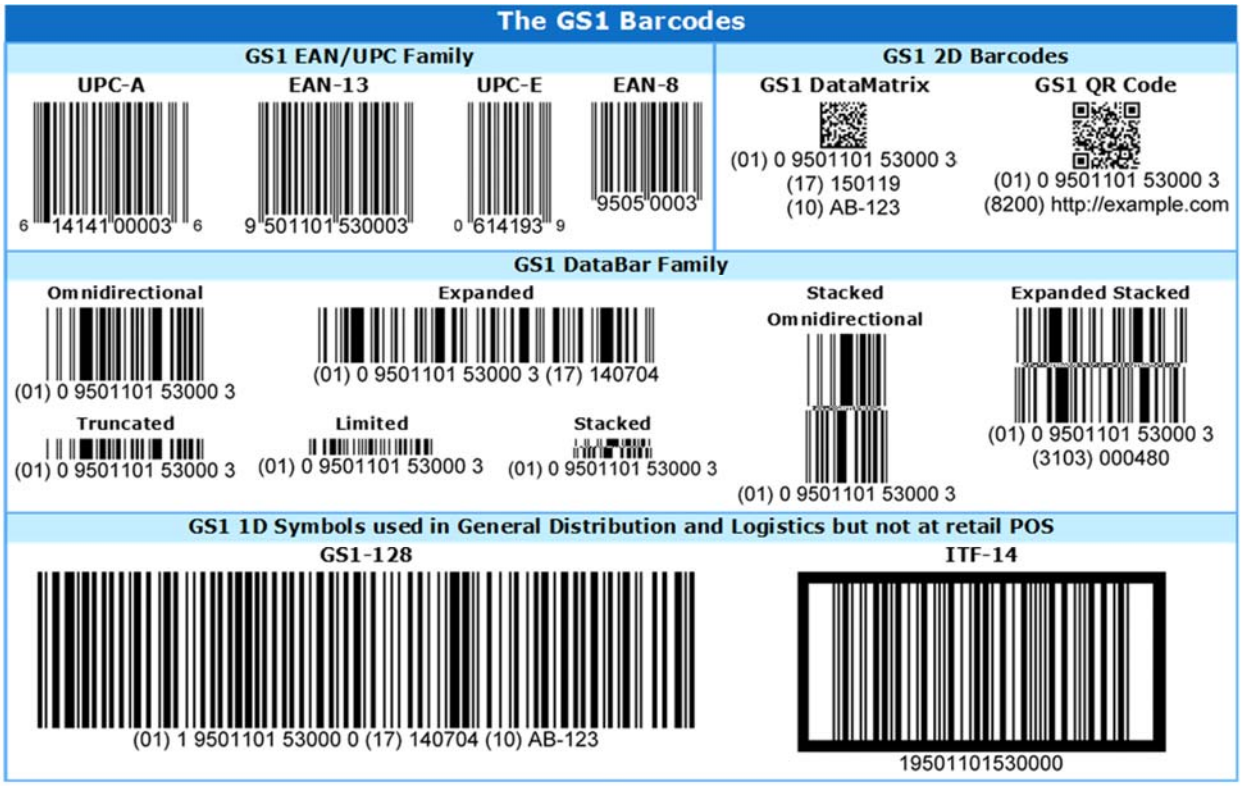
2.4 Barcode symbologies

The GS1 system offers various types of barcodes:

- GS1 EAN/UPC Family
- ITF-14
- GS1-128 and ITF-14
- GS1 DataMatrix
- GS1 DataBar Family
- GS1 QR Code

Advice on choosing between them is given in Section 5.3 Choosing between barcodes.

Figure 2-3 Overview of the GS1 barcodes



GS1 barcodes reference card:
http://www.gs1.org/docs/barcodes/GS1_Barcodes_Fact_Sheet-overview_of_all_GS1_barcodes.pdf

Linear barcodes

These barcodes can be scanned using laser or image-based scanners.

The **EAN/UPC barcodes** can be read omnidirectionally. Majority of items that are scanned at the retail point-of-sale carry EAN/UPC barcodes and other trade items may also carry them.

The use of the **ITF-14 barcode** is restricted to the barcoding of GTINs on trade items NOT passing through retail checkouts. This symbology is better suited than EAN/UPC symbols for direct printing onto corrugated fibreboard.

The **GS1-128 barcode** 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.

GS1 DataBar is a family of linear barcodes. Its use is exclusively licensed to GS1. Its small size and ability to include attributes beyond the GTIN make it a suitable barcode for specific applications, such as fresh foods scanned at POS, and scanning of coupons.

2D barcodes

These barcodes can only be scanned using image-based scanners.

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

GS1 QR Code is a subset of ISO/IEC QR Code that is a matrix symbology. The Function 1 Symbol Character in the first position ensures GS1 system compatibility. GS1 QR Code can encode the GS1 keys and additional data using the GS1 Application Identifiers. One application, 'extended packaging', is to encode a URL in association with a GTIN.

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.

Trade items are identified with the Global Trade Item Number (GTIN). When encoded in a barcode four data structures can be applied: 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 GTIN is the identification of items at the retail point of sale – retail items. These are to be identified with a GTIN-13 or GTIN-12 Number. For items that are very small a GTIN-8 Number or a zero-suppressed GTIN-12 may be used.

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.

Note: The identification of trade items for outer cases and logistic pallets is explained in more detail in section 7 Identifying and barcoding distribution trade items and 8 Identifying and barcoding logistic units.

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. Such trade items are subject to specific rules described in section 6, Barcoding variable measure trade items.

Specific rules also exist for books, serial publications or products that are not sold in open environments. These special cases are treated in section 10, Special barcoding applications.

3.1 GTIN structure

There are four numbering structures for GTIN. They are described below.

Figure 3-1 GTIN number formats

	GS1 Company Prefix →								← Item reference					Check digit
(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}
			U.P.C. Company Prefix →						← Item reference					Check digit
(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}
							GS1-8 Prefix →			← Item reference				Check digit
(GTIN-8)							N_1	N_2	N_3	N_4	N_5	N_6	N_7	N_8

3.1.1 GS1 Company Prefix

The GS1 Company Prefix provides a way for companies to create identification keys for trade items, logistic units, locations, parties, assets, coupons, etc. which are unique all around the world.

Figure 3-2 Structure of GS1 Company Prefix

The first two or three digits N1, N2, N3 constitute the **GS1 Prefix** allocated by GS1 Global Office to each GS1 Member Organisation.

The **GS1 Company Prefix** that is created based on the GS1 Prefix is allocated by one of the GS1 Member Organisations. In general it comprises four to twelve digits depending on the needs of the company.

Important: The GS1 Prefix does not indicate 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 GS1 Company Prefix.

The GS1 Company Prefix may not be sold, leased, or given, in whole or in part, for use by any other company. This restriction also applies to GS1 identification keys that are constructed without a GS1 Company Prefix.

3.1.2 Item reference

The item reference is composed of one to eight 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 about the trade item.

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 barcode has been correctly scanned or that the number is correctly composed.

3.1.4 Indicator digit

The indicator digit is only used in the GTIN-14 data structure. It takes the value 1 to 8 for fixed quantity trade items (see section 7). The value 9 has a special usage for variable quantity trade items (see Section 6), and the value 0 is considered a filler digit that does not change the number itself.

Important: The GTIN must always be processed as a whole. No processing of parts of the key should be applied.

To be written by each Member Organisation:
The local structures of GS1 Company Prefixes and item references

3.2 Small products

3.2.1 GTIN-8

The allocation of the GTIN-8 format is restricted to items that cannot accommodate an EAN-13 or UPC-A barcode. GTIN-8 and are issued individually by GS1 Member Organisations.

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

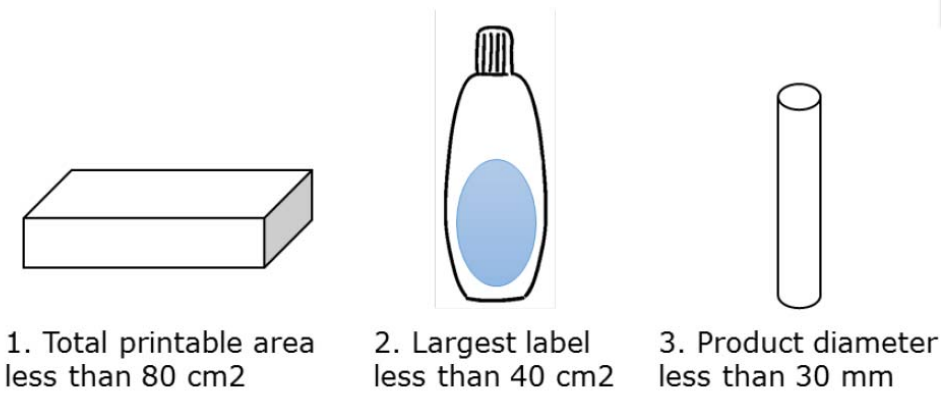
- Whether the symbol can be reduced in size, i.e. printed at a lower magnification, taking into account the minimum barcode print quality requirements.
- Whether the package artwork or the label design can reasonably be changed, to enable the printer's recommended size of standard EAN/UPC symbol to be included.
- 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.

Important: 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.

The use of a GTIN-8 is authorised when:

- The total printable area of the product packaging is less than 80 cm², or
- The area of the largest label for the item is less than 40 cm², or
- The product is cylindrical with a diameter less than 30 mm.

Figure 3-3 GTIN-8 pack size constraints



3.2.2 GTIN-12 on a small product

Some U.P.C. Company Prefixes beginning with zero can be used to construct GTINs that can be used in UPC-E symbols that can be used on small products. The capacity of these U.P.C. Company Prefixes is limited and the technical details of UPC-E representation of GTIN-12 numbers is described in Appendix *A.2, GTIN-12 identification numbers in a UPC-E symbol*.

3.3 Who is responsible for numbering trade items?

3.3.1 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.

A brand-owner 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 (private label).

3.3.2 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.
- Another option is for the retailer to 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 can be found in Section 10.2, Company internal numbering in a store or warehouse.
- Items that are non-branded - have no brand name or are generic items 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 allocation should be coordinated centrally.

3.4 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, or to the final user or consumer.

What is understood to be an apparent and significant variation may differ from industry to industry.

Some basic characteristics of a trade item that will usually require separate GTINs are

- The product name, brand, and product Description
- The trade item type and variety
- The net content
- If the trade item is a grouping, the number of items contained, and the type of package (carton, pallet, box-pallet, flat-pallet…)

This list is not exhaustive.

- Price is not a relevant criterion for allocating a separate GTIN except when the price is printed directly on the trade item.

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 to 0.33 litre;
- Maintain the same GTIN: the colour of a juice bottle label has been changed from pale pink to darker pink.
- 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.

If a new GTIN is allocated to an existing trade item, the GTIN assigned to any grouping containing that trade item should also be assigned a new GTIN. For allocating numbers to outer cases please refer to section 7.

GTIN Allocation Rules: 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.

3.4.1 The uses of the GTIN

In whatever country the item is sold, its GTIN will remain valid. It is independent of local 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.

3.4.2 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 6, Variable measure trade items for information on variable measure items

3.5 What if the legal status of a brand owner changes?

Additional guidelines apply when a company changes legal status as a result of an acquisition, merger, partial purchase, split or spin-off. These are specified in the *GS1 General Specifications* section 1.6 Allocation.

GS1 Member Organisations may adapt the following guidelines if the law of the country makes it absolutely necessary.

Companies SHOULD notify their GS1 Member Organisation of any legal status change within one year of that change to facilitate a smooth transition.

3.5.1 Acquisitions and mergers

If a company is being acquired by or merged with another company and has stock on hand, the stock's existing Global Trade Item Numbers (GTINs) should be kept. Products that are produced after the acquisition or merger may keep the GTIN allocated before the acquisition if the acquiring company maintains the licence with the GS1 Member Organisation to use the applicable GS1 Company Prefix or keys.

3.5.1.1 GS1 identification keys transferred to an acquiring company

An acquisition or merger often implies that a company has taken over another company and has assumed responsibility for the acquired company's GS1 Company Prefixes and any individually

assigned GS1 identification keys. For example, products that the acquired company identified using its GS1 Company Prefix or individually assigned GTINs can still be produced using the same keys after the merger, since the acquiring company now has the licence to use the acquired company's GS1 identification keys. If it so desires, the acquiring company can also choose to identify the products using their own GS1 Company Prefix.

Note: A company should be careful when centralising the allocation of all numbers under one GS1 Company Prefix, for example resulting in a change of the GTIN of existing products, which are otherwise unchanged. Centralising the allocation of all numbers under a single GS1 Company Prefix should be an exception, as it may result in additional work and data file maintenance for customers.

