

# GS1 system

A common foundation for business



# GS1 designs and manages a global system of supply chain standards

The GS1 standards are built on three main elements:

- **Identify** • **Capture** • **Share**

Businesses use standards to identify real world objects such as products, services, assets and more, so that they may be the subject of electronic information that is stored and/or communicated by stakeholders in the supply chain. To identify these entities, businesses use GS1 Identification (ID) Keys.

This data is carried directly on physical objects, bridging the world of physical and electronic information. Capture standards include barcodes and Radio Frequency Identification (RFID).

The sharing of the information that is contained and then captured is made available through numerous standards that provide the foundation for electronic business transactions and the visibility of the physical world and other information applications.

## Why businesses use standards

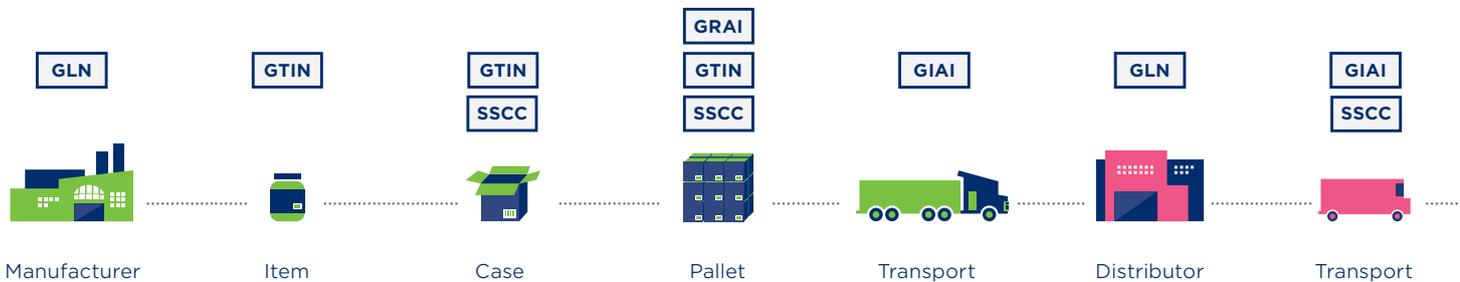
Standards are agreements that structure any activity or any industry. They may be rules or guidelines that everyone applies in the same way. They may be an agreed-upon and uniform way of measuring, describing or classifying products or services.

Well-designed supply chain standards play a critical role in day-to-day business operations because they:

- Reduce complexity between and within organisations.
- Make it easier to make the right decisions about purchasing hardware, software and equipment.
- Reduce the costs of implementation, integration and maintenance.

## IDENTIFY: GS1 standards for Identification

**GLN** Global Location Number    **GTIN** Global Trade Item Number    **SSCC** Serial Shipping Container Code    **GRAI** Global Returnable Asset Identifier



## CAPTURE: GS1 standards for barcodes and EPC/RFID

### GS1 BARCODES



## SHARE: GS1 standards for Data Exchange

**MASTER DATA** Global Data Synchronisation Network (GDSN)    **BUSINESS TRANSACTIONS** (EDI)    **PHYSICAL VISIBILITY** (EPCIS)



- Facilitate collaboration between trading partners in the supply chain to make it quicker and easier to identify items, share information, order and receive parts or ingredients from suppliers, or ship goods to customers.
- Help improve patient safety and reduce medication errors.
- Enable global traceability and authentication.

Well-designed standards are the foundation for clear, understandable exchanges that keep costs down for everyone by reducing complexity.

### Why businesses choose GS1 standards

Some companies develop their own proprietary identification, classification and data capture systems. Others use standards that are only functional within a single industry sector, or a single country.

The GS1 system of standards is:

- **Global** – No matter where in the world your business, suppliers or customers are based, GS1 standards are universal.

- **Robust** – GS1 standards have been purpose-built by industry to be extremely robust.
- **Multi-sector** – GS1 standards work within any organisation or business. They have been widely adopted by many industry sectors around the world.
- **User-generated** – All GS1 standards are built and maintained through the GS1 Global Standards Management Process (GSMP), a worldwide collaborative forum. The GSMP is a community-based forum for businesses facing similar problems to work together and develop standards-based solutions to address them. These are standards created by industry, for industry.
- **Scalable** – GS1 standards can be used by small, large or multinational companies.

Originally created by manufacturers and retailers to improve the efficiency of the distribution of food and consumer goods to supermarkets, GS1 standards are used today by more than one million companies across many industry sectors.

