WR #	GSCN Name	Effective Date
24-363	EPC/RFID possible data carrier in application standards	Mar 2025

Associated Work Request (WR) Number:

N/A

Background:

GS1 General Specifications refer to EPC/RFID as a possible data carrier for some application standards that are described in section 2 (e.g., section 2.1.15 Identification of non-new trade items). Since some of the stakeholders involved in the implementation of an application standard might not be able to capture EPC/RFID tags, the use of such data carrier must be considered **as an option in addition** to one of the preferred mandatory barcodes. This is well described in Figure 2.1.5-2 of section 2.1.5 Healthcare primary packaging (non-retail trade items).

In addition, when EPC/RFID is to be used, it must be noted that instance level identifiers (like GLNs and SSCC) must be used. Where EPC/RFID tags are used for product instances (whether new or non-new), the tag SHALL be encoded with one of the SGTIN EPC schemes, based on GTIN (AI 01) and Serial Number (AI 21).

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2.1.7 Fixed measure trade items scanned in general distribution

Every trade item that is different from another in any respect is assigned a unique Global Trade Item Number (GTIN). This includes trade item groupings of retail and non-retail trade items that are also trade items, and non-retail single units. For example, each of the packaging types in the figure below, if traded, is assigned a separate GTIN.

Trade item	GTIN numbering options								
	GTIN-8	GTIN-12	GTIN-13	GTIN-14					
Single product A	Х	Х	Х						
50 x product A (Trade item grouping)		Х	Х	Х					
50 x product A (Trade item grouping, e.g., display case)		Х	Х	Х					
100 x product A (Trade item grouping)		Х	Х	Х					
Single product B	Х	Х	Х						
50 x product A 50 x product B		Х	Х						

Figure	2.1.7-1	Example	of GTIN	numbering	options
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If, at any time, the trade item is shipped or transported as an independent logistic unit, at the time of shipment it SHOULD additionally be identified with an SSCC. The combination of a GTIN and a serial number (also known as SGTIN) does not replace the SSCC as the identifier of a logistic unit.

If, in addition to the item being identified by GTIN, the item also has a product model, then this product model is identified with a Global Model Number (GMN). See section 2.6.13 for the application standard on GMN.

2.1.7.1 Identification of a trade item that is a single product

Application description

The manufacturer or supplier has the option of assigning a unique GTIN-8, GTIN-12, GTIN-13 or in the case of regulated healthcare trade items and trade items used in manufacturing and maintenance, repair & overhaul (MRO) processes, a GTIN-14 to a trade item that is a single product as shown in figure 2.1.7-1. Restricted Circulation Numbers (RCNs) SHALL NOT be used in this element string.

GS1 key

Required

The allowed key formats for this application are:

- GTIN-8
- GTIN-12
- GTIN-13
- For regulated healthcare trade items and trade items used in manufacturing and maintenance, repair & overhaul (MRO) processes: GTIN-14.

Rules

See the GTIN rules described in section 4.



Attributes

Required

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

AIDC marking level for regulated healthcare trade items	Кеу	Batch/lot number - AI (10)	Expiration date – AI (17)	Serial number - AI (21)	Other
Minimum	GTIN-8, GTIN-12, GTIN-13, or GTIN-14	No	No	No	None
Enhanced	GTIN-8, GTIN-12, GTIN-13, or GTIN-14	Yes	Yes	No	None
Highest – Brand owner AIDC marking	GTIN-8, GTIN-12, GTIN-13, or GTIN-14	Yes	Yes	Yes	Potency AI (7004) for pharmaceutical, and for medical device kits with pharmaceutical (cases only for both situations)
Highest – Hospital AIDC marking of pharmaceutical	GTIN-8, GTIN-12, GTIN-13, or GTIN-14	No	AI (7003) for short-life products	Yes	None
Hospital AIDC marking of medical devices	No	No	No	No	None

Figure	2.1.7.1-1	Overview	of required	attributes
inguic	~···/··		orrequired	attributes

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

Optional

Not applicable

Rules

Not applicable

Data carrier specification

Carrier choices

- Symbols from the EAN/UPC symbology family (UPC-A, UPC-E, may be used to encode the GTIN-12, EAN-13 to encode the GTIN-13 and, if the size requirements are met, EAN-8 to encode the GTIN-8 of the trade item that is a single product).
- ITF-14 symbols may be used where printing conditions require the application of a less demanding symbology. ITF-14 symbols can encode the GTIN-12, or GTIN-13 of the item.
- A GS1-128 barcode or GS1 DataBar barcode with GS1 Application Identifier (01) may be used to encode a GTIN that identifies the trade item if the printing conditions allow. The choice of one of these symbologies is particularly relevant if there is a need to encode attribute information in addition to the identification number.

