GS1 Australia

The Global Language of Business

Building and Construction

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1. Background

Several actors in the Building, Construction and Facility Management sector gave GS1 Norway the task of developing a Guideline for unique identification and labelling/tagging of products, including the use of GS1 DataMatrix barcodes and RFID. GS1 Australia and buildingSMART believes these Guidelines have relevance to the Building, Construction and Facility Management sector in Australia and other countries around the world. GS1's open global standards shall be used for the tasks covered in this Guideline.

This Guideline contains the primary activities and instructions for assigning and proper use of GTIN and SGTIN (Serialised GTIN). In addition, this document explains how labelling with GS1 DataMatrix barcode and tagging with GS1's standard for EPC/RFID Gen2 UHF RFID chips should be conducted by a manufacturer/ supplier for its products. More information about EPC/ RFID Gen2 is in the Reference list in chapter 10.

Products exist in numerous variants regarding shape, size and performance. Thus, this Guideline provides only general instructions. This Guideline provides advice and tips that are useful to take into consideration when identifying and labelling/tagging products.

2. Purpose and application for unique ID and labelling / tagging of products

Unique identification and labelling/tagging of products is a very important and prioritised area for the Building, Construction and Facility Management sector. The purpose of unique identification and labelling/tagging is to ensure that product and information flow in value chains become easier, faster and safer, thus contributing to effective construction site logistics as well as Management, Repair and Operations (MRO). This will result in reduced costs for all actors in the value chain.

Unique identification and labelling/tagging shall be used by manufacturers and suppliers of building and construction products, and must be used throughout the value chain for efficient logistics and traceability of products and deliveries. Suppliers must therefore take actions and apply solutions that enable them to label their products according to GS1's standards for identification, labelling/tagging and traceability.

3. Allocation of GTIN and SGTIN (Serialised GTIN)

3.1 Subscription of GS1 Company Prefix (GCP)

The allocation of GTIN and SGTIN requires a GS1 Company Prefix (GS1 GCP) subscription. This allows for unique identification of products. When applying for a GS1 Company Prefix (GCP) from GS1 Australia, unless otherwise specified, you will receive a GS1 GCP with a capacity based on the level of membership (typically 10,000 to 100,000 numbers which can be assigned to different types of products). Different units of the same identical product may be identified with serial numbers. For more information about application of GS1 GCP from GS1 Australia, see the Reference list in chapter 10.

3.2 Allocation of GTIN and serialisation

A product, for which it is required to know predefined information, has to be uniquely identified to make this possible. For this purpose, GTIN (Global Trade Item Number) is used.

Identification and labelling/tagging of products enable automation of processes such as production, inventory management, shipping and goods receipt. This is also used for internal logistics at construction site, for assembly and in MRO throughout the life time of the building.

It is the individual manufacturer or brand owner who is responsible for subscribing to a GS1 Company Prefix and assign GTIN to their products. GS1 has guidelines that help avoid duplicates and reuse of GTINs. Each product that is different from another in design and/or content is assigned a unique GTIN. This remains the same as long as the product exists. The same GTIN is assigned to all identical products.

The Serialised Global Trade Item Number (SGTIN) is an add-on to GTIN that allows you to individually identify different units of the same product. A GTIN itself does not provide unique identification of each unit of a product because it does not uniquely identify each instance of a physical object.

GTIN identifies a specific group of identical products (single SKU), while SGTIN identifies each unit of identical products using serial numbers. E.g. a light fixture has a GTIN, and to distinguish between two identical light fixtures, they must have their own SGTIN.

There is a set of rules and regulations (GS1 GTIN Management Rules) for how to manage GTINs. When making changes to a product this would in many cases lead to the assignment of a new GTIN. Also, it is forbidden to reuse a GTIN previously used, even if that product is no longer available.

3.3 Use of GS1 AIs for encoding data elements

GS1 Application Identifiers (AI) are numeric prefixes used in barcodes and EPC/RFID tags to define the meaning and format of information elements. The use of AIs makes it possible to distinguish different information elements from one another in a barcode or Electronic Product Code-enabled Radio Frequency Identification (EPC/RFID) tag. In the human readable text underneath the barcode, these appear as parentheses and the content of the individual AI follows. In an EPC/RFID tag, an AI is used to identify what information is entered into the chip's user memory. A GS1 approved barcode or an EPC Gen2 RFID chip is required for the use of AIs.

