General Specifications Change Notification (GSCN)

The Global Language of Business

WR #	GSCN Name	Effective Date
20-378	Allowance for Larger x-dim on non-retail trade items	Dec 2020

Associated Work Request (WR) Number:

20-004

Background: Gen Spec Continuous Improvement

Some industries such as rail, construction, and T&L utilise the GS1 system on non-retail trade items to track movement of goods, maintain inventory, support maintenance processes and other business processes. These applications sometimes require barcode symbols that can last a long time, be read from a distance and maintain readability over the course of many years. This work request describes rules and recommendations for GS1 data carriers that can support these applications.

GS1 General Specification Change:

The recommended changes are highlighted below, relative to GS1 General Specifications version 2020.

Disclaimer

2.3 Assets

The GS1 system provides a method for the identification of assets. The object of asset identification is to identify a physical entity as an inventory item.

Each company holding a GS1 Company Prefix may assign a Global Returnable Asset Identifier (GRAI) or Global Individual Asset Identifier (GIAI). If the asset is manufactured on behalf of a company best practice may dictate that the manufacturing company applies the GRAI or GIAI during the manufacturing process on behalf of this customer.

Note: Where assets of the same type need to be ordered a GTIN is required for the ordering process. There is no conflict when a GTIN and a GRAI (GS1 Company Prefix, asset type and check digit) have the same digits, because the data carrier (EDI qualifier, GS1 barcode with GS1 Application Identifier, or EPC/RFID) will distinguish between the two GS1 identification keys.

The GS1 asset identifiers act as keys to access the characteristics of an asset stored in a computer file and/or to record movements of assets.

Note: The attributes of the asset should be recorded and shared digitally using the GS1 asset identifier as the key to the information. Examples of the type of information held include the party who owns the asset, the value of the asset, the location of the asset, and the life-cycle history of the asset.

Asset identifiers may be used for basic applications, such as the location and usership of a given asset (e.g., a personal computer or returnable transport item) 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.

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

Application description

A returnable asset is a reusable package or transport equipment of a certain value, such as a beer keg, a gas cylinder, a plastic pallet, or a crate. The GS1 system identification of a returnable asset, the Global Returnable Asset Identifier (GRAI), enables tracking as well as recording of all relevant data.

The GRAI is composed of the GS1 Company Prefix (of the company assigning the asset identifier) and the asset type. The latter is assigned to uniquely identify, together with the GS1 Company Prefix, a particular kind of asset. The GRAI remains the same for all identical returnable assets. Although consecutive numbering is recommended, the structure is left to the discretion of the assigning company. An optional serial component may be used to distinguish individual assets within a given asset type.

A typical application using this element string is in tracking returnable beer kegs. The owner of the beer keg applies a barcode carrying a GRAI to the keg using a permanent marking technique. This barcode is scanned whenever the keg is supplied full to a customer and scanned again when it is returned. This scanning operation allows the beer keg owner to automatically capture the life-cycle history of a given keg and to operate a deposit system, if desired.

Note: This element string identifies a physical entity as a returnable asset. When such a physical entity is used to transport or to contain a trade item, the element string AI (8003) must never be used to identify the transported or contained trade item.

Note: GS1 refers to the GRAI in section 2.1.8, which deals the Automatic Identification and Data Capture (AIDC) of medical devices within the micro-logistics cycle of use, cleaning and sterilisation. See section 2.1.8 for more details.

GS1 key

Required

- GRAI

The GS1 Application Identifier to indicate the Global Returnable Asset Identifier (GRAI) is AI (8003), see section 3.2.

Rules

See section 4.5.

Attributes

Not applicable

Data carrier specification

Carrier choices

The GS1 data carriers that can be used to represent the GRAI are:

- GS1-128
- GS1 DataMatrix
- GS1 QR Code
- EPC/RFID

When encoding an asset identifier for medical devices see section 2.1.8.

When applying ~~direct part~~permanent marking, also see the information in section 2.6.14.