Some scanning systems may be able to handle 2D barcodes as well as linear barcodes. In these environments, GS1 DataMatrix and GS1 QR Code may be used in addition to linear symbols. For information on how to manage multiple barcodes see section 4.15.

For trade items used in manufacturing and maintenance, repair & overhaul (MRO) processes the following data carrier choices take precedence over the carrier choices above: GS1-128, GS1 DataMatrix, GS1 QR Code and EPC/RFID. (see section 3.11 and the most recent version of the EPC Tag Data Standard).



Note: When EPC/RFID is used, it SHALL be in addition to GS1-128 or GS1 DataMatrix or GS1 QR Code. The SGTIN EPC, corresponding to a compound key of AI (01) and AI (21), must be used. When the associated barcode carries AI (21), this SHALL encode the same, brandowner assigned Serial Number used to encode the Serial Number component of the SGTIN EPC on the EPC/RFID tag, taking care not to change any characters and neither add nor remove any leading zeros (see Section 4.15.1).

For healthcare, the following carrier selections take precedence over the carrier choices above and apply to all regulated healthcare retail consumer trade items.

Preferred option(s) (this is the long-term direction for AIDC marking)	First preference: GS1-128 symbology. After Jan 2010, GS1 DataBar is permitted for use on all trade items and therefore may be encountered in general distribution however use of GS1-128 is preferred as the scanners in the field today pervasively support it.
	Second preference: When one linear symbol cannot accommodate the field length of the data (exceeds 48 characters), two symbols should be used.
	Third option: Where the package or label size does not permit the use of the first two options, GS1 DataMatrix symbology are permitted but should be avoided wherever possible if the package could be scanned by a mounted conveyorised scanner.
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 $2.1.5$.
Other acceptable options (GS1 strongly supports existing options for symbol marking as a guiding principle and therefore supports all previous AIDC marking specifications)	See the "data carrier specification carrier choices" recommendations on other acceptable options found at the end of section $2.1.5$.

	Figure	2.1.7.1	-2. Healt	hcare ca	rrier choic	es
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Symbol X-dimensions, minimum symbol height and minimum symbol quality

For multi-sector use except for retail or regulated healthcare trade items see section <u>5.12.3.2</u>, GS1 symbol specification table 2.

For regulated healthcare non-retail consumer trade items see section <u>5.12.3.8</u>, GS1 symbol specification table 8.

For manufacturing and MRO processes see <u>5.12.3.4</u>, GS1 symbol specification table 4.

Symbol placement

All the symbol placement guidelines defined in section $\underline{6}$.

Unique application processing requirements

For a description of processing requirements, see section $\underline{7}$.

2.1.7.2 Trade item groupings of identical trade items

Application description

A trade item grouping that is a predefined grouping of identical trade items. The manufacturer or supplier has the option of either assigning a unique GTIN-13 or GTIN-12 to each trade item grouping or assigning a unique GTIN-14. These 14-digit GTINs incorporate the GTIN (less its check digit) of the trade item contained in each grouping. The check digit for each GTIN-14 is then recalculated.



The indicators have no meaning. The digits do not have to be used in sequential order, and some may not be used at all. The GTIN-14 structure for trade item groupings creates extra numbering capacity.

	Global Trade Item Number (GTIN)													
	Indicator		GTIN of contained trade items (without check digit)						Check digit					
GTIN-8 based	N1	0	0	0	0	0	N ₇	N ₈	N9	N ₁₀	N ₁₁	N_{12}	N ₁₃	N ₁₄
GTIN-12 based	N1	0	N ₃	N4	N_5	N_6	N ₇	N ₈	N9	N ₁₀	N ₁₁	N_{12}	N ₁₃	N ₁₄
GTIN-13 based	N1	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

The indicator is a digit with a value of 1 to 8. It is assigned as required by the company that constructs the identification number. It can provide up to eight separate GTIN-14s to identify trade item groupings.