For example, AI (240) - Additional Data, can be used for TFM number.

GS1 has defined over 100 AIs. Each Application Identifier is by default a two, three or four-digit number. For the full list of GS1 Application Identifiers and their definitions, see section 3.2 of the GS1 General Specification. For more information, see the Reference list in Chapter 10.

GS1 DataMatrix barcode:

When encoding a GTIN + Serial Number, an SGTIN, with a 2D barcode, it is the GS1 DataMatrix barcode symbology that shall be used. This requires the use of AIs (Application Identifiers). These are used for the systems to understand which information elements are contained in the barcode.

EPC Gen2 RFID tags:

The information in an AI is stored in EPC User Memory of the RFID tag, together with the information element (i.e. batch/lot no.). The software application will then be able to extract the right information elements from User Memory.

3.4 Structure of GTIN and SGTIN in a barcode and EPC/RFID Gen 2V2 RFID tag

The structure of the GTIN content is slightly different depending on whether it should be placed in a GS1 DataMatrix barcode or in an EPC RFID tag. Common to both is the GS1 Company Prefix with country code and Item Number assigned to each product by the manufacturer.

Here is the structure of the GTIN content in a barcode:

If you are using SGTIN, AI (Application Identifier) 21 is used to encode the serial number. This is explained in chapter 4.1. Serial number cannot exceed 20 digits/alphanumeric characters.

In an RFID tag, only SGTIN (not GTIN without serial number) is used

In a barcode, you can have up to 20 alphanumeric characters in the serial number. If you are using the SGTIN-96 in an RFID chip, you have a restriction. The serial number must be numeric and cannot exceed 12 digits, with 274,877,906,943 as the highest value. Therefore, it is important to relate to the limitations in the RFID chip when allocating serial numbers and not use alphanumeric characters or exceed the maximum allowable value. If you need alphanumeric characters in the serial numbers, SGTIN-198 must be used. This means that you must use RFID tags with higher capacity in the EPC memory, than if you use the SGTIN-96. The SGTIN-96 is sufficient if you only have digits, and not alphanumeric characters in the serial number.

Data structure SGTIN-96		
EPC SGTIN-96	**Value (decimal)**	**Comment**
Header	48	Number for SGTIN-96
Filter value	1, 7*	1 = Consumer Unit (CU) - (installed product) (POS Trade Item) 7 = Unit inside a Consumer Unit (CU) that is not intended for individual sales
Partition	3, 5 or 6	3 = GS1 GCP of 9 digits and 4 digits in indicator + item number 5 = GS1 GCP of 7 digits and 6 digits in indicator + item number 6 = GS1 GCP of 6 digits and 7 digits in indicator + item number Check digit is removed from GTIN-13 and a 0 (zero) is entered in front of the item number For GTIN-14 the check digit is removed and indicator (extension digit) is entered in front of the item number.
GS1 Company Prefix (GS1 GCP)	N..9	GS1 GCP; 6, 7, or 9 digits
Item number	N..7	Depending on the number of digits in GS1 GCP. 3, 5, or 6 digits
Serial number	N..12	Up to 12 digits (highest allowable value = 274,877,906,943) A fixed number of digits is chosen for serial number, it must not be 12 digits. You choose as many as needed. Leading zero is not allowed

*Other filter values exist, but they are not relevant for this Guideline

Data structure SGTIN-198		
EPC SGTIN-198	**Value (decimal)**	**Comment**
Header	54	Number for SGTIN-198
Filter value	1, 7*	1 = Consumer Unit (CU) - (installed product) (POS Trade Item) 7 = Unit inside a Consumer Unit (CU) that is not intended for individual sales
Partition	3, 5 or 6	3 = GS1 GCP of 9 digits and 4 digits in indicator + item number 5 = GS1 GCP of 7 digits and 6 digits in indicator + item number 6 = GS1 GCP of 6 digits and 7 digits in indicator + item number Check digit is removed from GTIN-13 and a 0 (zero) is entered in front of the item number For GTIN-14 the check digit is removed and indicator (extension digit) is entered in front of the item number.
GS1 Company Prefix (GS1 GCP)	N..9	GS1 GCP; 6, 7, or 9 digits
Item number	N..7	Depending on the number of digits in GS1 GCP. 4, 6, or 7 digits.
Serial number	X..20	Up to 20 alphanumeric characters.