**GIAI** Global Individual Asset Identifier    **GSRN** Global Service Relation Number



### GS1 EPC/RFID

GS1 DataMatrix



GS1 QR Code



GS1 Composite Barcode



EPC HF Gen 2



EPC UHF Gen 2



### INTEROPERABILITY

Traceability

Product Recall/withdrawal

Pedigree

Purchase Order/despatch Advice/invoice

# Identification and capture (numbering and barcoding)

## GS1 identification keys

The GS1 Identification (ID) Keys support the identification of items, services, locations, logistic units, returnable containers, etc. If you have been assigned a GS1 Company Prefix your company can create any of the GS1 Identification Keys.

**GTIN** - Global Trade Item Number assigned to any item (product or service) that may be priced, ordered, or invoiced at any point in any supply chain. The GTIN is then used to retrieve predefined information about the item.

**GLN** - Global Location Number, the GS1 ID Key for locations. The GLN can be used to identify locations where there is a need to retrieve predefined information to improve the efficiency of communication within the supply chain.

**SSCC** - Serial Shipping Container Code, the GS1 Identification Key for an item of any composition established for transport and/or storage (logistic unit) which needs to be managed through the supply chain.

**GIAI** - Global Individual Asset Identifier, used to identify fixed assets of any value within a company that need to be identified uniquely such as a computer, a desk or a vehicle. Having a unique identifier allows a business to identify, track and manage assets across their entire life. The GIAI provides a quick way to look up an asset in a database so its use, location or state can be recorded.

**GRAI** - Global Returnable Asset Identifier, used to identify returnable assets such as re-usable transport equipment like trays, crates, pallets or beer kegs that are used and then returned to be used again. The GRAI can be used simply for asset identification and tracking purposes, or it can be part of a hiring or rental system where two or more companies collaborate, as it allows enterprises to scan assets into and out of their businesses.

**GSRN** - Global Service Relation Number, used to identify a service relationship between a business and a client, such as club membership, loyalty programs, or a patient in a hospital.



**GDTI** - Global Document Type Identifier, used to identify a document by type. The term 'document' is applied broadly to cover any official or private papers that infer a right (e.g. proof of ownership) or an obligation (e.g. call for military service) upon the bearer. Other examples of the kinds of documents that could have a GDTI are tax demands, proof of shipment forms, insurance policies, internal invoices, nationalised or standardised exams, and passports. A company or business will issue a GDTI where it is important to maintain a record of the document; the GDTI will provide a link to the database that holds the 'master' copy of the document.

**GSIN** - Global Shipment Identification Number is a globally unique number that identifies a logical grouping of logistic units for the purpose of a transport shipment that travels under the one bill of lading.

**GINC** - Global Identification Number for Consignment, identifies a logical grouping of goods (one or more physical entities) that has been consigned to a freight forwarder or carrier and is intended to be transported as a whole. A consignment can comprise one or many logistic units.

## Identification and capture of trade items at point-of-sale

To identify products and services for Point-of-Sale and/or consumption businesses use:

## The number

### Global Trade Item Number (GTIN)

- A GTIN provides a unique way to identify a trade item so it can be looked up in a database. For example, to get its price, record its sale, confirm its delivery or identify its order – and this, at any point along the supply chain and from any place in the world.
- Each trade item that is different to another is allocated its own GTIN. A trade item can be a product or service that is priced, ordered or invoiced at any point in the supply chain, whether at the checkout, in a warehouse, in an electronic catalogue or elsewhere.
- GTINs provide accuracy, speed and efficiencies to millions of companies around the world, in all areas of modern business.

The GTIN's global uniqueness is guaranteed by its structure:

- GS1 Company Prefix:** Allocated by GS1 Member Organisations to member companies enabling them to allocate GTINs.
- Item Reference:** Allocated by the company with each different product receiving a different number.
- Check Digit:** Calculated from all other digits to provide extra security.

More information of how to form a GTIN can be found at [www.gs1au.org/gtin-allocation-rules](http://www.gs1au.org/gtin-allocation-rules)

## The barcode

### EAN/UPC barcodes

If a company wants to put a barcode on a trade item that can be scanned at any retail Point-of-Sale anywhere in the world, they need an EAN/UPC barcode.