The check digit is explained in section 7.9. Its verification, usually carried out automatically by the barcode reader, ensures that the number is correctly composed.

Indicator	GTIN of trade item contained in the grouping, less its check digit	New check digit	Description	Quantity
	061414112345	2	Trade item	Single
1	061414112345	9	Trade item grouping	A grouping
8	061414112345	8	Trade item grouping	Another grouping
The distance of the			have the second shall be discussed as the second	have and Caller

Figure 2.1.7.2-2. Different groupings of the same trade item

Indicators 1 to 8 may be used to create new GTIN-14s. When these eight indicators have been used, further groupings must be identified with either a GTIN-13 or GTIN-12. Indicator digit 9 is reserved for variable measure trade items, see section 2.1.10.

For packaging configuration hierarchies that include a retail consumer trade item identified with a GTIN-13, GTIN-12, or GTIN-8, this GTIN must always be one of the relevant levels of packaging contained, usually the lowest level (see note below related to GTIN-14 assignment on the primary packaging). Restricted Circulation Numbers must not be used in this element string.

Note: For regulated healthcare trade items on the primary packaging, the phrase "usually the lowest level" SHALL be interpreted as allowing for the use of GTIN-14 on packaging configurations below the retail consumer trade item level, if one exists. This interpretation may not be applied to other trade item categories such as Do It Yourself (DIY) or Foodservice.

Any product package which will encounter scanning or product listing for sale at point-of-sale SHALL be identified according to retail point-of-sale specifications.

When a GTIN change at the retail consumer trade item level is required, the GTIN change must be made at all configuration levels above the retail consumer trade item level. Where there is an association between primary packaging and retail consumer trade item levels and GTIN-14 assignment is used on the primary packaging, the GTIN-14 assigned to the primary packaging is based on the retail level GTIN. There are three scenarios to consider for the relationship of these GTIN assignments:

- If changes to the primary packaging drive the change of the GTIN assigned to the retail consumer trade item level, the GTIN of the primary packaging will change.



- If changes to retail consumer trade item level GTIN are not caused by a change in primary packaging, the GTIN at the primary package level may or may not change per the discretion of the brand owner.
- If additional retail level package(s) are introduced beyond the original retail package or replace the original retail package, the GTIN-14 on the primary packaging may remain tied to the original retail level GTIN.

GS1 key

Required

The allowed key formats for this application are:

- GTIN-12
- GTIN-13
- GTIN-14

Note: Product groupings created prior to 2023 may be identified with a GTIN-8. Starting on 1 January 2023, GTIN-8 SHALL NOT be used for application.

Rules

All the GTIN rules described in section 4.

Attributes

Required

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

AIDC marking level for regulated healthcare trade items	Кеу	Batch/lot number - AI (10)	Expiration date – AI (17)	Serial number – AI (21)	Other
Minimum	GTIN-12, GTIN- 13, or GTIN-14	No	No	No	None
Enhanced	GTIN-12, GTIN- 13, or GTIN-14	Yes	Yes	No	None
Highest – Brand owner AIDC marking	GTIN-12, GTIN- 13, or GTIN-14	Yes	Yes	Yes	Potency AI (7004) for pharmaceutical, and for medical device kits with pharmaceutical (cases only for both situations)
Highest – Hospital AIDC marking of pharmaceutical	GTIN-12, GTIN- 13, or GTIN-14	No	AI (7003) for short- life products	Yes	None
Hospital AIDC marking of medical devices	No	No	No	No	None

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

Optional

Not applicable

Rules

Not applicable



Data carrier specification

Carrier choices

- For multi-sector use symbols from the EAN/UPC symbology family (UPC-A, UPC-E and EAN-13) may be used to encode the GTIN-12 or GTIN-13 of the trade item grouping.
- ITF-14 symbols may be used on trade item groupings where printing conditions require the application of a less demanding symbology. ITF-14 symbols can encode the GTIN-12, GTIN-13, or GTIN-14 of the item.
- A GS1-128 barcode or GS1 DataBar barcode with GS1 Application Identifier (01) may be used to encode a GTIN-12, GTIN-13, or GTIN-14 that identifies the trade item if the printing conditions allow. The choice of one of these symbologies is particularly relevant if there is a need to encode attribute information in addition to the identification number.