*Other filter values exist, but they are not relevant for this Guideline

(01) 09312345678907
(17) 211231
(10) BL998254
(21) SN4792146874

Example of a GS1 DataMatrix barcode with GTIN and additional information:

AI 01 = GTIN
AI 17 = Expiry date
AI 10 = Batch/lot number
AI 21 = Serial number

The GTIN in this example consists of 09312345678907
0 = Indicator (GTIN-14 extension digit)
93 = Country Code (In this example Australia)
12345 = GS1 Company Prefix
67890 = Item number
7 = Check digit (calculated using Check Digit Calculator)

Contact your system integrator to assist you in setting up the system for identification and labelling with barcodes and programming of RFID tags.

Example of data string in an EPC/Gen2 RFID chip:

urn:epc:tag:sgtin-96:1.9332402.026591.1234567890

The data string consists of:

urn:epc:id = URI (Uniform Resource Identifier) sgtin-96 = GS1 ID key 1 = Filter value (in this example Consumer Unit (CU)) 9332402 = GS1 GCP (GS1 Company Prefix) 023591 = Indicator and Item number 1234567890 = Serial number

The partition value indicates where the . (dot) should be placed and split the string between GCP and item number.

The Check digit is not included in the EPC code in an RFID tag

A new . (dot) distinguishes between the GTIN and the Serial number

The additional information in the barcode is placed in the User Memory in the RFID chip and appears as follows:

AI 240 - ADDITIONAL ID 442.001-UP00 AI 91 - INTERNAL 3vHSn0oT0Hsm00051Mm0081T

4. Labelling of GS1 DataMatrix 2D barcode

4.1 GS1 DataMatrix 2D barcode

When encoding a GTIN + Serial Number, an SGTIN, with a 2D barcode, the GS1 DataMatrix barcode symbology shall be used.

This requires the use of AIs (Application Identifiers). These are used for the systems to understand which information elements are contained in the barcode when you have more information elements in the same barcode.

There are other types of 2D barcodes, e.g. QR. We recommend using GS1 DataMatrix, this is a more robust code and has more error correction. The GS1 DataMatrix is also more suitable for DPM (Direct Part Marking).

It is important that the barcode you use is a GS1 barcode. This applies regardless of whether you use GS1 QR or GS1 DataMatrix. There is a difference between QR and GS1 QR, and between DataMatrix and GS1 DataMatrix. If you do not use GS1 barcodes, the data content will not be interpreted correctly, and the use of Application Identifiers will not be possible.

4.2 Size of the barcode

The physical size of the barcode varies with the amount of information contained in it. The barcode resolution (X-dimension) must be at least 0.38mm and maximum 0.45mm depending on the scanning environment.

4.3 Quality of the barcode and desired length of life

2D barcodes are verified according to the ISO/IEC 15415 standard. This is an international standard that describes the quality of barcodes and how easily readable they are. Highest grade is 4.0/20/660. The minimum requirement is 1.5/20/660. The numbers indicate; quality character/aperture/wavelength of the light that illuminates the barcode.

The length of life of a barcode depends on the type of label material used and where/how the label is placed on the product. Label material must be chosen that has at least as long length of life as the estimated durability of the product to be labelled.

4.4 Placement of the barcode on the product

If the barcode is normally used after assembly of the product, it should be placed in a way to make it readable without the need to disassemble the product. The barcode must be placed in such a way that it is not exposed to external abuse which may cause it to be damaged. Should the barcode be used for MRO, it should be placed in such a way that it will not be coated by paint or similar or otherwise covered to make it unreadable.

4.5 Readability of the barcode

The readability of the barcode is dependent on barcode size, type of barcode reader, and distance from barcode to barcode reader. If the requirements of section 5.2 and 5.3 is met, this is according to industry standard and barcodes are readable at normal distance with normal equipment.