The importance of ensuring trading partners are informed of any changes in a timely manner cannot be overemphasised.

3.5.1.2 GS1 identification keys not transferred to acquiring company

If a company acquires a division of a company, but its GS1 Company Prefixes continue to be used in other divisions not acquired, then the acquiring company must change the Global Trade Item Numbers (GTINs) and Global Location Numbers (GLNs) for the acquired division within one year.

Note: 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 acquiring company SHOULD phase-in new numbers from its own range of numbers for items whose brand name it has acquired. The acquiring company will be able to do this, for example, when packaging is redesigned or reprinted.

3.5.2 Split or spin-off

When a company splits into two or more separate companies it is necessary for each GS1 Company Prefix of the original company to be transferred to only one of the new companies. Individually assigned keys also need to be transferred to only one of the new companies. If a company is left without a GS1 Company Prefix or individually assigned keys and has a requirement to identify products, locations, or assets etc., it will need to apply to a GS1 Member Organisation to obtain a new GS1 Company Prefix or individual key as appropriate.

The decision about which of the new companies should take the original GS1 Company Prefixes should be made in such a way as to minimise the impact on existing GS1 identification keys, in particular existing Global Trade Item Numbers (GTINs). The decision should be part of the legal arrangements of the new companies.

It is not necessary for existing stocks of items to be renumbered. However, when any of the split or spin-off companies has trade items that are numbered with a GS1 Company Prefix that it no longer holds, the company 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.

Split or spin-off companies that retain a GS1 Company Prefix must keep a record of the GTINs created that have been allocated to items they no longer own. They must not re-use these GTINs for a period of at least four years after the company that split away last supplied goods identified by those GTINs. Therefore, the company that did not retain the GS1 Company Prefix has to keep the company that now maintains it informed of the dates on which goods were last supplied using that GS1 Company Prefix or to guarantee a date by which the number change will be made.

3.6 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.

Companies must ensure that GTINs allocated to regulated healthcare trade items shall never be reused.

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.

4 Processing the GTIN

4.1 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 structure) is used.

There are four GTIN formats. For applications that require a uniform 14-digit format, leading zeroes need to be added:

000000nnnnnnnn (GTIN-8)

00nnnnnnnnnnn (GTIN-12)

0nnnnnnnnnnnn (GTIN-13)

The GTIN is an access key to all data related to the particular trade item.

Hierarchies of trade items can be defined by linking GTINs. An example would be the links between the GTIN A of a can of paint, the GTIN B of a box of ten cans of paint (10 units of GTIN A), and a pallet of 24 boxes (24 units of GTIN B) of ten cans of paint (240 units of GTIN A).

Such hierarchies enable companies to control their stock-keeping and ordering processes, for example to compare sales at the checkout with the number of units received or still in stock.

4.2 Transmission of product information

Transmission of information concerning the item is a prerequisite for the collaboration between supplier and customer and third parties such as logistic services providers.

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". And 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:

- GTIN of the trade item
- GLN of the supplier
- Brand name and product name
- A full product description and an abbreviated description for use at the point of sale (display, receipts)
- The physical characteristics of the trade item including dimensions, net weight
- Composition of trade item groupings, including the number of single trade items contained in larger trade units
- etc.

4.3 How should the information be exchanged?

Product information should be exchanged electronically to enable a timely and precise communication of data attributes. GS1 supports various methods, the most prominent one is GS1's Global Data Synchronisation Network (GDSN). Another frequently used method is EDI, GS1 offers dedicated standard messages for item master data exchange.

4.4 When should communication occur?

It is vital to ensure that GTINs and associated data are timely and accurately communicated to all involved parties in a value chain. This ensures that any scanned barcode and read RFID tag 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.

Communication of GTINs and associated data is essential in the 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 to existing product. If a change in a product demands a new number, the new GTIN must be communicated immediately when trading partners are being notified of the product change. The information must be given to the trading partner before the goods concerned will be 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 related GTINs are communicated as early as possible.
5. Temporary replacement item with a GTIN different from the normal one. 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.

5 Barcoding trade items

10 steps to barcode your product: *http://www.gs1.org/10-steps-to-barcode-your-product*

5.1 Barcode production and quality

Barcodes 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.

There are several ways to apply a barcode to an item:

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

5.1.1 Scanning environments and printing methods

The scanning environment and printing method are important factors to take into account when creating a correct barcode.

The following printing methods can be distinguished:

- Traditional
  - Flexography, offset lithography, photogravure
- Digital
  - Inkjet, thermal, laser
- Direct part marking
  - Dot peen, electro-chemical etching, engraving, laser marking etc.

When it comes to scanning environments, the first distinction to be made is whether the equipment to be used is whether the equipment will be laser-based, image-based or a mix of both. Another aspect is the type of application (retail POS, healthcare point-of-care, distribution) and the way the scanning equipment will be operated (e.g. flatbed scanners, handheld scanners, fixed mounted scanners).

Scanner environments and printing methods (fact sheet): *http://www.gs1.org/docs/barcodes/GS1_Barcodes_Fact_Sheet-Scanner_enviroments_and_printing_methods.pdf*

5.1.2 Sizes

Barcodes can be printed in various sizes. The size to be selected, besides of the scanning environment, depends also on the printing conditions. A small barcode can be used if good quality printing is coupled with a good quality substrate.

For each type of barcode, 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 barcodes from pixels or dots will not be able to produce barcodes in the full range of sizes.

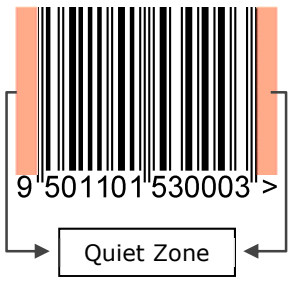
Another factor that should always be taken into account when deciding about the barcode symbol size should be the environment in which it is to be scanned. Symbols intended for retail applications may be as small as the print quality permits, whereas the barcodes for warehouse environment should be as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

5.1.3 Quiet Zones

All types of barcodes 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 barcode. Any print within Quiet Zones can prevent the reading of the barcode symbol.

Figure 5-1 Example of Quiet Zones



5.1.4 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.

Barcodes 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 barcodes. 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.

5.1.5 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 barcode. 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 in which orientation to print the barcode, the print process involved should be taken into account. For example, when using a flexographic process, it is essential to print the barcode 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 specifications should be checked.

GS1 barcode verification guidelines: For more information on print quality see the *GS1 General Specifications* and the GS1 barcode verification guidelines
1D barcode verification guideline:
http://www.gs1.org/docs/barcodes/1D_Barcode_verification_implementation_guideline.pdf
2D barcode verification guideline:
http://www.gs1.org/barcodes/docs/barcodes/2D_Barcode_Verification_Process_Implementation_Guideline.pdf

5.1.6 Symbol placement guidelines

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

5.1.6.1 Symbol placement guidelines for retail items

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

Never allow two barcodes 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 barcodes obscured.

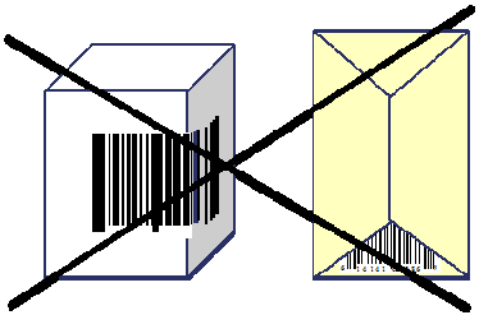
Figure 5-2 Example of GTINs on Multi-Packs

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

Figure 5-3 Example of Random Wrapped GTINs

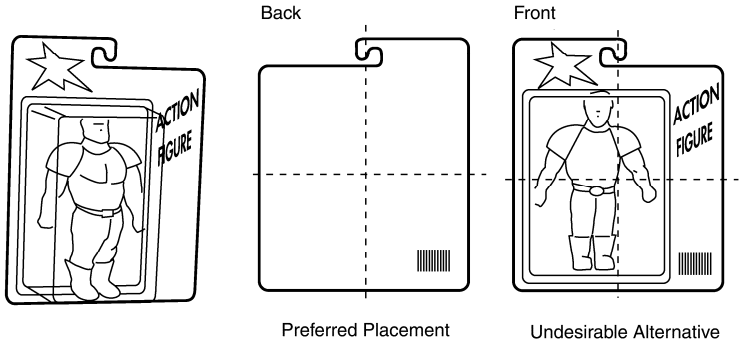
Scanning is most successful when the barcode is printed on a reasonably smooth surface. Avoid printing around the corners or on folds, creases, seams, and any other uneven packaging area.

Figure 5-4 Incorrect Barcode Surface Examples



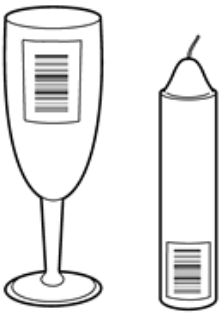
Sometimes the irregular shape of packaging prevents the barcode from flat (parallel) contact with the scanning surface of slot scanners. This applies in particular to carded, blister-packed, or concave items.

Figure 5-5 Additional Barcode Surface Examples



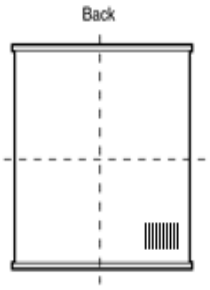
On cylindrical products, where the printing direction allows, it is generally desirable that the bars are perpendicular to the axis of the cylinder (ladder style), so that a scan line can pass through the symbol on as near a flat plane as possible. This caters for the problems associated with curves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

Figure 5-6 Cylindrical Barcode Surface Examples



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

Figure 5-7 Barcode on the Lower Right Quadrant



Edge rule: The barcode 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

5.2 Barcode types used in GS1 system

5.2.1 EAN/UPC symbols

Trade items that are sold through retail outlets will generally be barcoded with one of the EAN/UPC symbols: EAN-13, UPC-A or EAN-8 or UPC-E. EAN/UPC symbols may also be used for trade items intended only for general distribution (not for retail sale, such as outer cases).

Figure 5-8 EAN/UPC symbols

EAN UPC Family fact sheet:
http://www.gs1.org/docs/barcodes/GS1_Barcodes_Fact_Sheet-GS_%20EAN_UPC_family.pdf

The EAN and UPC symbols can be read omni-directionally. The 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 an X-dimension of 0.495 mm (0.0195 inch) 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 barcode symbol directly on the package, the symbol may be printed on a label affixed to it.

The following barcode symbols are shown here in target X-dimensions including Quiet Zones. The minimum and maximum X-dimensions are given for each type of barcode. See Appendix A.3, Dimensions of Modules and symbols at different magnification for a detailed table of dimensions of EAN/UPC symbols.

The symbols are 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 not enough space for a full size barcode.

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".

5.2.1.1 EAN-8 symbol

Figure 5-9 Example of EAN-8 symbol

Min. X-dimension: 0.264 mm (0.0104 inch)

Max. X-dimension: 0.660 mm (0.0260 inch)

Target X-dimension: 0.330 mm (0.0130 inch)

Note: The X-dimension is the specified width of the narrow element in a barcode symbol. This width varies from one symbology to another.