Some scanning systems may be able to handle 2D barcodes as well as linear barcodes. In these environments, GS1 DataMatrix and GS1 QR Code may be used in addition to linear symbols. For information on how to manage multiple barcodes see section 4.15.

For trade items used in manufacturing and maintenance, repair & overhaul (MRO) processes the following data carrier choices take precedence over the carrier choices above: GS1-128, GS1 DataMatrix, GS1 QR Code and EPC/RFID (see section 3.11 and the most recent version of the EPC Tag Data Standard).



Note: When EPC/RFID is used, it SHALL be in addition to GS1-128 or GS1 DataMatrix or GS1 QR Code. The SGTIN EPC, corresponding to a compound key of AI (01) and AI (21), must be used. When the associated barcode carries AI (21), this SHALL encode the same, brand-owner assigned Serial Number used to encode the Serial Number component of the SGTIN EPC on the EPC/RFID tag, taking care not to change any characters and neither add nor remove any leading zeros (see Section 4.15.1).

For healthcare the carrier selections noted at the end of section 2.1.7.1 take precedence over the carrier choices above and apply to all regulated healthcare retail consumer trade items.

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

For multi-sector use other than regulated healthcare trade items see section <u>5.12.3.2</u>, *GS1 symbol specification table 2*.

For regulated healthcare non-retail consumer trade items see section <u>5.12.3.8</u>, GS1 symbol specification table 8.

For manufacturing and MRO processes see <u>5.12.3.4</u>, GS1 symbol specification table 4.

Symbol placement

All the symbol placement guidelines defined in section $\underline{6}$.

Unique application processing requirements

For a description of processing requirements, see section $\underline{7}$.

2.1.7.3 Trade item groupings of mixed trade items

Application description

A trade item grouping that is a predefined grouping of two or more different trade items.

For example:

- Product C is a grouping of Product A (GTIN 'A') and Product B (GTIN 'B'), and is identified with either a GTIN-12 or GTIN-13, GTIN 'C.'
- GTIN 'C' could then be used to construct a GTIN-14 for a trade item grouping comprised of Product C.



As shown in figure 2.1.7.3-1, the GTIN-12s 614141234561 and 614141345670 identify the two trade items in the trade item assortment/bundle identified by the GTIN 614141456789.

Indicator	GTIN of trade item less its check digit	Check digit	Description	Quantity
	061414123456 061414134567	1 0	Retail consumer trade item (Product A) Retail consumer trade item (Product B)	Single Single
	061414145678	9	Retail consumer trade item (Product C)	Trade item assortment/bundle
1	061414145678	6	Trade item grouping	A grouping of the trade item assortment/bundle
8	061414145678	5	Trade item grouping	Another grouping of the trade item assortment/bundle

The indicators 1 to 8 may be used to create new GTIN-14s. When these eight indicators have been used, further groupings must be identified with either a GTIN-13 or GTIN-12. Indicator digit 9 is reserved for variable measure trade items, see section 2.1.10.

GS1 key

Required

The allowed key formats for this application are:

- GTIN-12
- GTIN-13
- GTIN-14

Rules

All the GTIN rules described in section 4; in addition, the GTIN-14 is valid for trade item groupings only when the trade item contained is a trade item assortment/bundle of two or more different trade items.

Attributes

Not applicable

Data carrier specification

Carrier choices

- Symbols from the EAN/UPC symbology family (UPC-A, UPC-E and EAN-13) may be used to encode the GTIN-12 or GTIN-13 of the trade item grouping.
- ITF-14 symbols may be used on trade item groupings where printing conditions require the application of a less demanding symbology. ITF-14 symbols can encode the GTIN-12, GTIN-13, or GTIN-14 of the item.
- A GS1-128 barcode or GS1 DataBar barcode with GS1 Application Identifier (01) may be used to encode a GTIN-12, GTIN-13, or GTIN-14 that identifies the trade item if the printing conditions allow. The choice of one of these symbologies is particularly relevant if there is a need to encode attribute information in addition to the identification number.