The EAN/UPC barcodes are the longest-established and most widely used GS1 Data Carriers. They are an indispensable product-marking method that is found on virtually every consumer product in the world. The 'beep' that people associate with the checkout of a supermarket is a scanning device reading the information encoded in an EAN/UPC barcode, i.e. the GTIN. These linear or one-dimensional barcodes are an optical machine-readable representation of the GTIN.

The most commonly used EAN/UPC barcodes are:

- **EAN-13 which encodes a GTIN-13**
- **EAN-8 which encodes a GTIN-8** (for small items only - these are allocated directly by GS1 Australia)
- **UPC-A which encodes a GTIN-12** (for use in North America)

#### Benefits:

- Omnidirectional scanning – an EAN/UPC barcode can be passed in front of a barcode reader at a Point-of-Sale right-side up or upside-down, and it will still 'beep' properly.
- It is a quick and efficient data carrier for high-volume scanning situations like supermarkets.

Example of a GTIN-13 represented in an EAN-13 barcode



Example of a GTIN-8 represented in an EAN-8 barcode



## GS1 DataBar

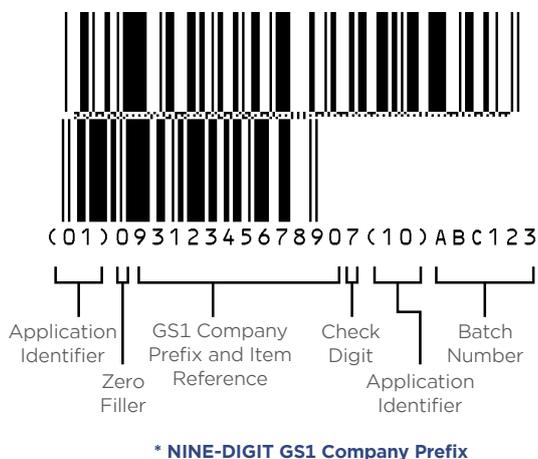
GS1 DataBar barcodes are often used to label fresh foods.

GS1 DataBar can carry more information on smaller items than EAN/UPC barcodes and can also be scanned at retail Point-of-Sale.

- GS1 DataBar enables GTIN identification for fresh variable-measure and hard-to-mark products like loose produce, jewellery and cosmetics.
- GS1 DataBar can carry additional information such as serial numbers, batch numbers, and expiration dates, creating solutions to support product authentication and traceability for fresh food products.

The decision about whether to use GS1 DataBar or not will be left to the brand owner (the organisation that owns the specifications of the trade item), as it is not obligatory to replace EAN/UPC barcodes where they work today. The decision to move to GS1 DataBar should be based purely on business requirements.

### GS1 Databar Expanded Stacked



# Identification and capture of trade items other than at point-of-sale

## The number

### Global Trade Item Number (GTIN)

Provides a way to uniquely identify a trade item so it can be looked up in a database. For example, to get its price, record its sale, confirm its delivery or identify its purchase - at any point during the supply chain and from any place in the world.

## The barcode

### The GS1-128 barcode

GS1-128 cannot be used on items crossing a retail Point-of-Sale.

GS1-128 barcodes can carry all GS1 Identification Keys, as well as additional information like serial numbers, expiry dates and variable measure information.

The GS1-128 barcode plays an important role in product traceability - a transport label with a GS1-128 barcode is the centrepiece of any global standards based tracking and tracing system.

### Additional information

The GS1-128 allows additional information or attribute data to be included in a standard format in the barcode through the use of Application Identifiers (AIs).

AIs act as flags to the scanner that a specific type of attribute data will follow. This ensures that the attribute data encoded by one company can also be scanned and interpreted by any other company in the supply chain.

Each AI is a two, three, or four-digit prefix that defines the meaning and format of the data following it.

A complete list of AIs is available on the GS1 Australia website [www.gs1au.org/application-identifiers](http://www.gs1au.org/application-identifiers)

**Benefits:**

- GS1-128 is adaptable to a wide variety of needs and uses.
- It can be read with a variety of commercially available scanners.
- It is a linear symbol that is more compressed than other linear technologies.

**The ITF-14 barcode**

ITF-14 barcodes only encode GTINs. They cannot be used to identify items that will cross a Point-of-Sale and they are usually used for trade items where printing directly onto corrugated cartons is required.

**Benefits:**

Maximum legibility on corrugated cardboard.

GS1-128 barcode



(01)19312345678904



ITF-14 barcode



19312345678904



All measurements and diagrams are for illustration purposes only and not to scale or intended to be scanned.