Symbol X-dimension, minimum symbol height, and minimum symbol quality

For GS1-128, GS1 DataMatrix and GS1 QR Code, see section 5.12.3.9~~5.10.3.9~~ *GS1 symbol specification table 9* and section 5.12.3.7~~5.10.3.7~~ *GS1 symbol specification table 7* (direct part marking)or section 5.12.3.13 *GS1 symbol specification table 13* (long distance scanning).

Symbol placement

Not applicable.

Unique application processing requirements

For a description of processing requirements, see section 7.

2.3.2 Global Individual Asset Identifier (GIAI): AI (8004)

Application description

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

This element string identifies a particular physical entity as an asset. It must not be used for other purposes and must be unique for a period well beyond the lifetime of the relevant asset records. Whether or not the assigned Global Individual Asset Identifier (GIAI) may remain with the asset when changing hands depends on the particular business application. If it remains with the asset it SHALL never be reused.

The GIAI comprises the GS1 Company Prefix of the company assigning the asset identifier and an individual asset reference (see section 3). The individual asset reference is alphanumeric. Its structure is left to the discretion of the asset owner or manager.

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

GS1 refers to GIAI in the section 2.1.8, which deals with Automatic Identification and Data Capture (AIDC) for medical devices within the micro-logistics cycle of use, cleaning and sterilisation. See section 2.1.8 for more details.

GS1 key

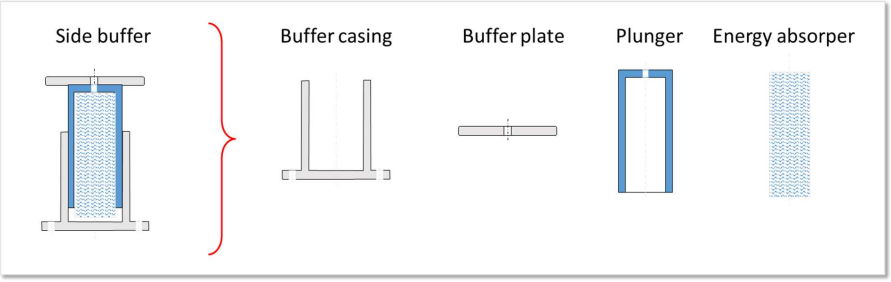
Required

- GIAI

The GS1 Application Identifier to indicate the Global Individual Asset Identifier (GIAI) is AI (8004), see section 3.2.

Note: The GIAI of assemblies (composite components) may need to be marked on a component of the assembly (the so called leading part) when there is no dedicated space to mark the GIAI on the assembly itself. For example, the GIAI of a *side buffer* of a rail vehicle may be included in a separate marking on the *buffer casing*, in addition to the marking of the *buffer casing* itself. To be able to recognise the marking of the assembly AI (7023) SHALL be used to indicate the GIAI of the assembly.

Figure 2.3.2-1. Example: Side buffer (assembly) with buffer casing (leading part)



Rules

See section 4.5

Attributes

Not applicable

Data carrier specification

Carrier choices

The GS1 data carriers that can be used to represent the GIAI are:

- GS1-128.
- GS1 DataMatrix.
- GS1 QR Code.
- EPC/RFID.

When encoding an asset identifier for medical devices see section 2.1.8.

When applying permanent ~~direct part~~ marking, also see the information in section 2.6.14.

Symbol X-dimension, minimum symbol height, and minimum symbol quality

For GS1-128, GS1 DataMatrix and GS1 QR Code, see section 5.12.3.9~~5.10.3.9~~ *GS1 symbol specification table 9* and section 5.12.3.7~~5.10.3.7~~ *GS1 symbol specification table 7* (direct part marking), or section 5.12.3.13 *GS1 symbol specification table 13* (long distance scanning).

2.6.14 Permanently marked items

Application description

Some applications require a permanent mark on the item, in order for it to be identified during its full lifetime independent of its packaging. These items may be identified with GIAI, GRAI, or GTIN plus serial number.