Some scanning systems may be able to handle 2D barcodes as well as linear barcodes. In these environments, GS1 DataMatrix and GS1 QR Code may be used in addition to linear barcodes. For information on how to manage multiple barcodes see section 4.15.



For trade items used in manufacturing and maintenance, repair & overhaul (MRO) processes the following data carrier choices take precedence over the carrier choices above: GS1-128, GS1 DataMatrix, GS1 QR Code and EPC/RFID (see section 3.11 and the most recent version of the EPC Tag Data Standard).

Note: When EPC/RFID is used, it SHALL be in addition to GS1-128 or GS1 DataMatrix or GS1 QR Code. The SGTIN EPC, corresponding to a compound key of AI (01) and AI (21), must be used. When the associated barcode carries AI (21), this SHALL encode the same, brandowner assigned Serial Number used to encode the Serial Number component of the SGTIN EPC on the EPC/RFID tag, taking care not to change any characters and neither add nor remove any leading zeros (see Section 4.15.1).

For healthcare, the carrier selections noted at the end of section 2.1.7.1 take precedence over the carrier choices above and apply to all regulated healthcare retail consumer trade items.

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

For multi-sector use other than regulated healthcare trade items see section <u>5.12.3.2</u>, *GS1 symbol specification table 2*.

For regulated healthcare non-retail consumer trade items see section <u>5.12.3.8</u>, GS1 symbol specification table 8.

For manufacturing and MRO processes see <u>5.12.3.4</u>, GS1 symbol specification table 4.

Symbol placement

All the symbol placement guidelines defined in section $\underline{6}$.

Unique application processing requirements

For a description of processing requirements, see section $\underline{7}$.

2.1.8 Medical devices (non-retail trade items)

Application description

Within this application are the rules and recommendations for the direct part marking (DPM) of medical devices for the Automatic Identification and Data Capture (AIDC) management, including medical devices that are reprocessed (within the micro-logistics cycle of use, including cleaning and sterilisation).

Medical devices SHOULD be identified with GTIN and any appropriate GS1 Application Identifiers used for production control, as determined by the responsible entity for the device. For medical devices that are reprocessed, GTIN and serial number are recommended for manufacturers that use DPM to enable traceability throughout the product life cycle.

Also, for hospitals or instrument owners that mark medical devices that are reprocessed, GTIN and serial number are recommended for all hospital/instrument owner marking. Some existing in-house legacy systems already use GS1 asset identifiers (GIAI or GRAI, see section 2.3), which are compliant with GS1 standards.

Note: Only one GS1 key (GTIN or GIAI/GRAI) SHOULD be marked on a single instrument.

GS1 key

Required

The allowed key formats for this application are:

- GTIN-12
- GTIN-13



- GTIN-14
- GRAI
- GIAI

Rules

- All the GTIN rules described in section <u>4</u>.
- All the GIAI and GRAI application rules described in section <u>4.4</u>.
- If the AIDC marking on the medical device may be seen and scanned when placed in the protective packaging after sterilisation, the protective packaging will not have to be AIDC marked.

Attributes

Required

Not applicable

Optional

When using GTIN-12, GTIN-13, or GTIN-14 to identify a medical device that is reprocessed, a serial number is recommended to complete the identification. To manage GS1 healthcare data requirements within EPC/RFID tags, see section 3.11 and the <u>EPC Tag Data Standard</u>.

Rules

Not applicable

Data carrier specification

Carrier choices

Medical devices (non-retail trade items), when direct marked, SHALL be marked with GS1 DataMatrix symbology. See section <u>2.6.14</u> for more details.

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

See section 5.12.3.7, GS1 symbol specification table 7.

Symbol placement

All the symbol placement guidelines defined in section $\underline{6}$.

Unique application processing requirements

For a description of processing requirements, see section $\underline{7}$.

2.1.9 Fixed measure trade items packed in several individual pieces not scanned at retail POS

Application description

The trade item includes two or more pieces that are marked for non-POS scanning purposes such as inventory management, theft prevention, or quality control. The identifier of each individual piece consists of the Global Trade Item Number (GTIN) of the trade item, the piece number and the total count of pieces in the trade item. The GTIN on all pieces of the trade item must be the same.