# Two-dimensional barcode system

The GS1 system supports the use of two-dimensional Barcodes for specific application use as defined by the GS1 standards.

The two available symbols are:

- **GS1 DataMatrix**
- **GS1 QR Code**

Both symbols allow for a lot of information to be encoded in a compact space.

These symbols are not currently intended to be used in high-volume omnidirectional retail Point-of-Sale environments as they require reading systems that use camera based scanners.

GS1 DataMatrix can be used to apply markings directly to objects by etching and laser-engraving directly onto the surface of an item.

GS1 DataMatrix has been identified by the global Healthcare community as its preferred symbol for use in the long term as it can support the use of the Application Identifier (AI) standard thus allowing for batch, serial and expiry date information to be encoded in a small symbol. This supports its use on medical devices, such as surgical instruments facilitating improved tracking and tracing in hospitals.

Both GS1 QR and GS1 DataMatrix symbols have been identified for use in the identification of a GTIN and URL on a consumer product for consumer scanning.

GS1 QR Code was recently introduced to the GS1 family. It is an alternate 2D barcode specifically for the purpose of capturing a URL for a product, in conjunction with its GTIN. Contact GS1 Australia for further information.

Symbol of a GS1 DataMatrix



Example of a GS1 QR code symbol



The square form is the most commonly used and enables the encoding of the largest amount of data according to ISO / IEC 16022 Information Technology

# Identification and capture of logistic units

## Serial Shipping Container Code (SSCC)

- A GS1 ID key used to identify individual logistic units. A logistic unit can be any combination of units put together in a carton, in a case, on a pallet or on a truck, where the specific unit load needs to be managed through the supply chain.
- The SSCC enables a unit to be tracked individually, providing benefits for order and delivery tracking and automated goods receiving.
- The serial reference component of the SSCC provides significant number capacity, simplifying number allocation and guaranteeing unique identification.
- The SSCC can be used as a look-up number to provide not only detailed information regarding the contents of the load, but also as part of an Advanced Shipping Notice (ASN) or Despatch Advice message.
- With an SSCC, a company can reliably look up details about complex loads without the sender having to encode long consignment information on individual logistic unit labels.

The SSCC links barcode or GS1 EPC/RFID tag information to electronic communications about a logistic unit. Its structure is:

- Extension Digit:** Allocated by the user to increase capacity
- GS1 Company Prefix:** Allocated by GS1 Member Organisations to member companies enabling them to allocate SSCCs
- Serial Reference:** Allocated by the creator of the logistic unit with each logistic unit receiving a different number
- Check Digit:** Calculated from all other digits to provide extra security

The Application Identifier (AI) 00 is always used in front of an SSCC but is not part of it. Its function is to alert the scanner software that the data that follows is an SSCC.

An SSCC is represented in a GS1-128 barcode. Other information beyond the SSCC can also be encoded on a logistics label. This should be in a separate GS1-128 barcode on the same logistics label.

Each individual logistic unit is allocated a unique number which remains the same for the life of the logistic unit. When assigning an SSCC, the rule is that an individual SSCC must not be reallocated within one year of the shipment date from the SSCC assignor to a trading partner. However, prevailing regulatory or industry organisation specific requirements may extend this period.

Example of Serial Shipping Container Code (SSCC)



Example of GS1 Logistics Label

GS1 BEAN FACTORY	
SSCC	393123450000000037
ITEM NO.	09312345000005
USE BY (ddmmyy)	22/01/06
QUANTITY	20 Cases
BATCH	2468

(02)09312345000005(17)060122(10)2468(37)20

(00)393123450000000037

## Global Shipment Identification Number (GSIN)

The GSIN is a number assigned by a consignor (seller) of the goods (it can be referenced on the despatch advice and/or bill of lading). It identifies a logical grouping of logistic units each identified with its own SSCC. It may be used by all parties in the transport chain as a communication reference, e.g. in EDI (Electronic Data Interchange) messages where it can be used as a shipment reference and/or a consignor's lading list.

An individual GSIN must not be reallocated within 10 years of the shipment date from the seller or third party logistics provider (sender) of the GSIN to a buyer (recipient) to comply with the regulations of the World Customs Organisation. For goods that circulate within one country (domestic transport) the period of re-use is based on either governmental or industry guidelines or the discretion of the seller (sender) of the goods.