5.2.1.2 EAN-13 symbol

Figure 5-10 Example of EAN-13 symbol

Min. X-dimension: 0.264 mm (0.0104 inch)

Max. X-dimension: 0.660 mm (0.0260 inch)

Target X-dimension: 0.330 mm (0.0130 inch)

Note: X-dimensions are stated only for retail POS scanning environment

5.2.1.3 UPC-A symbol

Figure 5-11 Example of UPC-A symbol

Min. X-dimension: 0.264 mm (0.0104 inch)

Max. X-dimension: 0.660 mm (0.0260 inch)

Target X-dimension: 0.330 mm (0.0130 inch)

Note: X-dimensions are stated only for retail POS

5.2.1.4 UPC-E symbol

Figure 5-12 Example of UPC-E symbol

Min. X-dimension: 0.264 mm (0.0104 inch)

Max. X-dimension: 0.660 mm (0.0260 inch)

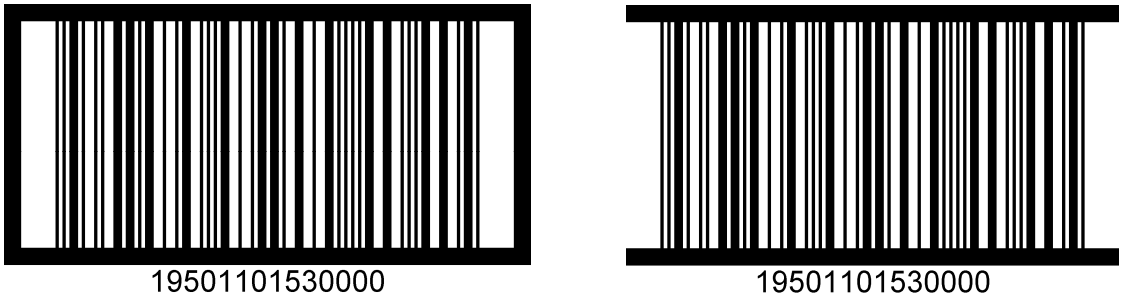
Target X-dimension: 0.330 mm (0.0130 inch)

Note: X-dimensions are stated only for retail POS

5.2.2 ITF-14 symbol

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

Figure 5-13 Examples of ITF-14 symbol
(left: rectangular bearer bars, right: top-bottom bearer bars)



GS1 Barcodes fact sheet:
http://www.gs1.org/docs/barcodes/GS1%20Barcodes%20Fact%20Sheet%20-%20GS1%201D%20symbols%20for%20general%20distribution%20only.pdf

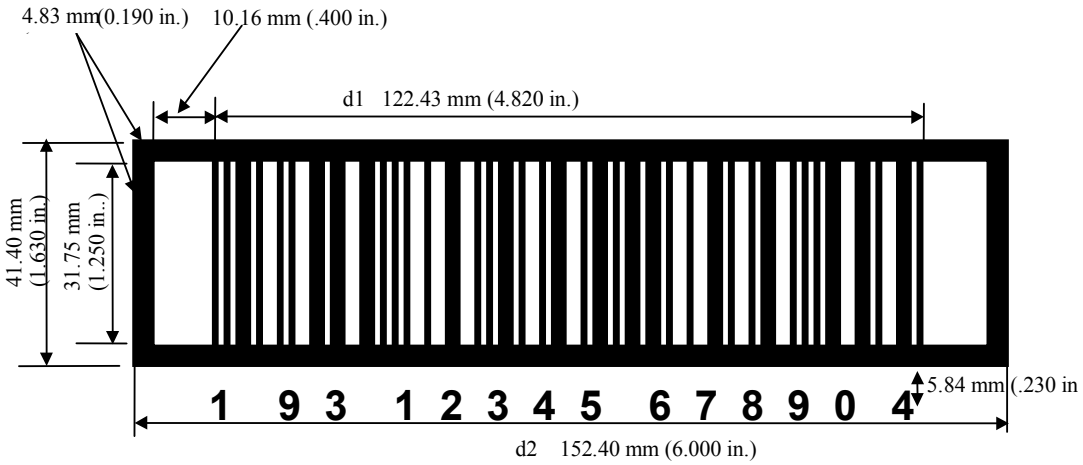
For companies wishing to print the barcode directly on the carton, particularly on corrugated cardboard, the ITF-14 symbol is more suitable because the printing requirements are less demanding. Pre-printing or direct print by thermal transfer or ink-jet may be possible.

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 barcodes 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 (0.0195 inch) to 1.016 mm (0.0400 inch).

Whichever size of symbol is used, the height of the bars must be at least 31.75 mm (1.250 inch), as this makes scanning the barcodes much easier.

Figure 5-14 ITF-14 symbol size



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

Dimensions below do not include the bearer bar:

Min. X-dimension: 0.495 mm (0.0195 inch)

Max. X-dimension: 1.016 mm (0.0400 inch)

Target X-dimension: 0.660 mm (0.0260 inch)

Note: X-dimensions are stated only for retail general distribution applications.

5.2.3 GS1-128 symbol

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 5-15 Example of GS1-128 symbol

GS1 symbols used in General Distribution fact sheet:
http://www.gs1.org/docs/barcodes/GS1%20Barcodes%20Fact%20Sheet%20-%20GS1%201D%20symbols%20for%20general%20distribution%20only.pdf

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

Dimensions below do not include the bearer bar:

Min. X-dimension: 0.495 mm (0.0195 inch)

Max. X-dimension: 0.940 mm (0.0370 inch)

Target X-dimension: 0.495 mm (0.0195 inch)

Note: X-dimensions are stated only for general distribution that are logistic units

These barcodes 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 barcodes 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 barcodes in that they cannot be printed directly onto brown corrugate packaging, and most users will print these onto white labels.

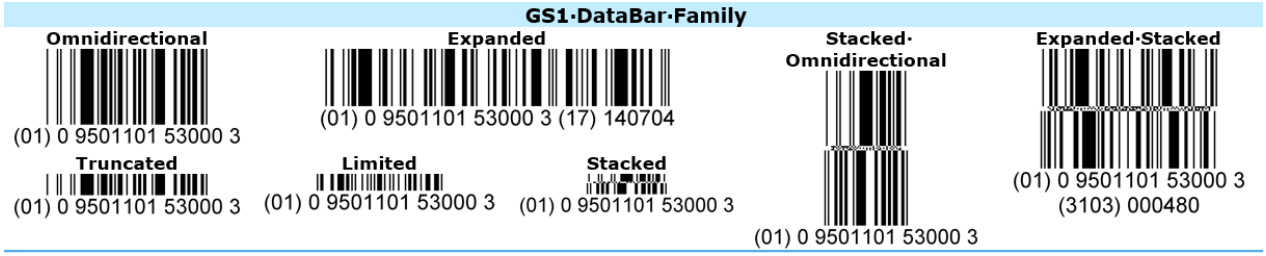
The GS1-128 is of variable length, depending on the number of characters encoded, the types of character encoded and the X-dimension (resulting in overall symbol size) achieved. For a given length of data, the symbol size is variable between limits, to accommodate the ranges in quality achievable by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

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 (0.0195 inch) to 1.016 mm (0.0400 inch), and as with ITF-14 symbols, the height of the bars must always be at least 31.75 mm (1.250 inch).

5.2.4 GS1 DataBar family

GS1 DataBar is a family of linear symbologies. Its use is exclusively licensed to GS1. Its small size and ability to include attributes make it a suitable barcode for specific applications, such as fresh foods scanned at POS, and scanning of coupons.

Figure 5-16 GS1 DataBar family overview (not actual size images)



GS1 DataBar Family fact sheet:
http://www.gs1.org/docs/barcodes/GS1_Barcodes_Fact_Sheet-GS1_DataBar_family.pdf

5.2.4.1 GS1 DataBar omnidirectional

Figure 5-17 Example of GS1 DataBar omnidirectional symbol

Minimum x-dimension 0.264 mm (0.0104’ inches)

Target x-dimension: 0.330 mm (0.0130’ inches)

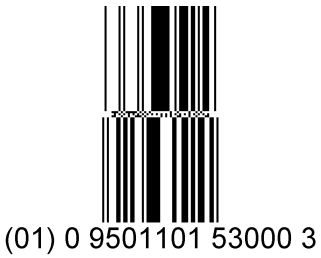
Maximum x-dimension: 0.660 mm (0.0260’ inches)

Note: Minimum X-dimensions are stated only for retail POS

5.2.4.2 GS1 DataBar stacked omnidirectional

The GS1 DataBar Stacked Omnidirectional barcode is a full height, two-row version of the GS1 DataBar Omnidirectional barcode 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.

Figure 5-18 Example of GS1 DataBar omnidirectional symbol



Minimum x-dimension 0.264 mm (0.0104’ inches)

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

Maximum x-dimension: 0.660 mm (0.0260’ inches)

Note: Minimum X-dimensions are stated only for retail POS

5.2.4.3 GS1 DataBar expanded stacked symbol

Figure 5-19 Example of GS1 DataBar expanded stacked symbol

Minimum x-dimension 0.264 mm (0.0104’ inches)

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

Maximum x-dimension: 0.660 mm (0.0260’ inches)

Note: Minimum X-dimensions are stated only for retail POS

5.2.5 GS1 DataMatrix

GS1 DataMatrix is a variant of Data Matrix ISO/IEC 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 barcoding a GTIN (and additional data) on medical devices and healthcare items.

Figure 5-20 Example of GS1 DataMatrix symbol
encoding a GTIN, expiry date and batch number

(01) 0 9501101 53000 3
(17) 150119
(10) AB-123

GS1 Barcodes – 2D Symbols fact sheet:
http://www.gs1.org/docs/barcodes/GS1_Barcodes_Fact_Sheet-GS1_2D_symbols.pdf

For healthcare companies wishing to print barcodes 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/IEC 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: 0.743 mm (0.0293’ inches)

Note: Minimum sizes are stated only for retail POS

GS1 DataMatrix Guideline:
http://www.gs1.org/docs/barcodes/GS1_DataMatrix_Introduction_and_technical_overview.pdf

5.2.6 GS1 QR Code

GS1 QR Code is a subset of ISO/IEC QR Code that is a matrix symbology. The Function 1 Symbol Character in the first position ensures GS1 system compatibility. GS1 QR Code can encode the GS1 keys and additional data using the GS1 Application Identifiers. See below an example application, ‘extended packaging’, that encodes a URL in association with a GTIN.

Figure 5-21 Example of GS1 QR Code symbol
encoding a GTIN AI (01) and extended packaging URL: AI (8200)

(01) 0 9501101 02091 7
(8200) http://www.gs1.org

Note: GS1 QR Code 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: 0.743 mm (0.0293’ inches)

GS1 Barcodes – 2D Symbols fact sheet:
http://www.gs1.org/docs/barcodes/GS1_Barcodes_Fact_Sheet-GS1_2D_symbols.pdf

5.3 Choosing between barcodes

Numbering items and the physical application of the barcode 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.

Users should take the following considerations into account when choosing between the different symbologies:

- Space available on the item to be barcoded
- Type of information to be barcoded; GTIN only or GTIN and additional information (attributes)
- Operational environment in which the barcode symbol is to be scanned; retail point of sale or general distribution

Some barcodes only support specific GTIN formats.

Figure 5-22 GS1 identification keys represented in specific barcode symbols

Symbol		Can represent
EAN-8	→	GTIN-8
UPC-A	→	GTIN-12
UPC-E	→	GTIN-12 (only certain numbers, see ...)
EAN-13	→	GTIN-13
ITF-14 GS1-128 GS1 DataBar GS1 DataMatrix GS1 QR Code	→	All GTIN formats are supported. For GTIN-8, GTIN-12 and GTIN-13 leading zeroes need to be added to arrive at the 14-digit format required by these barcodes.

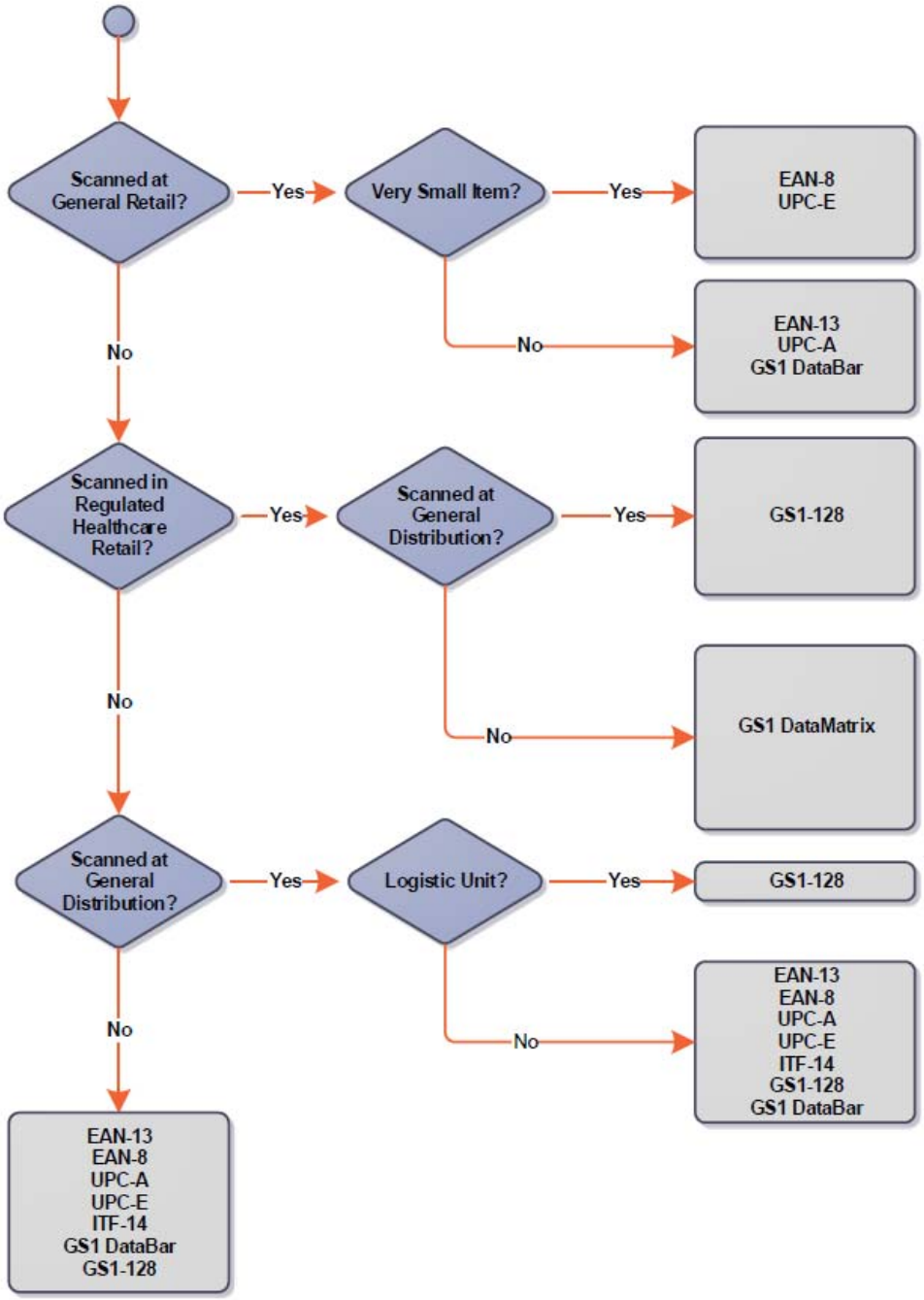
Another important factor is the type of scanner and the scanning environment:

Figure 5-23 Barcode scanning environments

Symbol	Scanners	Point-of-sale (POS)	General distribution and logistics	Healthcare items	Direct part marking
EAN/UPC	laser or camera	X	X	X	
GS1-128	laser or camera		X	X	
ITF-14	laser or camera		X	X	
GS1 DataBar	laser or camera	X	X	X	
GS1 DataMatrix	camera only		X	X	X
GS1 QR Code	camera only		X		X

The figure below will help users to choose between options.