5. Tagging with EPC/RFID Gen2 UHF RFID chip

5.1 Structure / content in the RFID chip

This Guideline is based on EPC/RFID Gen2 Radio protocol that specifies physical data transfer between an RFID chip and an RFID reader with commands for controlling the RFID reader relative to the RFID tags. EPC/RFID Gen2 is an ISO standard and covers functionality such as security and extended user memory.

GS1 has published TDS (Tag Data Standard) that defines the EPC code and link to the various GS1 identification standards, such as GTIN. TDS specifies the data content in EPC Gen2 RFID tags. It is fully possible to use EPC/RFID Gen2V1.2.0 and EPC/RFID Gen2V2 in the same system. For more information, see the Reference list in chapter 10.

The RFID tags content can be created from, for example, a GTIN. The serial number is the only element missing when you already have a GTIN. This can either be created entirely independently of the existing information architecture of the manufacturer. Or based on continuation of numerical or alphanumeric existing serial numbers that, together with GTIN, become a globally unique SGTIN. See example in the table below:

Typical new serial number			
Elements		**Example**	
GTIN serial number	1234567891234 (GTIN-13) i.e. GS1-128 or GS1 DataMatrix (01)1234567891234	Serial number = [previous] +1 = 2	
Pure Identity	urn:epc:id:sgtin:1234567.089123.2		A full independent ID representation where all barcodes, RFID tags, GS1 DataMatrix codes and similar can be programmed and read from
PureID -> RFID	TAG SIZE = size of memory of the tag. Usually 96 bit, but sometimes more		The RFID tags need the following additional information to convert to what's actually inside an RFID chip (1's and 0's)
RFID	30144B5A1C5708C000000002		(96 bit RFID tag with the value 2 in the serial number)

Typical conversion from existing serial number with numeric content			
Elements		**Example**	
GTIN serial number	1234567891234 (GTIN-13) i.e. GS1-128 (01)01234567891234	Serial number 12334	Typical new serial number, possibly existing alphanumeric number
Pure Identity	urn:epc:id:sgtin:1234567.089123.12334		A full independent ID representation where all barcodes, RFID tags, GS1 DataMatrix codes and similar can be programmed and read from
PureID -> RFID	TAG SIZE = size of memory of the tag. Usually 96 bit, but sometimes more		The RFID tags need the following additional information to convert to what's actually inside an RFID tag (1's and 0's)
RFID	30144B5A1C5708C00000302E (96 bit and 12334 in the serial number)		

Typical conversion from existing serial number with numeric content			
Elements		**Example**	
GTIN + serial number	1234567891234 (GTIN-13) i.e. GS1-128 (01)01234567891234	Serial number ab23vw	
Pure Identity	urn:epc:id:sgtin:1234567.089123.ab23vw		A full independent ID representation where all barcodes, RFID tags, GS1 DataMatrix codes and similar can be programmed and read from
PureID -> RFID	TAG SIZE = size of memory of the tag. Usually 96 bit, but sometimes more		The RFID tags need the following additional information to convert to what's actually inside an RFID tag (1's and 0's)
RFID	36144B5A1C5708F0E269D BB8000000000000000000000000 (198 bit and ab23vw in serial number)		Notice: There will be slightly lower performance on a tag with higher capacity due to the need of more data to be transferred

The following table gives a simple overview of some of the main differences between EPC Gen 2V1.2.0 and EPC Gen2V2					
EPC Gen 2 Air Interface	**Read rate**	**Reading distance**	**Safety**	**User Memory**	**Traceability**
EPC Gen 2V1.2.0	<3-400 RFID tags/sec.	5 - 10 m	Possibility of locking using password or permanent locking, "permalock"	OK, From 32 bit to 32 kilobit size	Traceable
EPC Gen 2V2	500 RFID tags/sec.	20 m	Locking using password and permalock. Optional RFID chip functionality to support data encryption and/or concealing of data	From 32 bit to 32 kilobit size Extended file management functionality	Can be set to "Untraceable"

The following guidelines apply when tagging with RFID tags:

- EPC Gen2V2 RFID tags are used as default
- EPC Gen2V1.2.0 RFID tags can be accepted
- EPC Gen2V2 RFID tag must be used for additional requirements, such as "Non-Traceable" or Encryption of the RFID tag content

Storing user information in the RFID tag is done in User Memory.