Three methods exist for the permanent marking of items:

1. Direct part marking (DPM): The process of marking a symbol directly onto an item using an intrusive or non-intrusive method instead of applying a label or using another indirect marking process. These symbols are typically read from a shorter distance.
2. Durable labelling and marking: The process of marking a symbol onto a label or the item itself that is intended to permanently identify the item, part, or asset (i.e. medical devices, consumer electronics, etc.) ~~stay on the trade item~~. These symbols will also appear on items that are tracked and traced for maintenance, repair, and overhaul (MRO) purposes. Some of these symbols must withstand harsh environmental conditions and be readable from a long distance, typically more than 3 metres (10 feet).
3. Durable RFID-tagging: The process of applying an RFID-tag that is intended to permanently stay on the trade item.

GS1 key

Required

The allowed key formats for this application are:

- GTIN-12
- GTIN-13
- GTIN-14
- GRAI
- GIAI

Rules

See the rules for GTIN, section *4.3*, and GIAI and GRAI in section *4.5*.

Attributes

Required

For regulated healthcare consumer trade items the following levels of AIDC marking are specified:

Figure 2.6.14-1. AIDC marking levels for regulated healthcare consumer trade items

AIDC marking level for regulated healthcare trade items	Key	Batch/lot number - AI (10)	Expiration date – AI (17)	Serial number – AI (21)	Other
Highest – Brand owner AIDC marking of certain medical devices	GTIN-12, GTIN-13, or GTIN-14	No	No	Yes	None
Highest - Hospital AIDC marking of certain medical devices (see section *2.1.8*)	GRAI, AI (8003), or GIAI, AI (8004), is optional if GTIN, AI (01), + serial number, AI (21), is not marked on the product.	No	No	GRAI, AI (8003), or GIAI, AI (8004), is optional if GTIN, AI (01), + serial number, AI (21), is not marked on the product.	

To manage healthcare data requirements within EPC/RFID tags, see section *3.11* and the most recent version of the *EPC Tag Data Standard*.

Optional

See section *3* for all the GS1 Application Identifiers (AIs) that can be used with a GTIN. Since the GTIN identifies a grouping of items, the optional attributes apply to the grouping as well.

Rules

Not applicable.

Data carrier specification

Carrier choices

- GS1 DataMatrix
- GS1 QR Code
- EPC/RFID

For healthcare, the following carrier selection applies to regulated healthcare retail consumer trade items.

Figure 2.6.14-2. Carrier choices for regulated healthcare retail consumer trade items

Preferred option	GS1 DataMatrix symbology
Option in addition to the barcode	See the "Data carrier specification carrier choices" recommendations on options in addition to the barcode at the end of section *2.1.5*

Figure 2.6.14-3. Example of GS1 DataMatrix symbol encoded with GTIN and AIs (17) and (10) per section *2.1.5*

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

Figure 2.6.14-4. Example of GS1 DataMatrix symbol encoded with GTIN and serial number AI (21)

(21) ABCDEFG123456789

(01) 04012345678901

Symbol X-dimensions, minimum symbol height, and minimum symbol quality

Direct part marking:

The use of GS1 DataMatrix and GS1 QR Code in direct part marking applications is endorsed by GS1 for those applications that require permanent marking for cradle-to-grave history of the part's lifecycle. For regulated healthcare trade items including medical devices, GS1 DataMatrix is the only GS1 data carrier approved for direct part marking application. These symbols are typically read from a shorter distance.

Some sources express the height of the 2D cell in terms of a Y dimension. For GS1 DataMatrix and GS1 QR Code the cells are considered the same size under optimal print conditions so that X = Y.

Symbol size is determined by the amount of data and the number of rows and columns required encoding the data for the X-dimensions selected (see figures 5.6.3.2-1 and 5.6.3.2-2).

Consult *GS1 symbol specification table 7*, section 5.12.3.7~~5.10.3.7~~, for minimum and maximum X-dimensions and other sizing requirements.

Durable labelling and marking:

For long distance scanning see section 5.12.3.13, *GS1 symbol specification table 13*.

For short distance scanning see section 5.12.3.9, *GS1 symbol specification table 9* (assets) or ~~See~~ section 5.12.3.4~~5.10.3.4~~, *GS1 symbol specification table 4* (trade items).

Symbol placement

General principles on placement of barcodes are described in section 6.