Figure 5-24 Option Diagram



6 Barcoding variable measure trade items

A variable measure trade item is product that is traded in a varying quantities (e.g. contained number of pieces) or in a varying measure (e.g. net weight or length). Examples of such products are fruits and vegetables, meat, cheese, rope, chain, fabric, carpet on a roll, etc.

6.1 Variable measure trade items scanned at retail point-of-sale

Unlike a fixed measure trade item, a variable measure trade item has one measure that varies continuously while other characteristics remain the same. The variable measure may be weight, length, quantity contained or volume.

Two methods exist two identify and barcode such trade items for the retail point-of-sale: 1. GTIN (recommended approach), 2. Restricted Circulation Number (RCN).

6.1.1 GTIN in a GS1 DataBar

If a GTIN will be used to identify the item, the allowed barcodes are GS1 DataBar Expanded and Expanded Stacked.

Combining GS1 DataBar and GS1 Application Identifiers provides a global solution for variable measure products. Unlike restricted circulation numbers, GS1 DataBar can be used without geographical restrictions.

The global adoption of GS1 DataBar is an ongoing process, especially for fresh food products. More information can be found on:

Fresh Food Implementation Guide:
http://www.gs1.org/docs/freshfood/Fresh_Food_Implementation_Guide.pdf

6.1.2 Restricted Circulation Number in an EAN/UPC barcode

Restricted Circulation Numbers (RCNs) can also be applied to variable measure items, since they allow embed the weight, quantity or price in an EAN/UPC barcode.

The exact structure of the RCN is determined by each GS1 Member Organisation for their respective territory:

- The GS1 Prefix is selected by the Member Organisation from the range 02 and 20 to 29.
- The item reference 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 measure or price may include a special verifier digit.

Important: The solutions for barcoding variable measure products using RCNs are national solutions. Companies that export must adopt the solutions in force in the country of destination. Details are available at the respective GS1 Member Organisation.

To be written by each Member Organisation: information on the available RCN ranges and structures

6.2 Variable measure trade items not scanned at retail point-of-sale

These are items sold and distributed between trading partners, but not directly to end consumers. 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 a crate containing ten chickens, or an outer case containing six cheeses.

The GTIN-14 Identification Number with the indicator "9" is used to identify such 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 barcoded form, configured for measuring an item in kilograms.

Figure 6-1 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

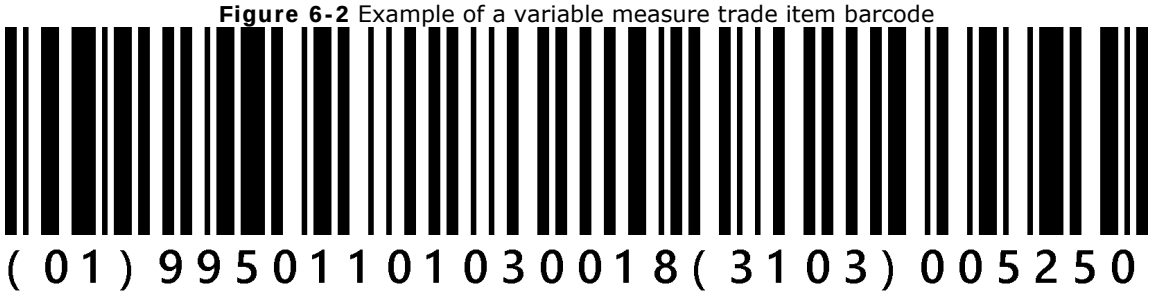
There are two ways to translate this information into a barcode.

- 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.
- Alternately, 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.

Figure 6-2 Example of a variable measure trade item barcode



7 Identifying and barcoding trade item groupings

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 barcodes 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 barcode to use, and some of the common problems to avoid.

7.1 Identification (numbering)

Outer cases can be identified in two ways:

1. With independent GTINs.
2. With GTIN-14 that is based on the GTIN of the consumer unit.

7.1.1 Independent GTINs

By allocating a specific GTIN. A scenario based on GTIN-13 is shown below as an example.

Figure 7-1 Trade item groupings identified with independent GTINs

GTIN-13: 5412150000154

GTIN-13: 5412150000161

GTIN-13: 5412150000178

7.1.2 GTIN-14 based on GTIN of consumer unit

This solution is only available for homogeneous groupings of trade items, where all units contained in the group are identical.

This number is formed by taking the number allocated to the consumer unit, and preceding the number by an indicator, which can take the value 1 to 8.

The indicator digit has no explicit meaning – they simply generate 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. A scenario based on GTINs is shown below as an example.

Figure 7-2 Trade item groupings identified with GTIN-14 based on GTIN of consumer unit

GTIN-13: 5412150000154

GTIN-14: **1**5412150000151

GTIN-14: **2**5412150000158

Note: GTIN-14s beginning with 9 are created in a similar manner, and are used to identify outer cases with varying content (see section 6 for variable measure trade items).

7.2 Allowed barcode types

For trade item groupings that only need to be identified in distribution and never at POS, the recommended barcodes are:

- ITF-14
- GS1-128

For trade item groupings that need to be identified in distribution process as well as at retail POS the only allowed barcodes are:

- EAN/UPC
- GS1 DataBar

Note: Note that a larger X-dimension is recommended for barcodes on such items.

See section 5 for more information about the GS1 barcode types.

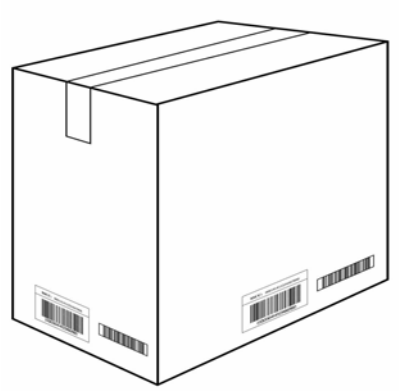
7.3 Symbol placement guidelines on outer cases

The minimum requirement is to place at least one barcode 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 the barcode 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 barcode, the outer edges of the barcode's left or right bearer bar should be a minimum of 19 mm (0.75 inch) from the vertical edges of the side of the item.

Figure 7-3 Barcodes on Cartons and Outer Cases



On shallow trays and cases

If the height of a case or tray is less than 50 mm (2 inch) and printing a full height barcode 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 7-4 Barcodes on shallow trays and cases

2. When the height of the unit is less than 32 mm (1.26 inch), 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.

7.4 Common problems to avoid

7.4.1 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 barcodes. Any leading zeroes before a GTIN only act as filler characters and do not change the GTIN.

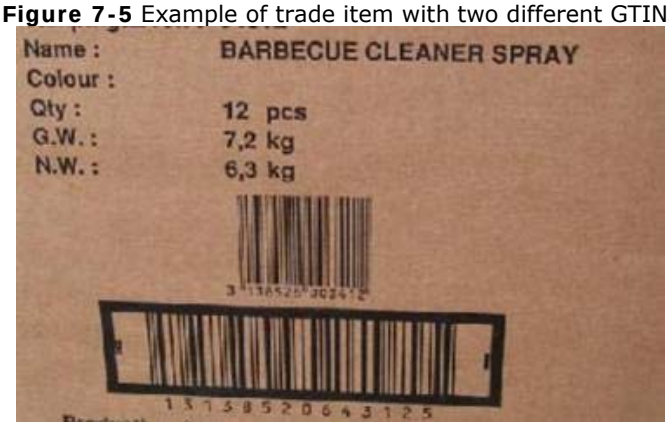
If GTIN-13s are to be shown in ITF-14 or GS1-128 symbols to identify an outer case, they must be different 13-digit numbers which are then prefixed with a zero to allow them to be encoded in either of these symbols.

7.4.2 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 7-5 Example of trade item with two different GTINs



This figure shows a GTIN in an EAN-13 symbol and just below another GTIN in an ITF-14 symbol.

7.4.3 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 7-6 Example of incorrect use of AI (02) and (37)
(there is no AI (00) SSCC)

7.4.4 Poor print quality

All the barcodes being printed onto packaging or labelling should be verified to ensure that they will be scannable. This is particularly important when barcodes 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 barcodes by using an ISO/IEC compliant verifier
- Don't print EAN/UPC and GS1-128 symbols directly onto brown board
- Ensure the barcodes meet the minimum size requirements
- If using on-demand printing equipment, consider using online scanners to check the presence of scannable barcodes, as well as using barcode verifiers to confirm the quality expected from the particular printing process.

8 Identifying and barcoding logistic units

As shipments of goods arrive from manufacturing plants to warehouses for consolidation, cross docking, or storage, efficient and accurate receipt processes demand that trading partners have clear and aligned identification of pallets and cases. Likewise, shipments from manufacturers and distribution centres to stores, hospitals, construction sites, etc., mandate the same rigor in communications and identification of goods down to the product/ item level.

The **Serial Shipping Container Code (SSCC)** can be used by companies to identify a logistic unit, which can be any combination of trade items packaged together for storage and/or transport purposes; for example a case, pallet or parcel. The SSCC is a crucial key for traceability, since it uniquely identifies each distributed logistic unit and its content. The SSCC enables companies to track each logistic unit for efficient order and transport management.

As each logistic unit must be assigned its own unique SSCC, the pre-printing of the barcode 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.

The **GS1 Logistics Label** standard allows users to identify logistic units uniquely so that they can be tracked and traced throughout the supply chain. The only mandatory requirement is that each logistic unit must be identified with a unique serial number, the Serial Shipping Container Code (SSCC). Scanning the SSCC barcoded on each logistic unit allows the physical movement of units to be matched with the electronic business messages that refer to them. Using the SSCC to identify individual units opens up the opportunity to implement a wide range of applications such as cross docking, shipment routing, and automated receiving. Besides the SSCC other information can be included on the GS1 Logistics Label.

8.1 SSCC structure

Figure 8-1 SSCC Data Structure

SSCC (Serial Shipping Container Code)																	
Extension digit	GS1 Company Prefix →									← Serial reference							Check digit
N_1	N_2	N_3	N_4	N_5	N_6	N_7	N_8	N_9	N_{10}	N_{11}	N_{12}	N_{13}	N_{14}	N_{15}	N_{16}	N_{17}	N_{18}

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 N2 to N17. The simplest way to allocate the item reference is sequentially that is 000, 001, 002, 003, ...

The **extension digit** is used to increase the capacity of the serial reference. It is assigned by the company that allocates the SSCC.

To be written by each Member Organisation:

The local structure of GS1 Company Prefixes

8.2 The GS1 logistics label

GS1 Logistics Label Guideline:
http://www.gs1.org/docs/tl/GS1_Logistic_Label_Guideline.pdf

8.2.1 Representation of information

The information included on a GS1 logistics label comes in two basic forms.

1. Information to be used by people: This is comprised of Human Readable Interpretation (HRI), Non-HRI text and graphics.
2. Information designed for data capture by a machine: Barcodes.

Barcodes are machine readable and are a secure and efficient method for conveying structured data, while HRI, Non-HRI text and graphics allow people general access to basic information at any point in the supply chain. Both methods add value to GS1 logistics labels, and often co-exist on the same label.