User Memory is available in both EPC Gen2V1.2.0 and EPC Gen2V2, but there is extended functionality in V2. In V2 User Memory can be divided into files, and each file can be defined with attributes for reading, writing or locking each file. GS1 AI's must be used when the requirement indicates to do so. GS1 AI's is used to specify what is entered in User Memory for both V1.2.0 and V2. User Memory in an RFID tag can be used to enter data such as service log and alternative identifiers for the product. It must be programmed in the control section of the RFID tag that User Memory is used. This is done by the application that is used to program the RFID tags.

There are currently RFID tags with User Memory up to 32kb, which is relatively ample storage. If a lot of data is to be read by the RFID reader from an EPC Gen2 RFID tag, this may affect reading time. It must therefore be tested to quality assure functionality. This is important in use cases where multiple objects tagged with RFID are to be read at the same time.

The RFID tag information content in User Memory may be updated after assembly of the product. For more information, see the Reference list in chapter 10.

5.2 Enhanced User Memory

EPC Gen 2V2 contains Enhanced User Memory and has 16 alternative custom features that are associated with the RFID chip itself. Choosing the different options also affects the price of the RFID Chip/Tag. For example, it may be necessary to store more information in User Memory in an improved way, but where encryption is not required. In essence, Enhanced User Memory has the following main functionality compared to regular User Memory:

- The RFID chip User Memory is divided into several areas
- Access rights are controlled by means of read, write and lock for each file.
- Electronic maintenance log

User memory is used to enter required additional information. The information can be inserted into the tag at any time, either in production, assembly or in a maintenance / operational situation. Examples of information that can be entered are: TFM, GUID or any other desired information. You must use a defined GS1 application identifier (AI) to add structured information into User Memory.

5.3 Alternative types of RFID tags

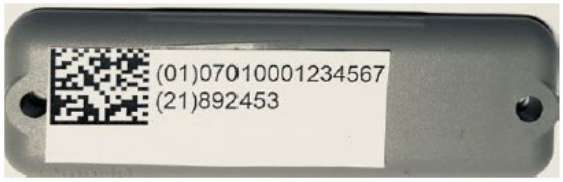
There are many different suppliers of UHF RFID tags on the market and for various purposes. An important component of an RFID tag is the microprocessor (Chip). For example, there are special RFID tags suitable for attachment on metal surfaces.

For Building, Construction and Facility Management, there will be a need for UHF RFID tags that can:

- Be attached to different kind of metal surfaces
- Be attached to glass surfaces
- Be embedded inside concrete structures or attached on concrete surfaces
- Be inserted in door-, window frames, etc.

An RFID tag is affected by the material on which it is attached and the materials it is surrounded by. The RFID tags selected must be adapted to the product the RFID tags are to be attached to.

There are several RFID tag suppliers that specialise in solutions for Technical Industries. For Building, Construction and Facility Management, it will be appropriate to attach a label containing a GS1 DataMatrix barcode to the RFID tag itself where this is possible. This may require the design of the chip to ensure satisfactory readability of the barcode.



This RFID has a tag label with a GS1 DataMatrix 2D barcode attached to it

5.4 The length of life of the RFID chip

Passive RFID tags have a standard lifetime limitation of 50 years. If the RFID tag is reprogrammed the length of life is expanded with another 50 years. This is related to the characteristics of Flash Memory and its ability to store information.

5.5 Placement and fastening / mounting of the RFID tag

The manufacturer or supplier must label/tag the products, and it is important that they know the scope of the products to determine how the labelling/tagging is to be performed.

If the item's RFID tag is readable through the packaging, the packaging is labelled with barcode only.

If the item's RFID tag is not readable through the packaging, external packaging must also be tagged with an RFID tag. This also applies if it is a multi-pack and all items cannot be read through the packaging. This must be tested by the manufacturer/supplier before the products are shipped to the customer.

It is important to test readability to ensure that surrounding metals or other objects will influence the reading and cause problems.