## Global Identification Number for Consignment (GINC)

The GINC identifies a logical grouping of goods (one or more physical entities) that has been consigned to a freight forwarder and is intended to be transported as a whole. The GINC is assigned by the freight forwarder (or carrier acting on behalf of a freight forwarder or a consignor, but only if the prior agreement of the freight forwarder is given).

An individual GINC must not be reallocated within one year of the shipment date from the freight forwarder assigning the GINC to a transport. Prevailing regulatory or industry organisation specific requirements may extend this period.

# Identification of locations

## Global Location Number (GLN)

A GLN provides the unique and unambiguous identification of any locations used in business process. Identification in this manner is a prerequisite for efficient communication between trading partners.

The GLN provides a unique and unambiguous identification of:

- **Physical Locations** – A site (an area, a structure or group of structures) or an area within the site where something was, is or will be located.
- **Digital Locations** – Representing an electronic (non-physical) address that is used for communication between computer systems.
- **Legal Entities** – Any business, government body, department, charity, individual or institution that has standing in the eyes of the law and has the capacity to enter into agreements or contracts.
- **Functions** – An organisational subdivision or department based on the specific tasks being performed, as defined by the organisation.

The GLN is an ISO-compliant identifier whose global uniqueness is guaranteed by its structure:

- a. **GS1 Company Prefix:** Allocated by GS1 Member Organisations to member companies enabling them to allocate GLNs.
- b. **Location Reference:** Allocated by the location owner with each different location receiving a different number.
- c. **Check Digit:** The last digit calculated mathematically to provide extra security.



# Identification of assets, services and documents

## Assets

The object of asset identification is to identify a physical entity as an inventory item. Each company holding a GS1 Company Prefix may assign asset identifiers to the assets supplied to their customers.

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

### Global Returnable Asset Identifier (GRAI)

A returnable asset is a reusable package or transport equipment of a certain value. The GRAI enables tracking as well as recording of all relevant data.

### Global Individual Asset Identifier (GIAI)

In the GS1 system, an individual asset is considered a physical entity made up of any characteristics. The GIAI is used for the unique identification of individual assets to provide a means to store relevant data. The exact method used to allocate the GIAI is left to the discretion of the issuing organisation. However, each GIAI must be unique for each individual asset being identified.

## Services

Examples of services relationships that can be identified are:

- Membership in a frequent flyer program
- Membership in a loyalty scheme
- Membership in a club
- Identifying patients in hospitals

### Global Service Relation Number (GSRN)

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

## Documents

Examples of documents that could be identified are:

- Land registration papers
- Tax demands
- Proof of shipment/receipt forms
- Customs clearance forms
- Insurance policies
- National press documents
- Educational papers
- Transport company documents

### Global Document Type Identifier (GDTI)

The GDTI is used to identify a document type with an optional serial component.



# Radio frequency identification

## GS1 EPC/RFID

This is a global standards system that combines RFID (Radio Frequency Identification) technology, existing communications network infrastructure and the EPC (Electronic Product Code). EPC is a number for uniquely identifying an item to enable immediate and automatic identification and tracking through the whole supply chain globally, resulting in improved efficiency and visibility of the supply chain.

## RFID standards make trading a better experience for everybody

GS1 EPC/RFID tags use Radio Frequency Identification technology to encode GS1 ID Keys in the GS1 EPC. They also enable the GS1 EPCIS Communication Standard.

RFID tags consist of a microchip (tag chip) connected to an antenna. The tag chip uses the antenna to receive commands from an RF reader (or interrogator) and then sends back a response. In addition the tag chip can store relevant product data (including the EPC) and that data is sent back to a reader antenna by means of electromagnetic waves. Since these waves can pass through most non-conductive solid materials, the chips may be shielded by adhesive film or integrated directly inside the packaging or product.

### Benefits:

- GS1 EPC/RFID tags encoding the GS1 Identification Keys offer significant time-savings.
- Since readers are usually fixed when the GS1 EPC/RFID tags are read, their location at that instant of time is known, resulting in optimised time-management.



# How to obtain barcodes

If your business needs barcode numbers you can join GS1 online at [www.gs1au.org/our-services/numbering-and-barcodes/join-gs1](http://www.gs1au.org/our-services/numbering-and-barcodes/join-gs1)

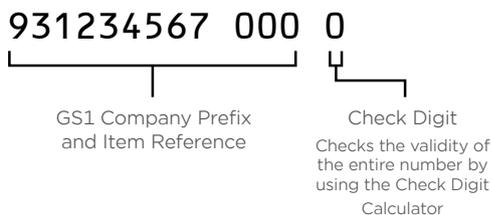
## Four steps to applying a GS1 barcode

### Step One

#### Retail Items (also referred to as POS and Consumer Items)

List your retail item/s and create a retail barcode number GTIN (Global Trade Item Number). Retail items commonly use a GTIN-13.