Note: Note: HRI and Non-HRI Text.
For the purposes of interpreting this guideline, there are two types of text that appear on a label:

- HRI is the information below or beside a barcode which is encoded in the barcode and represents the same characters as carried in the barcode.
- Non-HRI Text is all other text on a label.

8.2.2 Building blocks

On the GS1 logistics label a distinction is made between the types of data communicated on the GS1 Logistics label, in order to facilitate interpretation by machines and people. For this purpose the data can be expressed in three building blocks:

1. The 'Free Format' building block may contain Non-HRI text and graphics.
2. The 'Non-HRI Text Including Data Titles' building block contains Non-HRI text reflecting the information represented in the barcode(s) using data titles rather than AIs, and optionally additional information not represented in barcodes (preferably including data titles).
3. The 'Barcodes and HRI' building block contains the barcode(s) including human readable interpretation (HRI).

8.2.3 Segments

The information to be included on the label may become available at separate stages. Also some information may need to be replaced during the lifetime of the logistic unit. Dividing the label into separate segments is a way to address this.

A segment is a logical grouping of information that is generally known at a particular time. There may be up to three label segments on a GS1 logistics label, each representing a group of information. Generally, the order of the segments, from top to bottom, is: carrier (transport), customer, and supplier. However, this order and top/down alignment may vary depending on the size of the logistic unit and the business process being served.

Figure 8-2 GS1 logistics label layout examples

Supplier Segment

The supplier segment of the label contains information that is generally known at the time of packaging by the supplier. The SSCC is applied here as the unit identifier, along with the GTIN if used.

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

Customer Segment

The customer segment of the label contains information that is generally known at the time of order and order processing by the supplier. Typical information includes the ship to location, purchase order number, and customer-specific routing and handling information. If several logistic units are assembled to be transported under one despatch advice or Bill of Lading (BOL) to one customer the GSIN, AI (402) may also be applied in this customer segment.

Carrier (Transport) Segment

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

Figure 8-3 Example of GS1 Logistics Label

On the label and within label segments these building blocks are usually placed top down: Free Format (top), Non-HRI text including Data Titles (middle), Barcodes and HRI (bottom). If space permits it, and providing the barcodes conform to the size specifications for the application, the lower two building blocks may be placed side by side.

8.2.4 Allowed barcode types

On the GS1 logistics label the only currently allowed barcode is:

- GS1-128

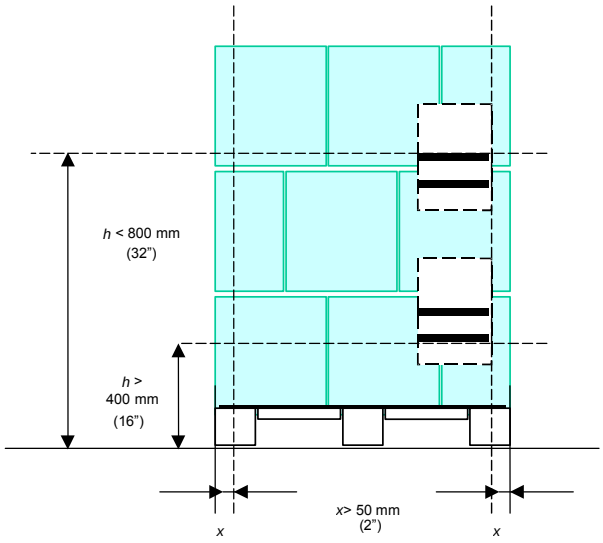
Note: Note that a larger X-dimension is recommended for barcodes on logistics labels.

See section 5 for more information about the GS1 barcode types.

8.3 Label placement guidelines on pallets

For pallets labels should be placed so that all the barcode 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 8-4 Barcodes on Pallets



9 Identifying and barcoding locations

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 can be used in many ways. The GLN can be used to identify parties, physical locations and even digital locations.

9.1 GLN structure

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 9-1 GLN Data Structure

GS1 Company Prefix →								← Location reference				Check digit
N_1	N_2	N_3	N_4	N_5	N_6	N_7	N_8	N_9	N_{10}	N_{11}	N_{12}	N_{13}

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.

9.2 Use of the GLN in a barcode

Two main applications exist where GLNs are used in barcoded form:

1. As primary key in location marking
7. As attribute in a barcode on a trade item or a logistics label

9.2.1 GLN used in barcode to mark the location

The following Application Identifiers have been defined for the use of GLN in location marking:

- Physical location, AI (414)
- GLN Extension Component, AI (254)

Allowed barcode types:

- GS1-128
- GS1 DataMatrix
- GS1 QR Code

9.2.2 GLN used as attribute trade item or logistics label

The following Application Identifiers have been defined for the use of GLN as attribute:

- Deliver to location, AI (410)
- Invoice to location, AI (411)
- Purchased from location, AI (412)
- Ship for - Deliver for - Forward to location, AI (413)
- Number of processor with ISO Country Code, AI (703)

GLN Allocation Rules: *www.gs1.org/glnrules*

10 Special barcoding applications

10.1 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.

10.1.1 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 Centre for Serial Publications (ISSN numbering system). ISSN (http://www.issn.org/) allocates identification numbers to Serial Publications using this prefix. Typically the number is structured as:

Figure 10-1 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 barcode symbol that complies with the print quality specifications applicable to all GS1 system barcode 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 barcode symbols. For example, the X-dimension applied to the main barcode symbol must also be applied to the add-on symbol.

10.1.2 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 Agency for books (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 barcode symbol that complies with the print quality specifications applicable to all GS1 system barcode symbols. The EAN/UPC 2-digit or 5-digit Add-on symbols are options used with the above EAN/UPC symbols.

10.2 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 EDI 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.

10.3 The numbering of coupons

A coupon is a digital or paper based voucher that can be redeemed at the point-of-sale for a cash value or free item. Coupon identification is organised at the local or regional level. Determining the data structure of a coupon is, therefore, the responsibility of the GS1 Member Organisations for their area of jurisdiction.

Two main methods exist:

1. Coupon identification using the Global Coupon Number (GCN)
2. Coupon identification using a restricted circulation number (RCN)

To be written by each Member Organisation:
The way coupons are identified in your market, if applicable.

10.4 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.

11 Electronic data exchange

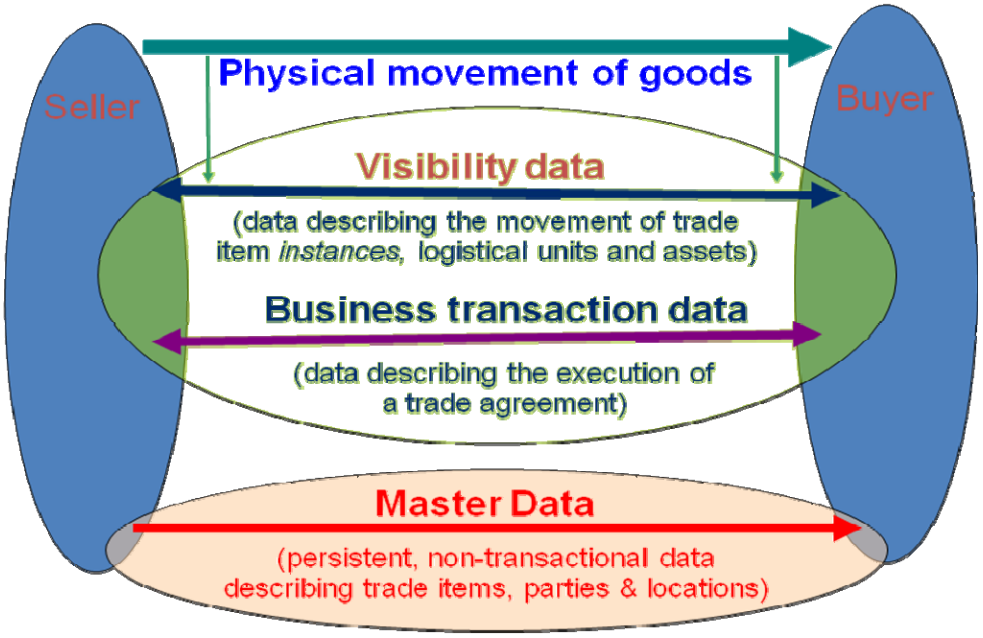
Every day, businesses generate and process a staggering amount of data, ranging from purchase orders and invoices, to product catalogues and sales reports. These data provide the vital information that will precede, accompany or follow the physical goods in a commercial transaction.

Types of data

Exchanged data can be divided into three main groups:

- **Master data** that provide descriptive attributes of real-world entities identified by GS1 Identification Keys, including trade items, parties, and physical locations.
- **Transaction data** that consist of trade transactions, triggering or confirming the execution of a function within a business process as defined by an explicit business agreement (e.g., a supply contract) or an implicit one (e.g., customs processing), from the start of the business process (e.g., ordering the product) to the end of it (e.g., financial settlement), also making use of GS1 Identification Keys.
- **Visibility event data** provide details about activity in the supply chain of products and other physical or digital assets, identified by keys, detailing where these objects are in time, and why; not just within one company's four walls, but throughout the supply chain.

Figure 11-1 Types of data



Communication methods

The communication methods may be broadly classified in two groups:

- "***Push***" methods, where one party unilaterally transfers data to another in the absence of a prior request. Push methods may be further classified as:
  - **Bilateral** party-to-party push, where one party transfers data directly to another party.
  - **Publish/subscribe**, where one party transfers data to a data pool, which in turn pushes the data to other parties who have previously expressed interest in that data by registering a subscription ("selective push").
  - **Broadcast**, where a party publishes Business Data in a publicly-accessible place such as a World Wide Web page, where it may be retrieved by any interested party
- "***Pull***" or "query" methods, where one party makes a request for specific data to another party, who in turn responds with the desired data. GS1 implementation: EPCIS, GS1 Source.

GS1 standards and services

GS1 offers several standards and services, based on the types of data and communication methods described above.

All GS1 data exchange standards and services are based on the use of GS1 identification keys rather than internal identifiers or descriptive elements. The use of globally unique keys greatly simplifies implementations between trading partners, since they provide interoperability across the various systems.

11.1 Master data

GDSN

The GS1 Global Data Synchronisation Network® (GDSN) enables trading partners to automatically share their business data with each other. This means organisations can have confidence that when one of their suppliers or retailers updates their database, their own database is similarly updated as a result. Everyone has access to the same continuously refreshed data.

For this to happen, each organisation needs to join a data pool certified and tested by GS1, who connect to the GS1 Global Registry®, a central directory which keeps track of connections, guarantees the uniqueness of data and ensures compliance with shared GS1 standards.

- Communication method: Publish / subscribe

GS1 Source

GS1 Source is a network of data aggregators who have all agreed to use GS1 standards. Data aggregators gather product data from brand owners and manufacturers, share it with each other on the cloud, and make it available to developers for their web and mobile applications.

- Communication method: Pull

GS1 SmartSearch

GS1 SmartSearch standard makes it possible to create structured data about a product and relate this data to its GTIN. The structured data about the product can then be used by search engines, smartphone apps, etc. to deliver a richer experience to the consumer.

- Communication method: Broadcast

GLN Service

The GS1 GLN Service provides a single point of access to GS1 GLN master data via an interconnected network of local registries.

- Communication method: Pull

EDI

The GS1 EDI standards, EANCOM and GS1 XML, offer several messages for bilateral exchange of master data.

- Communication method: Bilateral push

11.2 Transaction data

EDI

EDI provides trading partners with an efficient business tool for the automatic transmission of commercial data from one computer application directly to another. In EDI, all paper business documents sent previously between companies have been replaced by messages, suitable for exchange by electronic means between computer applications.

GS1 offers two EDI standards: EANCOM and GS1 XML. The GS1 EDI standards have been designed to take full advantage of the associated standards, such as product and location numbering and barcoding, in order to provide maximum efficiency and benefits to the user.

- Communication method: Bilateral push

EANCOM

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:

- 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.

GS1 XML

GS1 XML (Electronic Data Interchange) standards enabling exchange of transactional information between trading partners.

GS1 XML offers various types of messages in support of the following processes:

- Order to Cash (Order, Deliver and Payment)
- Planning and forecasting
- Transport & warehousing
- Product recall
- Artwork content management

11.3 Visibility event data

EPCIS

EPCIS is a GS1 standard that enables trading partners to share information about the physical movement and status of products as they travel throughout the supply chain – from business to business and ultimately to consumers. It helps answer the "what, where, when and why" questions to meet consumer and regulatory demands for accurate and detailed product information.

- Communication method: Pull (publish/subscribe is supported as well).