The RFID tag with the GS1 DataMatrix barcode must be installed either by the manufacturer as a part of the manufacturing process or by the supplier who receives products from other manufacturers before shipping to the end user. This includes the assignment of SGITN to the product by the manufacturer and/or the supplier. The manufacturer and /or the supplier must create the GS1 DataMatrix barcode, and program the content in the memory of the attached RFID tag. The label with the GS1 DataMatrix barcode must also be attached to the RFID tag, if applicable.

For some products, it may be appropriate to label the product only with the GS1 DataMatrix barcode. If a product is of a design and/or size that tagging with an RFID tag is not possible. Suppliers and system integrators of RFID and barcode solutions can assist in this context.

If the RFID tag should be used after installation for MRO purposes, it should be mounted in a way that it is readable without the need to disassemble the product.

Examples of placement:

- On doors, the frame is tagged as close to the upper corner as possible on the side where the door is hinged
- Windows are tagged in the frame as near the lower right corner (seen from the inside of the window) as possible

5.6 Security / Encryption of content in the RFID tag

EPC UHF Gen2V2 Air Interface Protocol is the latest version that provides enhanced security and encryption of information contained in the RFID tag.

- Non-Traceable (Non-Traceable in the value chain)

Non-Traceable functionality generally includes options for concealing parts of the contents of the various memory banks in the RFID tag, such as User Memory. In addition, the RFID reader's reading distance can be adjusted in the RFID reader software.

- Securing that the product is authentic

In several contexts, it is necessary to ensure that the product is authentic. Upon reading of the RFID tag's EPC code, it can be checked against the company's systems. This is very important for many industries.

Regarding security requirements that may be utilised in relation to the content of the RFID tag, a separate Guideline will be developed which describes functionality, applications and layout.

6. Data capture

6.1 Data capture using DataMatrix barcode readers

There are many suppliers of barcode readers on the market. The most important is to choose a barcode reader that is optimal in terms of the type of barcode to read, the size of the barcode, and the distance you want to read the barcode on.

6.1.1 DataMatrix reading equipment

To read a GS1 DataMatrix barcode, an image reader is required. This is an image capturing device, like a camera that captures the barcode and decodes the barcode content with software. Since the camera in these barcode readers is not of the same quality as the camera in a mobile phone. Therefore, a mobile phone cannot be used as a confirmation of the quality and whether a barcode is readable or not.

6.1.2 Reading distance

The readability of the barcode depends on the barcode size and the type of barcode reader you use. A rule of thumb is; The larger the barcode, the easier it is to read it from a distance.

6.2 Data capture using RFID readers

6.2.1 RFID readers and equipment

There are many different providers of RFID readers, RFID antennas and software, and UHF RFID readers are available that can be connected to smart phones and tablets via Bluetooth protocol.

There are a variety of portable RFID readers that also read barcodes, and there are stationary RFID readers that can be connected to multiple RFID antennas to cover a larger physical area. RFID readers can be built into portals, and they can be attached to fork lifts and trucks. There are also RFID readers with integrated antenna that can be mounted on the ceiling and cover a wide area. Such solutions are used, for example, in stores where this ensures dynamic control of the stock.

6.2.2 RFID Software Solutions

In connection with the implementation of SGTIN with GS1 DataMatrix barcode and EPC UHF RFID tags, RFID software solutions are required for the handling of RFID transactions retrieved from the RFID readers.

The individual supplier who deliver the products must use barcode and RFID solutions to identify the products. Identification must be linked to enterprise management system, often an ERP system. There are variations between the different ERP solutions. It is important to identify any limitations in the ERP system, to ensure that it is capable to support RFID and serialisation. This is a basic requirement in this Guideline.

7. Testing RFID solutions

7.1 Readability of RFID tagged objects

Readability of RFID tagged objects is affected by several factors, the RFID chip, RFID antenna and encapsulation (the complete RFID tag). In addition, the environment in which the RFID tag will be read will be of importance to the reading quality. Environment that has a lot of metal objects can, for example, create unwanted reflections of the radio waves, so reading is difficult, or the wrong object is read.

It is common for installations of RFID equipment to consider various factors that may affect the environment for RFID solutions. It may be appropriate to shield areas and/or move objects from the reading that may affect the quality and rate of reading.

It is very important to carry out testing of the various solutions to document functionality. The quality of the RFID solutions today is very good and there are few errors associated with a properly tested installation.