The majority of uses for these symbols will be on very small items with curved surfaces such as vials, ampoules, and very small bottles. For guidance in locating these symbols on curved surfaces, refer to section 6.2.

Unique application processing requirements for direct part marking

See section 7 and section 5.12.4.3~~5.10.4.3~~.

2.6.15 Encoding transport process information

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Introduction

The global Transport & Logistics industry is experiencing exponential growth in freight volumes and becoming ever more open and competitive to support the growing needs. The increasing number of service providers (especially in Last Mile) and new entrants coming in from outside the traditional T&L environment causes challenges within the supplychain where parties involved in a supply chain at times don't even know each other, let alone have integrated systems. The fragmented nature of the industry, connectivity limitations (e.g. internet access) and the need for redundancy (e.g. absence of advance information exchange) drives the need for greater interoperability and the ability to capture transport process information via barcode(s). Information such as ship-to / deliver-to address and other delivery information is encoded directly on the logistic label to support first/last mile and sortation processes.

Note (informative): For further guidance and supporting standards see the *GS1 Application Standard for encoding transport process information*.

Application description

This application describes the creation of transport unit labels when using 2D barcodes to include necessary transport data on GS1 transport labels. The SSCC is the mandatory identifier required on all transport labels in a GS1-128 barcode and this application defines how it should be used together with optional attributes in 2D barcodes to support transport and logistic processes.

GS1 Key

Required

- SSCC

The GS1 Application Identifier for the SSCC is AI (00), see section 3.2.

Rules

All SSCC rules described in section 4.4.

Application	See section	SST(s)	Carrier choices
Variable measure fresh food trade items scanned at retail point-of-sale using GTIN	2.1.12.1	1	GS1 DataBar Expanded, GS1 DataBar Expanded Stacked GS1 DataMatrix, GS1 QR Code
Variable measure trade items scanned at retail point-of-sale using Restricted Circulation Numbers	2.1.12.2	1	EAN-13, UPC-A
GS1 Digital Link URI syntax for extended packaging applications for trade items	2.1.13.1	1 Adden-dum 2	Data Matrix, QR Code
GS1 element string syntax for extended packaging applications for trade items~~Trade item extended packaging applications~~	~~2.1.13.2~~2.1.~~13~~	1 Adden-dum 1	GS1 DataMatrix, GS1 QR Code
▪ Regulated healthcare trade items	2.1.13	6, 7, 8, or 10	GS1 DataMatrix only
Regulated trade item, at unit pack level, per EU 2018/574 for tobacco traceability (GTIN + Third-Party Controlled Serialised Extension of GTIN)	2.1.14	12	GS1 DataMatrix, GS1 QR Code, GS1 DotCode
Regulated trade item, at standard trade grouping level, per EU 2018/574 for tobacco traceability (SGTIN)	2.1.14	12	GS1 DataMatrix, GS1 QR Code, GS1-128
Regulated logistics unit per EU 2018/574 for tobacco traceability (SSCC)	2.1.14	12	GS1 DataMatrix, GS1 QR Code, GS1-128
Logistics units - individual logistic units	2.2.1	5	GS1-128 As additional symbol: GS1 DataMatrix, GS1 QR Code
Logistics units - multiple logistic units (GSIN, GINC)	2.2.2, 2.2.3	5	GS1-128, GS1 DataMatrix, GS1 QR Code
Assets – Global Returnable Asset Identifier (GRAI)	2.3.1	9	GS1-128, GS1 DataMatrix, GS1 QR Code
▪ ~~Permanent~~ Direct part marking ~~of GRAI~~	2.3.1, 2.6.14	7	GS1 DataMatrix, GS1 QR Code
▪ Durable labelling and marking	2.3.1, 2.6.14	9, 13	GS1-128, GS1 DataMatrix, GS1 QR Code
Assets – Global Individual Asset Identifier (GIAI)	2.3.2	9	GS1-128, GS1 DataMatrix, GS1 QR Code
▪ ~~Permanent~~ Direct part marking ~~of GIAI~~	2.3.2 2.6.14	7	GS1 DataMatrix, GS1 QR Code
▪ Durable labelling and marking	2.3.2, 2.6.14	9, 13	GS1-128, GS1 DataMatrix, GS1 QR Code
Locations and parties - Identification of a physical location	2.4.4	9	GS1-128, GS1 Data Matrix, GS1 QR Code, EPC/RFID
Service relationships	2.5	11	GS1 DataBar Expanded, GS1 DataBar Expanded Stacked, GS1-128, GS1 DataMatrix, GS1 QR Code
Coupons identified using the Global Coupon Number	2.6.2	1	GS1 DataBar Expanded, GS1 DataBar Expanded Stacked
Coupon identification for restricted geographic distribution (GS1 Prefix 99) GS1 common currency coupon identification (GS1 Prefixes 981 to 983)	2.6.3.3 2.6.3.4 2.6.3.5	1	EAN-13
Coupon code identification for use in North America (AI 8110, 8112)	2.6.3.6 2.6.3.7	(*)	GS1 DataBar Expanded, GS1 DataBar Expanded Stacked or digitally transmitted
Refund receipts	2.6.4	1	EAN-13
Electronic serial identifier for cellular mobile telephones (CMTI): AI(8002)	2.6.5	4	GS1-128
Payment slips	2.6.6	4	GS1-128