12 References

Standards

- GS1 General Specifications *www.gs1.org/barcodes-epcrfid-id-keys/gs1-general-specifications*
- GTIN allocation rules *www.gs1.org/gtinrules*
- GLN allocation rules *www.gs1.org/glnrules*
- GS1 system architecture flyer: *http://www.gs1.org/sites/default/files/docs/architecture/AG_Flyer_final.pdf*
- GS1 discovery app: *http://discover.gs1.org/cpg*
- GS1 identification keys reference card: *http://www.gs1.org/sites/default/files/docs/idkeys/GS1_ID_Keys_Reference_Card.pdf*
- GS1 identification keys webpage: *http://www.gs1.org/id-keys*
- GTIN fact sheet: *http://www.gs1.org/docs/idkeys/GS1_GTIN_Executive_Summary.pdf*
- GLN brochure: *http://www.gs1.org/docs/idkeys/GS1_Global_Location_Numbers.pdf*
- GS1 barcodes reference card: *http://www.gs1.org/docs/barcodes/GS1_Barcodes_Fact_Sheet-overview_of_all_GS1_barcodes.pdf*
- 10 steps to barcode your product: *http://www.gs1.org/10-steps-to-barcode-your-product*
- Check Digit Calculator: *http://www.gs1.org/barcodes/support/check_digit_calculator*

Guidelines

- GS1 DataMatrix Guideline: *http://www.gs1.org/docs/barcodes/GS1_DataMatrix_Introduction_and_technical_overview.pdf*

- Fresh Food Implementation Guide: http://www.gs1.org/docs/freshfood/Fresh_Food_Implementation_Guide.pdf
- GS1 Logistics Label Guideline: http://www.gs1.org/docs/tl/GS1_Logistic_Label_Guideline.pdf
- 1D barcode verification guideline: http://www.gs1.org/docs/barcodes/1D_Barcode_verification_implementation_guideline.pdf
- 2D barcode verification guideline: http://www.gs1.org/barcodes/docs/barcodes/2D_Barcode_Verification_Process_Implementation_Guideline.pdf

Fact sheets

- GS1 symbols used in General Distribution Fact sheet: http://www.gs1.org/docs/barcodes/GS1%20Barcodes%20Fact%20Sheet%20-%20GS1%201D%20symbols%20for%20general%20distribution%20only.pdf
- GS1 DataBar Family Fact sheet: http://www.gs1.org/docs/barcodes/GS1_Barcodes_Fact_Sheet-GS1_DataBar_family.pdf
- GS1 Barcodes – 2D Symbols Fact sheet: http://www.gs1.org/docs/barcodes/GS1_Barcodes_Fact_Sheet-GS1_2D_symbols.pdf
- Scanner environments and printing methods (fact sheet): http://www.gs1.org/docs/barcodes/GS1_Barcodes_Fact_Sheet-Scanner_enviroments_and_printing_methods.pdf
- GS1 Application Identifiers fact sheet: http://www.gs1.org/sites/default/files/docs/barcodes/GS1%20Application%20Identifiers.pdf

Support

The frequently asked questions are posted at www.gs1.org/helpdesk

More information can be found either at the website: www.gs1.org, or by contacting the local GS1 Member Organisation. The GS1 Member Organisation contact list can be accessed at www.gs1.org/contact

Contact information about member companies holding a given GS1 identification key (GTIN, GLN, etc.) can be found at http://gepir.gs1.org/

13 Glossary

The following glossary was updated for the 2016 publication. Please refer to the www.gs1.org/glossary for the latest version.

Term	Definition
2-dimensional symbology	Optically readable symbols that must be examined both vertically and horizontally to read the entire message. Two-dimensional symbols may be one of two types: matrix symbols and multi-row symbols. Two-dimensional symbols have error detection and may include error correction features.
add-on symbol	A barcode used to encode information supplementary to that in the main barcode.
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).
bearer bars	Bar abutting the tops and bottoms of the bars in a barcode or a frame surrounding the entire symbol, intended to equalise the pressure exerted by the printing plate over the entire surface of the symbol and/or to prevent a short scan by the barcode reader.
brand owner	The party that is responsible for allocating GS1 identification keys. The administrator of a GS1 Company Prefix.

Term	Definition
carrier (logistics)	The party that provides freight transportation services or a physical or electronic mechanism that carries business information.
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.)
concatenation	The representation of several element strings in one barcode.
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 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 barcodes.
digital coupon	A digital coupon is an electronic presentation, that is distributed and presented without manifesting as "paper" or in other hard-copy form, and that can be exchanged for a financial discount or for loyalty points when making a purchase.
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 barcodes including EAN-8, EAN-13, UPC-A, and UPC-E barcodes. Although UPC-E barcodes do not have a separate symbology identifier, they act like a separate symbology through the scanning application software. See also EAN-8 barcode, EAN-13 barcode, UPC-A barcode, and UPC-E barcode.
EAN-13 barcode	A barcode of the EAN/UPC symbology that encodes GTIN-13, Coupon-13, RCN-13, and VMN-13.
EAN-8 barcode	A barcode of the EAN/UPC symbology that encodes GTIN-8 or RCN-8.
electronic commerce	The conduct of business communications and management through electronic methods, such as electronic data interchange (EDI) and automated data collection systems.
electronic message	A composition of element strings from scanned data and transaction information assembled for data validation and unambiguous processing in a user application.
Electronic Product Code (EPC)	An identification scheme for universally identifying physical objects (e.g. trade items, assets, and locations) via RFID tags and other means. The standardised EPC data consists of an EPC (or EPC Identifier) that uniquely identifies an individual object, as well as an optional filter value when judged to be necessary to enable effective and efficient reading of the EPC tags.
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 barcoded trade items packaged for transport, logistic units, assets, and location tags.
Global Coupon Number (GCN)	A GS1 identification key that provides a globally unique identification for a coupon, with an optional serial number
Global Location Number (GLN)	The GS1 identification key used to identify physical locations or parties. 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 Global Service Relation Number is the GS1 identification key used to identify the relationship between an organisation offering services and the recipient or provider of services. The key comprises a GS1 Company Prefix, service reference and check digit.

Term	Definition
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.
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	A unique string of four to twelve digits used to issue GS1 identification keys. The first digits are a valid GS1 Prefix and the length must be at least one longer than the length of the GS1 Prefix. The GS1 Company Prefix is issued by a GS1 Member Organisation. As the GS1 Company Prefix varies in length, the issuance of a GS1 Company Prefix excludes all longer strings that start with the same digits from being issued as GS1 Company Prefixes. See also U.P.C Company Prefix.
GS1 DataBar®	A family of barcodes, 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 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.
GS1 Global Standards Management Process	GS1 created the Global Standards Management Process (GSMP) to support standards development activity for the GS1 system. The GSMP uses a global consensus process to develop supply chain standards that are based on business needs and user-input
GS1 identification key	A unique identifier for a class of objects (e.g. a trade item) or an instance of an object (e.g. a logistic unit).
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 unique string of two or more digits issued by GS1 Global Office and allocated to GS1 Member Organisations to issue GS1 Company Prefixes or allocated to other specific areas.
GS1 symbologies using GS1 Application Identifiers	All GS1 endorsed barcode 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 (XML) schemas providing users with a global business messaging language of e-business to conduct efficient internet-based electronic commerce.
GS1®	Based in Brussels, Belgium, and Princeton, USA, it is the organisation that manages the GS1 system. Its members are GS1 Member Organisations.
GS1-128 symbology	A subset of Code 128 that is utilised exclusively for GS1 system data structures.
GS1-8 Prefix	A unique string of three digits issued by GS1 Global Office and allocated to GS1 Member Organisations to issue GTIN-8s or allocated to issue RCN-8s (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 uses a fixed field length, for example, when a GTIN-13 is encoded in symbology using 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.

Term	Definition
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.
Interleaved 2-of-5 symbology	Barcode symbology used for the ITF-14 barcode.
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 barcode	ITF-14 (a subset of Interleaved 2-of-5) barcodes carry GTINs only on trade items that are not expected to pass through the point-of-sale.
kit	A collection of different regulated healthcare items assembled for use in a single therapy.
local assigned code (LAC)	A particular use of the UPC-E barcode 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 barcodes 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 barcodes must be used to enable very rapid scanning or low volume checkout where linear or 2D matrix barcodes are used with image-based scanners.
Quiet Zone	A clear space which precedes the start character of a barcode and follows the stop character. Formerly referred to as "clear area" or "light margin".
radio frequency	Any frequency within the electromagnetic spectrum associated with radio wave propagation. When a radio frequency current is supplied to an antenna, an electromagnetic field is created that then is able to propagate through space. Many wireless technologies are based on radio frequency field propagation.
radio frequency identification (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-12	A 12-digit Restricted Circulation Number (see Restricted Circulation Number).
RCN-13	A 13-digit Restricted Circulation Number (see Restricted Circulation Number).
RCN-8	An 8-digit Restricted Circulation Number (see Restricted Circulation Number) beginning with GS1-8 Prefix 0 or 2.
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 utilising linear or 2D matrix barcodes 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).

Term	Definition
scanner	An electronic device to read barcode and convert them into electrical signals understandable by a computer device.
Serial Shipping Container Code (SSCC)	The GS1 identification key used to identify logistics units. The key comprises an extension digit, GS1 Company Prefix, serial reference, and check digit.
service relation instance number (SRIN)	An attribute to the GSRN which allows to distinguish different encounters during the same episode, or the reuse of the same GSRN in different episodes.
substrate	The material on which a barcode is printed.
supplier	The party that produces, provides, or furnishes an item or service.
symbol	The combination of symbol characters and features required by a particular symbology, including Quiet Zone, start and stop characters, data characters, and other auxiliary patterns, which together form a complete scannable entity; an instance of a symbology and a data structure.
symbol character	A group of bars and spaces in a symbol that is decoded as a single unit. It may represent an individual digit, letter, punctuation mark, control indicator, or multiple data characters.
symbol 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 barcode; a type of barcode.
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 item grouping	A predefined composition of trade item(s) that is not intended for point-of-sale scanning. It is identified with a GTIN-14, GTIN-13, or GTIN-12.
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 GS1 Company Prefix starting with a zero ('0') becomes a U.P.C. Company Prefix by removing the leading zero. A U.P.C. Company Prefix is used to issue GTIN-12.
U.P.C. Prefix	A GS1 Prefix starting with a zero ('0') becomes a U.P.C. Prefix by removing the leading zero. A U.P.C. Prefix is used to issue U.P.C. Company Prefixes or allocated to other specific areas.
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 barcode	A barcode of the EAN/UPC symbology that encodes GTIN-12, Coupon-12, RCN-12, and VMN-12.
UPC-E barcode	A barcode 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).
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 barcode symbology such as ITF-14 that has two different element widths.
X-dimension	The specified width of the narrowest element of a barcode.

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**

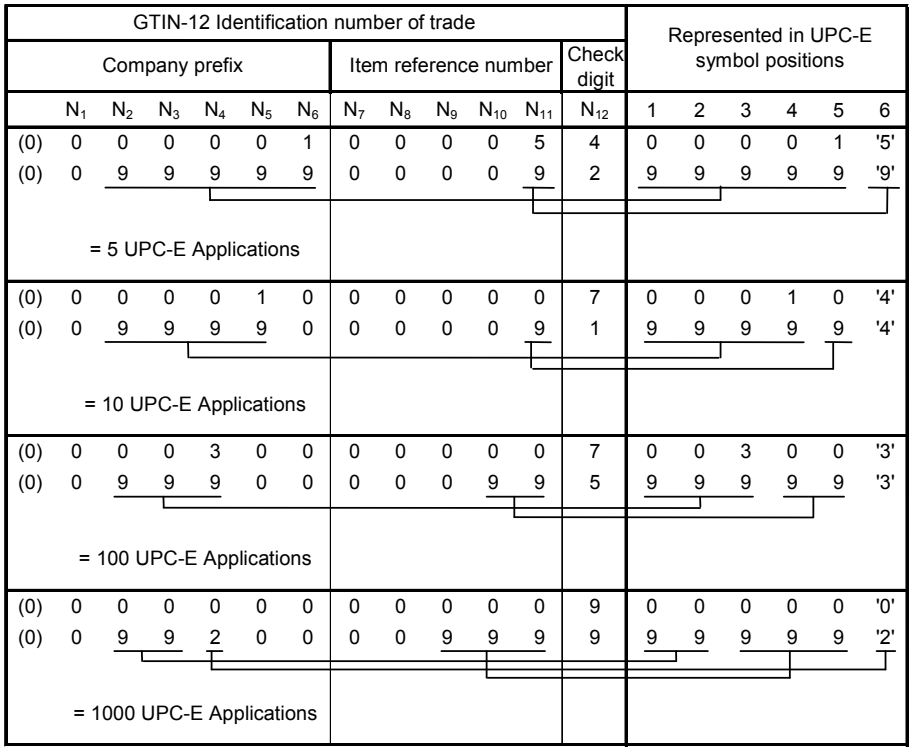
Note: An online check digit calculator is available on:

Check Digit Calculator: *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 barcode symbol named UPC-E. The GTIN-12 Item Number is condensed into a barcode symbol consisting of six symbol character positions. For application processing, the item number must be transformed into its full length by the barcode reader software or by the application software. There is no UPC-E six-digit trade item number.