EPC Gen2V2 RFID tags have been tested in connection with the development of the standard. Find more information in the Reference list in chapter 10.

7.2 Reading distance from RFID antennas to RFID tagged objects

GS1 EPC Gen2V2 UHF RFID tags have, through tests conducted by CISC Semiconductor, shown a significant improvement in several areas:

- Reading distance up to 20 m for standard solutions
- Opportunities for reading larger areas where products are tagged with RFID tags

8. Checklist for manufacturers and suppliers

In connection with the use of SGTIN and GS1 DataMatrix barcodes and/or GS1 EPC Gen2 RFID tags, there will be some primary activities that must be performed by manufacturers and suppliers of products. The subsequent checklist describes some of the activities that must be performed in connection with identification and labelling/tagging.

Building, Construction and Facility Management – Checklist		
Identification and labelling/tagging of products with GS1 standards		
Number	**Description**	**Comment**
1	Application for GS1 Company Prefix (GS1 GCP) - GS1 Membership	
2	Assign GTINs using your GCP	
3	Clarify which GS1 Application Identifiers (AI) to be used for storing data elements in EPC Gen2 UHF RFID tags and, if applicable GS1 DataMatrix barcode	
4	The company's management system (ERP) must be able to be updated with SGTIN (serial number information). This may require new software solutions	If the manufacturer does not need serial number management or have this in other systems, this does not need to be in the ERP system. There are stand-alone systems that can communicate with the ERP system
5	Manufacturers and suppliers must inform partners about the intended use of GS1 standards for identification and labelling/tagging	
6	Design label/barcode mock-ups for testing	
7	Testing of reading distance from RFID tag to RFID reader, reading quality and reading environment for EPC Gen2 UHF RFID tagged products	Important to determine the optimal placement of tagging on the product
8	Tagging with RFID tags and, if applicable labelling with GS1 DataMatrix barcode: Manufacturers and suppliers must ensure that they have the necessary technical equipment to tag the products with RFID tags and label with GS1 DataMatrix barcode	
9	Get your finished product/product labelling tested via GS1 Barcode Check, before mass roll-out	

9. Information about GS1 Australia

GS1 Australia is a user-driven, not-for-profit organisation. GS1 Australia is a member of a global standardisation organisation, GS1 - which develops, maintains and offers open global standards for efficient product- and information flow. GS1 is represented in 114 countries and over 2 million companies use GS1 standards. GS1 Australia currently has more than 20,000 members in several, diverse industries, and the member base is growing every year.

GS1 Australia's employees are experts in improving business processes based on GS1's global standards.

For the stakeholders in the value chain to communicate effectively with each other, they are required to use the same language. The GS1 system is such a common language, which can be understood across industries and borders. The GS1 system is the heart of our business - it streamlines the players' trade and logistics processes globally and locally.

10. References and glossary

References

1. GS1 General Specifications - www.gs1.org/standards/barcodes-epcrfid-id-keys/gs1-general-specifications

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10. Application for GS1 Company Prefix (GCP) - See www.gs1au.org/our-services/numbering-and-barcodes/preform/

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Glossary

BCFM – Building, Construction and Facility Management

EPC – Electronic Product Code

GCP – GS1 Company Prefix

GTIN – Global Trade Item Number

GS1 AI – Application Identifier - Used to enter information about data elements

MRO – Management, Repair and Operations

RFID – Radio Frequency Identification

SGTIN – Serialised Global Trade Item Number

SKU – Stock Keeping Unit

TID – Tag ID - Contains information from the chip manufacturer

UHF – Ultra High Frequency - Radio Frequency - 850 - 960 MHZ (used for RFID tags)

Contact us

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About GS1 Australia

GS1 is a neutral, not-for-profit organisation that develops and maintains the most widely used global standards for efficient business communication. We are best known for the barcode, named by the BBC as one of "the 50 things that made the world economy". GS1 standards and services improve the efficiency, safety and visibility of supply chains across physical and digital channels in 25 sectors. With local Member Organisations in 114 countries, 2 million user companies and 6 billion transactions every day, GS1 standards create a common language that supports systems and processes across the globe.

For more information visit the GS1 Australia website **www.gs1au.org**

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