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Application	See section	SST(s)	Carrier choices
Customer specific articles	2.6.7	1	EAN-13, UPC-A, ITF-14, GS1-128
Custom trade item	2.6.8	4	GS1–128, GS1 DataBar, GS1 DataMatrix, GS1 QR Code
Global Document Type Identifier for document control	2.6.9	9	GS1-128, GS1 DataMatrix, GS1 QR Code
Internal applications	2.6.10	N/A	GS1–128, GS1 DataBar Expanded, GS1 DataMatrix, GS1 QR Code
Consumer trade item production control	2.6.11	N/A	GS1 DataBar, GS1 DataMatrix, GS1 QR Code, GS1-128, Composite Component
Component/part identification	2.6.12	N/A	GS1-128, GS1 DataMatrix, GS1 QR Code
Global Model Number	2.6.13	~~N/A~~4	GS1 DataMatrix, GS1 QR Code, EPC/RFID~~N/A~~
Permanently marked items	2.6.14	4, 7, 9, 13	GS1 DataMatrix, GS1 QR Code
Encoding transport process information	2.6.15	5	GS1-128, GS1 DataMatrix, GS1 QR Code
(*) See *US Coupon Application Guideline Using GS1 DataBar Expanded Symbols* for the appropriate SST.			

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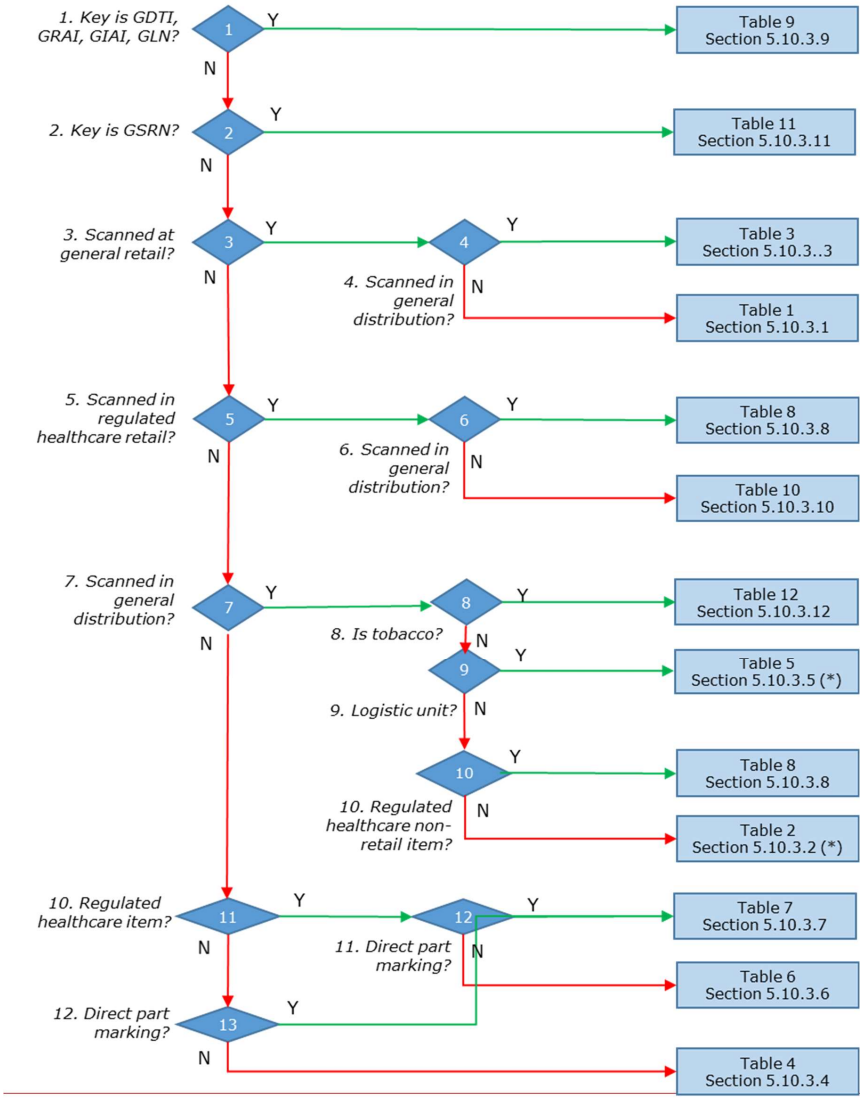
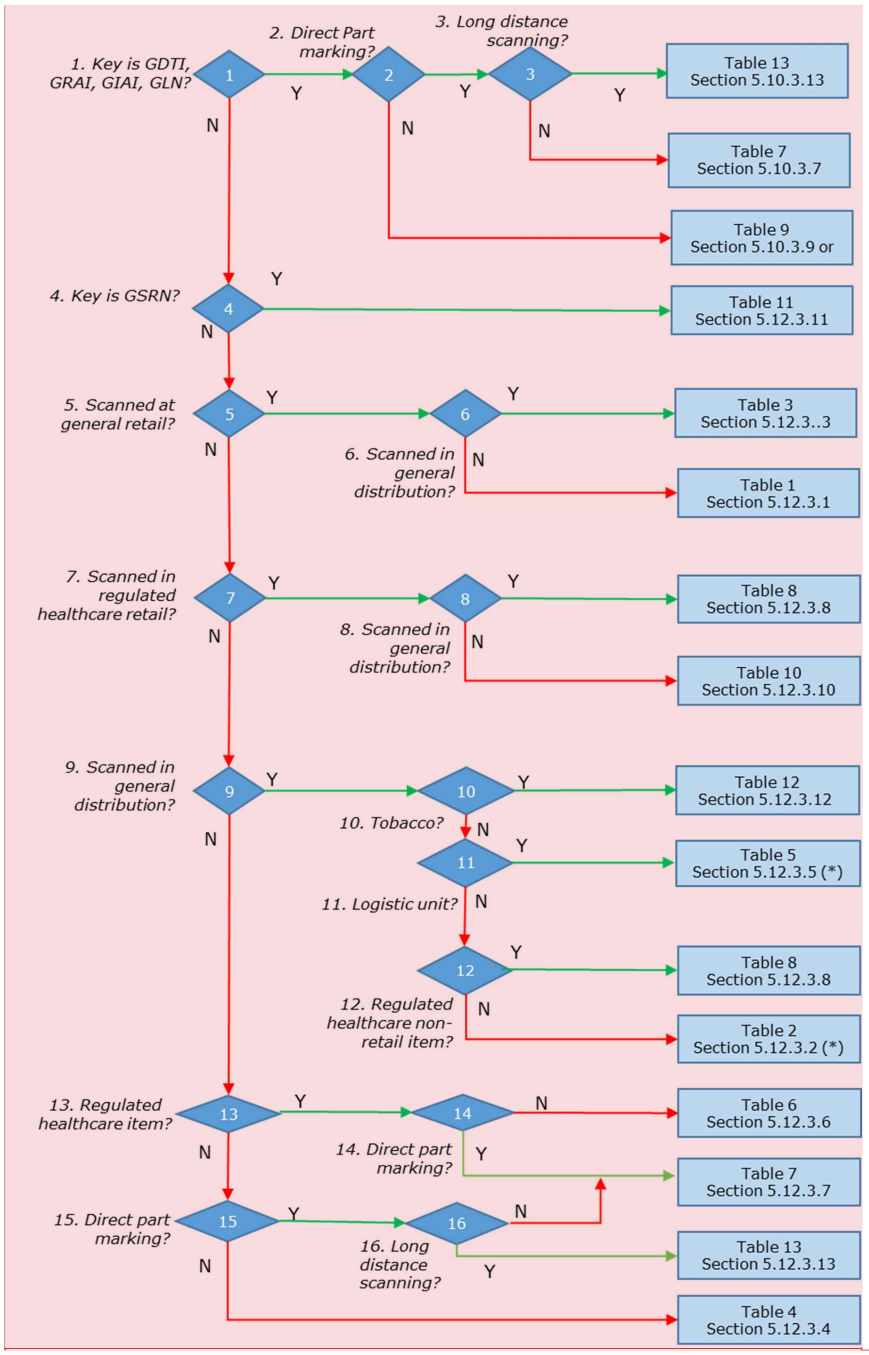
Figure 5.12.2.6-2. GS1 symbology operational environment decision tree