Figure A-1 UPC-E Option for the identification of trade items (GTIN)



Note: Company Prefixes showing 000000 and 001000 to 007999 in positions N1 to N6 are not available in this UPC-E option (see below).

Figure A-2 UPC-E Option for the identification of trade items for company internal distribution

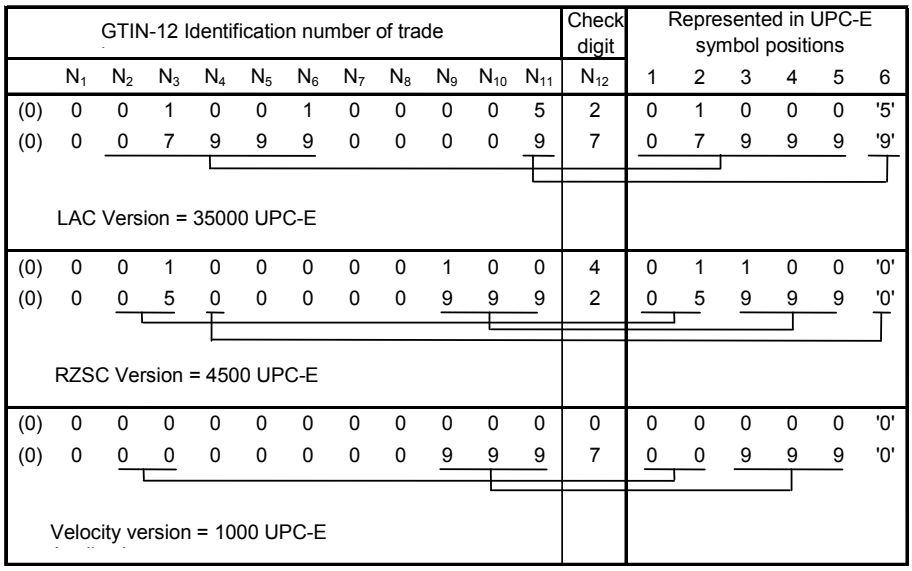


Table A-2 shows the construction principle of UPC-E for trade item numbering for restricted distribution (company internal). These identification numbers are not unambiguous when leaving the applying company.

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 barcode 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

Magnification factor	Ideal module width [mm]	EAN-13/UPC-A dimensions [mm]		EAN-8 dimensions [mm]	
		Width	Height	Width	Height
0.80	0.264	29.83	18.28	21.38	14.58
0.85	0.281	31.70	19.42	22.72	15.50
0.90	0.297	33.56	20.57	24.06	16.41
0.95	0.313	35.43	21.71	25.39	17.32
1.00	0.330	37.29	22.85	26.73	18.23
1.05	0.346	39.15	23.99	28.07	19.14
1.10	0.363	41.02	25.14	29.40	20.05
1.15	0.379	42.88	26.28	30.74	20.96
1.20	0.396	44.75	27.42	32.08	21.88
1.25	0.412	46.61	28.56	33.41	22.79
1.30	0.429	48.48	29.71	34.75	23.70
1.35	0.445	50.34	30.85	36.09	24.61
1.40	0.462	52.21	31.99	37.42	25.52
1.45	0.478	54.07	33.13	38.76	26.43
1.50	0.495	55.94	34.28	40.10	27.35
1.55	0.511	57.80	35.42	41.43	28.26
1.60	0.528	59.66	36.56	42.77	29.17
1.65	0.544	61.53	37.70	44.10	30.08
1.70	0.561	63.39	36.85	45.44	30.99
1.75	0.577	65.26	39.99	46.78	31.90
1.80	0.594	67.12	41.13	48.11	32.81
1.85	0.610	68.99	42.27	49.45	33.73
1.90	0.627	70.85	43.42	50.79	34.64
1.95	0.643	72.72	44.56	52.12	35.55
2.00	0.660	74.58	45.70	53.46	36.46

A.4 GS1 Application Identifiers in numerical order (taken from GS1 General Specifications)

AI	Data Content	Format (*)	FNC1 required (****)	Data title
00	Serial Shipping Container Code (SSCC)	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 BEST BY
16 (**)	Sell by date (YYMMDD)	N2+N6		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
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
243	Packaging component number	N3+X..20	(FNC1)	PCN
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 COMPONENT
255	Global Coupon Number (GCN)	N3+N13+N..12	(FNC1)	GCN
30	Count of items (variable measure trade item)	N2+N..8	(FNC1)	VAR. COUNT
310 (***)	Net weight, kilograms (variable measure trade item)	N4+N6		NET WEIGHT (kg)
311 (***)	Length or first dimension, metres (variable measure trade item)	N4+N6		LENGTH (m)
312 (***)	Width, diameter, or second dimension, metres (variable measure trade item)	N4+N6		WIDTH (m)
313 (***)	Depth, thickness, height, or third dimension, metres (variable measure trade item)	N4+N6		HEIGHT (m)
314 (***)	Area, square metres (variable measure trade item)	N4+N6		AREA (m^2)
315 (***)	Net volume, litres (variable measure trade item)	N4+N6		NET VOLUME (l)
316 (***)	Net volume, cubic metres (variable measure trade item)	N4+N6		NET VOLUME (m^3)
320 (***)	Net weight, pounds (variable measure trade item)	N4+N6		NET WEIGHT (lb)

AI	Data Content	Format (*)	FNC1 required (****)	Data title
321 (***)	Length or first dimension, inches (variable measure trade item)	N4+N6		LENGTH (i)
322 (***)	Length or first dimension, feet (variable measure trade item)	N4+N6		LENGTH (f)
323 (***)	Length or first dimension, yards (variable measure trade item)	N4+N6		LENGTH (y)
324 (***)	Width, diameter, or second dimension, inches (variable measure trade item)	N4+N6		WIDTH (i)
325 (***)	Width, diameter, or second dimension, feet (variable measure trade item)	N4+N6		WIDTH (f)
326 (***)	Width, diameter, or second dimension, yards (variable measure trade item)	N4+N6		WIDTH (y)
327 (***)	Depth, thickness, height, or third dimension, inches (variable measure trade item)	N4+N6		HEIGHT (i)
328 (***)	Depth, thickness, height, or third dimension, feet (variable measure trade item)	N4+N6		HEIGHT (f)
329 (***)	Depth, thickness, height, or third dimension, yards (variable measure trade item)	N4+N6		HEIGHT (y)
330 (***)	Logistic weight, kilograms	N4+N6		GROSS WEIGHT (kg)
331 (***)	Length or first dimension, metres	N4+N6		LENGTH (m), log
332 (***)	Width, diameter, or second dimension, metres	N4+N6		WIDTH (m), log
333 (***)	Depth, thickness, height, or third dimension, metres	N4+N6		HEIGHT (m), log
334 (***)	Area, square metres	N4+N6		AREA (m^2), log
335 (***)	Logistic volume, litres	N4+N6		VOLUME (l), log
336 (***)	Logistic volume, cubic metres	N4+N6		VOLUME (m^3), log
337 (***)	Kilograms per square metre	N4+N6		KG PER m^2
340 (***)	Logistic weight, pounds	N4+N6		GROSS WEIGHT (lb)
341 (***)	Length or first dimension, inches	N4+N6		LENGTH (i), log
342 (***)	Length or first dimension, feet	N4+N6		LENGTH (f), log
343 (***)	Length or first dimension, yards	N4+N6		LENGTH (y), log
344 (***)	Width, diameter, or second dimension, inches	N4+N6		WIDTH (i), log
345 (***)	Width, diameter, or second dimension, feet	N4+N6		WIDTH (f), log
346 (***)	Width, diameter, or second dimension, yard	N4+N6		WIDTH (y), log
347 (***)	Depth, thickness, height, or third dimension, inches	N4+N6		HEIGHT (i), log

AI	Data Content	Format (*)	FNC1 required (****)	Data title
348 (***)	Depth, thickness, height, or third dimension, feet	N4+N6		HEIGHT (f), log
349 (***)	Depth, thickness, height, or third dimension, yards	N4+N6		HEIGHT (y), log
350 (***)	Area, square inches (variable measure trade item)	N4+N6		AREA (i^2)
351 (***)	Area, square feet (variable measure trade item)	N4+N6		AREA (f^2)
352 (***)	Area, square yards (variable measure trade item)	N4+N6		AREA (y^2)
353 (***)	Area, square inches	N4+N6		AREA (i^2), log
354 (***)	Area, square feet	N4+N6		AREA (f^2), log
355 (***)	Area, square yards	N4+N6		AREA (y^2), log
356 (***)	Net weight, troy ounces (variable measure trade item)	N4+N6		NET WEIGHT (t)
357 (***)	Net weight (or volume), ounces (variable measure trade item)	N4+N6		NET VOLUME (oz)
360 (***)	Net volume, quarts (variable measure trade item)	N4+N6		NET VOLUME (q)
361 (***)	Net volume, gallons U.S. (variable measure trade item)	N4+N6		NET VOLUME (g)
362 (***)	Logistic volume, quarts	N4+N6		VOLUME (q), log
363 (***)	Logistic volume, gallons U.S.	N4+N6		VOLUME (g), log
364 (***)	Net volume, cubic inches (variable measure trade item)	N4+N6		VOLUME (i^3)
365 (***)	Net volume, cubic feet (variable measure trade item)	N4+N6		VOLUME (f^3)
366 (***)	Net volume, cubic yards (variable measure trade item)	N4+N6		VOLUME (y^3)
367 (***)	Logistic volume, cubic inches	N4+N6		VOLUME (i^3), log
368 (***)	Logistic volume, cubic feet	N4+N6		VOLUME (f^3), log
369 (***)	Logistic volume, cubic yards	N4+N6		VOLUME (y^3), log
37	Count of trade items	N2+N..8	(FNC1)	COUNT
390 (***)	Applicable amount payable or Coupon value, 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

AI	Data Content	Format (*)	FNC1 required (****)	Data title
394n (***)	Percentage discount of a coupon	N4+N4	(FNC1)	PRCNT OFF
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
427	Country subdivision Of origin	N3+X..3	(FNC1)	ORIGIN SUBDIVISION
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
7005	Catch area	N4+X..12	(FNC1)	CATCH AREA
7006	First freeze date	N4+N6	(FNC1)	FIRST FREEZE DATE
7007	Harvest date	N4+N6..12	(FNC1)	HARVEST DATE
7008	Species for fishery purposes	N4+X..3	(FNC1)	AQUATIC SPECIES
7009	Fishing gear type	N4+X..10	(FNC1)	FISHING GEAR TYPE
7010	Production method	N4+X..2	(FNC1)	PROD METHOD
703s	Number of processor with ISO Country Code	N4+N3+X..27	(FNC1)	PROCESSOR # s

AI	Data Content	Format (*)	FNC1 required (****)	Data title
710	National Healthcare Reimbursement Number (NHRN) – Germany PZN	N3+X..20	(FNC1)	NHRN PZN
711	National Healthcare Reimbursement Number (NHRN) – France CIP	N3+X..20	(FNC1)	NHRN CIP
712	National Healthcare Reimbursement Number (NHRN) – Spain CN	N3+X..20	(FNC1)	NHRN CN
713	National Healthcare Reimbursement Number (NHRN) – Brasil DRN	N3+X..20	(FNC1)	NHRN DRN
nnn (*****)	National Healthcare Reimbursement Number (NHRN) – Country "A" NHRN	N3+X..20	(FNC1)	NHRN xxx
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..34	(FNC1)	IBAN
8008	Date and time of production	N4+N8+N..4	(FNC1)	PROD TIME
8010	Component / Part Identifier (CPID)	N4 + X..30	(FNC1)	CPID
8011	Component / Part Identifier serial number (CPID SERIAL)	N4 + N..12	(FNC1)	CPID SERIAL
8012	Software version	N4 + X..20	(FNC1)	VERSION
8017	Global Service Relation Number to identify the relationship between an organisation offering services and the provider of services	N4+N18	(FNC1)	GSRN - PROVIDER
8018	Global Service Relation Number to identify the relationship between an organisation offering services and the recipient of services	N4+N18	(FNC1)	GSRN - RECIPIENT
8019	Service Relation Instance Number (SRIN)	N4+N..10	(FNC1)	SRIN
8020	Payment slip reference number	N4+X..25	(FNC1)	REF No
8110	Coupon code identification for use in North America	N4+X..70	(FNC1)	-
8111	Loyalty points of a coupon	N4+N4	(FNC1)	POINTS
8200	Extended Packaging URL	N4+X..70	(FNC1)	PRODUCT URL
90	Information mutually agreed between trading partners	N2+X..30	(FNC1)	INTERNAL
91 to 99	Company internal information	N2+X..30	(FNC1)	INTERNAL

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 alphanumeric character
- N3 3 numeric digits, fixed length
- N..3 up to 3 numeric digits

- X..3 up to 3 characters in **Error! Reference source not found.**

(**): 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

(****): 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 and GS1 QR Code symbology.