ITEM	PACKAGING	GTIN-13
Coloured Hair Conditioner	Bottle of 250ml	9312345670000



Barcode your retail item/s with an EAN-13 barcode representing the GTIN-13.

#### EAN-13 barcode



#### Check digit calculator

Before printing your barcode, make sure the Check Digit has been correctly calculated. The Check Digit, the last number of the barcode, is calculated by following a simple formula and exists as a 'security check' for the scanner. Without the correct Check Digit the scanner will not accept the barcode.

To assist you with the Check Digit Calculator please call our Customer Support on **1300 BARCODE** (1300 227 263) or visit [www.gs1au.org](http://www.gs1au.org)







## Step Two

### Barcode specifications

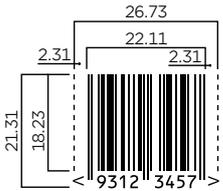
Physical requirements such as size, height, colour and location are very important. Barcodes that do not comply cause inefficiency in the supply chain as they do not scan reliably.

### Size

There are specific ranges for all barcodes. If the barcode is not the right size, the scanner simply cannot read the bars and register the number. Make sure your barcodes fit the size requirements for its magnification before placing it on your product.



Example of a nominal size (100%) **EAN-13** barcode



Example of a nominal size (100%) **EAN-8** barcode



Example of a nominal size (100%) **UPC-A** barcode



Example of a 100% **GS1-128** barcode



Example of a 100% **ITF-14** barcode

All measurements and diagrams are for illustration purposes only and not to scale.

## Height

Cutting the barcode height to fit in with package design is not recommended due to the scanning problems it causes.



## Colour

It is vital that the colour of the barcode and its background are recognisable by a scanner. A dark barcode on a light background is essential for scannability.



## Location

The location of the barcode on your product must be taken into consideration in your overall product design. GS1 Australia has a set of recommendations. However, the product must be considered in its final form before the barcode can be applied. Seams, seals, additional labels, corners, overlapping materials etc, can infringe on a barcode and make it illegible to the scanner. Pallets (and any other logistic units) also have location requirements. For more information refer to the GS1 General Specifications.



## Quiet Zones

To read a barcode correctly, a scanner must be able to clearly read where the barcode starts and finishes. Areas to the left and right of the barcode must be kept clear of obstructions that may cause scanning difficulties.



## Step Three

### Printing the barcode

Once your barcode has the correct size, height, colour and location, it is then just as important to ensure the barcode is not smudged or blurred. The barcode must show crisp, clear, well-defined bars. Imperfections in the barcode will confuse the scanner and will make your barcodes illegible.

Lists of companies able to print barcodes for you or that can supply the equipment or software to print barcodes are shown in the Alliance Partner Directory on the GS1 Australia website at [www.gs1au.org/solution-providers](http://www.gs1au.org/solution-providers)



## Step Four

### Barcode quality testing

Many major retailers will require you to show evidence of a GS1 Barcode Check for your barcodes. Without evidence of a successful test your product may be rejected or you may be required to re-label it before acceptance. Whichever sector you supply, a verification test is a wise precaution to ensure that your customers will not be disappointed with your product when they receive it.

### Customer support

To assist you through the process and to answer any of your questions, the GS1 Australia Customer Support is available between 8:30am and 5:30pm AEST Monday – Friday (excluding public holidays) on **1300 BARCODE** (1300 227 263). Alternatively, visit our website [www.gs1au.org](http://www.gs1au.org)

## About GS1 Australia

GS1 Australia is the leading provider of standards and solutions for over 20 industry sectors. We introduced barcoding to Australia in 1979 and today we enable more than 17,000 member companies, of all sizes, to become more efficient by implementing the GS1 system.

We bring businesses, associations and industries together. This blended community comes to GS1 Australia for advice, networking and solutions to their supply chain challenges.

We partner with, and help showcase, members, solution providers and industry leaders to demonstrate and encourage supply chain best practice.

We offer a range of value adding services that support our members through their journey including consulting, solution selection and compliance.

GS1 Australia makes a real and tangible difference to businesses. We are integral to your supply chain success.

### GS1 Australia

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