Commented [DM65]: This flowchart replaces the previous one (above).

Note: If an item is a general retail consumer trade item and regulated healthcare retail consumer trade item then the barcode marking for general retail is required at a minimum.

Figure 5.12.2.6-3. Summary of the symbol specification tables per following figure *5.12.2.65.10.2.6*-2 GS1 symbology operational environment decision tree

Symbol spec. tables	General retail POS	Retail pharmacy	* Non-retail pharmacy	Non-retail Non-healthcare	General distribution	Direct part marking	Durable labelling and marking	Logistics unit (SSCC)	GIAI, GRAI, GLN	GSRN
Table 1	Yes				No					
Table 2				Yes	Yes					
Table 3	Yes				Yes					
Table 4				Yes	No		Yes			
Table 5					Yes			Yes		
Table 6			Yes		No					
Table 7			Yes	Yes	No	Yes				
Table 8		Yes	Yes		Yes					
Table 9					No		Yes		Yes	
Table 10		Yes			No					
Table 11										Yes
Table 12	No	No	No	No	Yes	No		No	No	No
Table 13							Yes		Yes	
	* Table 6 should be used for products scanned at bedside									

5.12.3.13 Symbol specification table 13 – Durable labelling and durable marking enabling long distance scanning

Figure 5.12.3.13-1. GS1 symbol specification table 13

Symbol(s) specified	(*) X-dimension mm (inches)		Minimum symbol height for given X mm (inches)	Quiet Zone	Minimum quality specification
	Minimum	Maximum			
GS1 DataMatrix (ECC 200)	0.495 (0.0195")	3.50 (0.1378")	Height is determined by X-dimension and data that is encoded	1X on all four sides	1.5/(**)/660
GS1 QR Code	0.495 (0.0195")	3.50 (0.1378")	Height is determined by X-dimension and data that is encoded	4X on all four sides	1.5/(**)/660
GS1-128 (****)	0.495 (0.0195")	0.940 (***) (0.0370")	12.70 (0.500")	10X on left and right side	1.5/(**)/660

(*)	For optimal reader performance, a limited X-dimension range should be selected. For long distance scanning applications, X-dimensions greater than 1.75 mm (0.069") should be used.
(**)	For quality measurement of these GS1 symbols, the effective aperture should be 80% of the chosen X-dimension.
(***)	With an X-dimension at the upper end of the range, GS1-128 symbols have a limited data capacity because the maximum length is 165.10 mm (6.5"). See section 5.4.4.3.
(****)	The GS1-128 symbol may not be readable at the same distance as the GS1 2D symbols.

Note: See SECTION *2.7* TO ensure the correct symbol specification table is used.