(*****) An example to illustrate future additional NHRNs. If additional NHRN AIs are required, a request for a new NHRN AI SHALL be made through the GS1 GSMP.

A.5 Data relationships (taken from GS1 General Specifications)

A.5.1 Invalid pairs of element strings

This section defines the pairs of element strings that cannot appear on the same physical entity.

Figure 10.1.2-1. Invalid pairs of element strings

Pair of element strings				Comment
AI	Designation	AI	Designation	
01	Identification of a trade item	01	Identification of a trade item	Duplicate Global Trade Item Numbers (GTINs) with different values
01	Identification of a trade item	02	Identification of logistic unit contents	AI (02) must not be used for the identification of trade items contained in a trade item.
01	Identification of a trade item	37	Count of units contained	The count of units contained would duplicate the master data of the GTIN. AI (37) may only be used with AI (02).
242	Made-to-Order variation number	01 or 02 with N_1 not equal to 9	Identification of a variable measure trade item	Made-to-Order variation number can only be used with a GTIN-14, indicator digit 9. This represents a Custom Industrial Supply Item
420	Ship to postal code, single postal authority	421	Ship to postal code with ISO country code	Only one ship to postal code may be applied on an item
422	Country of origin of a trade item	426	Country of full processing	Duplication of country of origin of a trade item (covered by country of full processing)
423	Country of initial processing	426	Country of full processing	Duplication of country of initial processing (covered by country of full processing)
424	Country of processing	426	Country of full processing	Duplication of country of processing (covered by country of full processing)
425	Country of disassembly	426	Country of full processing	Duplication of country of disassembly (covered by country of full processing)

Pair of element strings				Comment
AI	Designation	AI	Designation	
390n	Amount payable or Coupon value – single monetary area	391n or 394n or 8111	Amount payable – with ISO currency code or Percentage discount of a coupon or Loyalty Points of a coupon	Only one amount payable element string may be applied on a payment slip or coupon and only one discount condition element string may be applied on a coupon
392n	Amount payable for a variable measure trade item – Single monetary area	393n	Amount payable for a variable measure trade item and ISO currency code	Only one amount payable element string may be applied on a variable measure trade item.
394n	Percentage discount of a coupon	390n or 8111	Coupon value or Loyalty points of a coupon	Only one discount condition element string may be applied on a coupon
710, 711, 712, 713 (nnn)	National Healthcare Reimbursement Number	Any AI (01) allowable attributes	Any GTIN allowable attributes	When NHRN(s) are applied to the physical trade item with the mandatory association to the GTIN, any attribute AIs must only be processed with the GTIN and must not be processed with the NHRNs (AIs 710, 711, 712, 713…..) alone.
8006	Component identification	01	Identification of a trade item	Other GTINs cannot be used with AI (8006). The trade item is identified by a GTIN contained in the AI (8006).
8111	Applicable loyalty points for coupon value	390n or 394n	Coupon value or Percentage discount of a coupon	Only one discount condition element string may be applied on a coupon
8018	Global Service Relation Number for the recipient	8017	Global Service Relation Number for the provider	Only one Global Service Relation Number (recipient or provider) can be applied at one time for identification of an individual in a given service relationship

A.5.2 Mandatory association of element strings

This section defines the element strings that mandate the appearance of another element string on the same physical entity.

Figure 10.1.2-2. Mandatory association of element strings

If element string		Then mandatory associated element string	Comment
AI	Designation		
01 with N_1 = 0	Identification of a variable measure trade item scanned at POS	30 or 3nnn* or 3nnn**	Mandatory association with a variable count or a trade measure information scanned at POS identified with GTIN-12 or GTIN-13. Only GS1 DataBar Expanded barcodes can encode associated elements strings for use at POS. (See note at bottom)
01 or 02 with N_1 = 9	Identification of a variable measure trade item not scanned at POS	30 or 3nnn* or 3nnn** or 8001	Mandatory association with variable measure information not scanned at POS identified with a GTIN-14 starting with indicator digit 9 (See Note at bottom) Only GS1-128, ITF-14, and GS1 DataBar Expanded barcodes can encode a GTIN with N1 = 9.

If element string		Then mandatory associated element string	Comment
02	Identification of logistic unit contents	00	Mandatory association with an SSCC (Serial Shipping Container Code)
02	Identification of logistic unit contents	37	Mandatory count of the contained trade items
10	Batch/lot number	01 or 02	Mandatory association with a Global Trade Item Number (GTIN) or with the identification of logistic unit contents
11, 13, 15, 16	Dates	01 or 02	Mandatory association with a GTIN or with the identification of logistic unit contents
12	Due date	8020 and 415	Mandatory association with the payment slip reference number and the Global Location Number (GLN) of the invoicing party
17	Expiration date	01 or 02 or 255	Mandatory association with a GTIN or with the identification of logistic unit contents or with the Global Coupon Number
20	Product variant	01 or 02	Mandatory association with a GTIN or with the identification of logistic unit contents
21	Serial number	01	Mandatory association with a GTIN of a single trade item (a serial number cannot apply to a grouping of trade items). SGTIN is a common term for the mandatory association of AI (21) with GTIN AI (01)
240	Additional product identification	01 or 02	Mandatory association with a GTIN or with the identification of logistic unit contents
241	Customer part number	01 or 02	Mandatory association with a GTIN or with the identification of logistic unit contents
242	Made-to-Order variation number	01 or 02 with $N_1 = 9$	Mandatory association with a GTIN-14 with indicator digit 9 represents a custom industrial supply item
243	Packaging Component Number	01	Mandatory association with GTIN
250	Secondary serial number	01 and 21	Mandatory association with a GTIN (a secondary serial number cannot apply to a grouping of trade items) and the serial number of the trade item AI(21)
251	Reference to source entity	01	Mandatory association with GTIN of the trade item
254	Extension component of a GLN	414	Mandatory association with AI (414). Only GS1-128, GS1 DataBar Expanded symbologies, and EPC RFID tags are valid. This is used with GLN and not GTIN.
30	Variable count	01 or 02	Mandatory association with a GTIN for a variable measure trade item (e.g., GTIN-12 or GTIN-13 for trade items scanned at POS, GTIN-14s starting with indicator digit 9 for trade items not scanned at POS) or the identification of variable measure content of a logistic unit
3nnn*	Trade measures that cannot be summed	01	Mandatory association with a GTIN for a variable measure trade item (e.g., GTIN-12 or GTIN-13 for trade items scanned at POS, GTIN-14s starting with indicator digit 9 for trade items not scanned at POS)

If element string		Then mandatory associated element string	Comment
3nnn**	Trade measures that can be summed	01 or 02	Mandatory association with a GTIN for a variable measure trade item (e.g., GTIN-12 or GTIN-13 for trade items scanned at POS, GTIN-14s starting with indicator digit 9 for trade items not scanned at POS) or the identification of variable measure content of a logistic unit
3nnn***	Logistic measures	00 or 01	Mandatory association with an SSCC or a variable measure GTIN for trade item not scanned at POS (e.g., a GTIN-14 starting with the digit 9)
337n	Kilograms per square metre	01	Mandatory association with a GTIN
37	Count of units contained	02	Mandatory association with the identification of logistic unit contents
390n	Amount payable or Coupon value – single monetary area	8020 and 415 or 255	Mandatory association with the payment slip reference number and the GLN of the invoicing party or with the Global Coupon Number
391n	Amount payable – with ISO currency code	8020 and 415	Mandatory association with the payment slip reference number and the GLN of the invoicing party
392n	Amount payable – when scanned at POS - single monetary unit	01	Mandatory association with a variable count or a trade measure scanned at POS when identified with a GTIN-12 or GTIN-13.
392n	Amount payable when not scanned at POS – single monetary unit	01	Mandatory association with a variable measure information when identified GTIN-14.
393n	Amount payable – when scanned at POS –with ISO currency code	01	Mandatory association with a variable count or a variable measure when scanned at POS and identified with GTIN-12 or GTIN-13.
393n	Amount payable when not scanned at POS – with ISO currency code	01	Mandatory association with a variable measure information when identified with a GTIN-14.
394n	Percentage of a coupon	255	Mandatory association with the Global Coupon Number
403	Routing code	00	Mandatory association with an SSCC
415	GLN of the invoicing party	8020	Mandatory association with payment slip reference number
422	Country of origin	01 or 02	Mandatory association with a GTIN
423	Country of initial processing	01 or 02	Mandatory association with a GTIN or with the identification of logistic unit contents
424	Country of processing	01 or 02	Mandatory association with a GTIN or with the identification of logistic unit contents
425	Country of disassembly	01 or 02	Mandatory association with a GTIN or with the identification of logistic unit contents
426	Country of full processing	01 or 02	Mandatory association with a GTIN or with the identification of logistic unit contents

If element string		Then mandatory associated element string	Comment
427	Country subdivision of origin code for a trade item	01 or 02 and 422	Mandatory association with a GTIN and the Country of Origin of the trade item
7001	NATO stock number	01 or 02	Mandatory association with a GTIN or with the identification of logistic unit contents
7002	UN/ECE meat carcasses and cuts classification	01 or 02	Mandatory association with a GTIN or with the identification of logistic unit contents
7003	Expiration date and time	01 or 02	Mandatory association with a GTIN or with the identification of logistic unit contents
7004	Active potency	01 and 10	Mandatory association with the GTIN and Batch/lot number
7005	Catch Area	01 or 02	Mandatory association with a Global Trade Item Number (GTIN) or with the identification of logistic unit contents
7006	First freeze date	01 or 02	Mandatory association with a Global Trade Item Number (GTIN) or with the identification of logistic unit contents
7007	Harvest date	01 or 02	Mandatory association with a Global Trade Item Number (GTIN) or with the identification of logistic unit contents
7008	Species for fishery purposes	01 or 02	Mandatory association with a Global Trade Item Number (GTIN) or with the identification of logistic unit contents
7009	Fishing Gear type	01 or 02	Mandatory association with a Global Trade Item Number (GTIN) or with the identification of logistic unit contents
7010	Production method	01 or 02	Mandatory association with a Global Trade Item Number (GTIN) or with the identification of logistic unit contents
703(s)	Number of processor	01 or 02	Mandatory association with a GTIN or with the identification of logistic unit contents
710	National Healthcare Reimbursement Number	01	Mandatory association with the GTIN of the trade item
711	National Healthcare Reimbursement Number	01	Mandatory association with the GTIN of the trade item
712	National Healthcare Reimbursement Number	01	Mandatory association with the GTIN of the trade item
713	National Healthcare Reimbursement Number	01	Mandatory association with the GTIN of the trade item
8001	Variables of roll products	01	Mandatory association with a variable measure GTIN (e.g., an GTIN-14 starting with the digit 9)
8005	Price per unit of measure	01 or 02	Mandatory association with a GTIN for a variable measure trade item (e.g., GTIN-12 or GTIN-13 for trade items scanned at POS, GTIN-14s starting with indicator digit 9 for trade items not scanned at POS) or the identification of variable measure content of a logistic unit.

If element string		Then mandatory associated element string	Comment
8007	International Bank Account Number	8020 and 415	Mandatory association with the payment slip reference number and the GLN of the invoicing party
8008	Date and time of production	01 or 02	Mandatory association with a GTIN or with the identification of logistic unit contents
8011	Component / Part Identifier serial number	8010	Mandatory association with Component / Part Identifier
8012	Software Version	01	Mandatory association with a Global Trade Item Number (GTIN)
8019	Service Relation Instance Number	8018	Mandatory association with a Global Service Relation Number (GSRN), AI 8018
8020	Payment slip reference number	415	Mandatory association with the GLN of the invoicing party
8111	Loyalty points of a coupon	255	Mandatory association with the Global Coupon Number
8200	Extended packaging URL	01	Mandatory association with GTIN

***** Is (3nnn) where the first three digits are 312, 313, 324, 325, 326, 327, 328, and 329

****** Is (3nnn) where the first three digits are 310, 311, 314, 315, 316, 320, 321, 322, 323, 350, 351, 352, 356, 357, 360, 361, 364, 365, and 366

******* Is (3nnn) where the first three digits are 330, 331, 332, 333, 334, 335, 336, 340, 341, 342, 343, 344, 345, 346, 347, 348, 349, 353, 354, 355, 362, 363, 367, 368, and 369