GS1 key

Required

The Global Trade Item Number (GTIN) is the GS1 identification key used to identify trade items. For the identification of pieces of a trade item, additional information is provided with a piece number and the total number of pieces. See section 3.2, Identification of an individual trade item piece: AI (8006).

Rules

- AI (8006) SHALL NOT be used for the identification of a single trade item piece.
- AI (8006) SHALL NOT be used for the identification of pieces that are themselves trade items, such as spare parts.
- The value of AI (8006) of all pieces of a trade item SHALL contain the same GTIN, the same total number of pieces and a different piece number.
- When the pieces of a trade item are packaged together, the value of the GTIN marked on the package SHALL be the same as the GTIN marked on the contained physical units.
- For trade items that pass the point-of-sale, all of the pieces of the trade item SHALL be packaged or presented together and identified with the GTIN.

Also see the GTIN rules described in section $\underline{4}$.

Attributes

Required

Not applicable.

Optional

See section $\underline{3}$ for an overview of all GS1 Application Identifiers and their intended usage.

Rules

See section <u>4.13</u> Data relationships. If used, optional AIs on all pieces of a trade item and on the trade item itself SHALL be identical.

Data carrier specification

Carrier choices

For multi-sector use except for regulated healthcare retail consumer trade items, data carriers used to represent each individual piece using the GS1 Application Identifier AI (8006) are GS1-128, GS1 DataMatrix, GS1 QR Code and EPC/RFID (see section 3.11 and the most recent version of the EPC Tag Data Standard).

Note: When EPC/RFID is used, it SHALL be in addition to GS1-128 or GS1 DataMatrix or GS1 QR Code. The SGTIN EPC, corresponding to a compound key of AI (01) and AI (21), must be used. When the associated barcode carries AI (21), this SHALL encode the same, brandowner assigned Serial Number used to encode the Serial Number component of the SGTIN EPC on the EPC/RFID tag, taking care not to change any characters and neither add nor remove any leading zeros (see Section 4.15.1).

For healthcare, the following carrier selections take precedence over the carrier choices above and apply to all regulated healthcare retail consumer trade items.

Figure 2.1.9-1. Healthcare carrier choices

Preferred option GS1-128 symbology	Preferred option	GS1-128 symbology



parallel, the ID Issuer validates all other attributes of the Economic Operator ID (EOID) Request. Once validated, the ID Issuer UIC, GS1 UIC Extension 1 and Importer index are concatenated before the GLN to form the EOID. To identify parties, see sections <u>2.4.5</u> and <u>3.7.12</u> Identification of a party - Global Location Number: AI (417).

Rules

All the GLN rules described in section 4.5.

Attributes

Required

GS1 UIC with Extension 1 and Importer index AI (7040)

Rules

Per section <u>4.5</u>.

Optional

Not applicable

Data carrier specification

Not applicable for EU 2018/574.

Unique application processing requirements

For a description of processing requirements, see section $\underline{7}$.

2.1.15 Identification of non-new trade items

Application description

Background

All new trade items that are identified using the GS1 system will have been issued a GTIN prior to their first use or consumer purchase. The GTIN is the same for all instances of the same trade item. In addition to the GTIN, some trade items have additional, more granular identification information, such as consumer product variant (CPV), a batch/lot number and/or a serial number. Each of these more granular GS1 identification key components are always associated to the GTIN. In most cases, the GTIN is present on the packaging of a new trade item and encoded in a barcode (see section 4.13.2).

Some new trade items have barcodes or EPC/RFID tags that include one or more pieces of more granular identification information in addition to the GTIN. For example, an EPC/RFID tag that is encoded with GS1 identification will include the GTIN and the serial number of a new trade item. Another example is 2D barcodes, such as a QR Code with a GS1 Digital Link URI, which can also include more granular GS1 identification key components in addition to the GTIN.

Trade item declarations and offer declarations

Trade item declarations

Any trade item has trade item declarations (see section <u>4.2.2.2</u>) that is the set of all information that is on the label and in the original packaging. Trade item declarations are declared by the original GTIN allocator (the party that assigned the GTIN to the trade item before the first use or consumer purchase).

Offer declarations

Any trade item that is being listed for sale has a set of offer declarations, which is the set of all information declared (or agreed to) by the seller about the trade item (inclusive of price, availability, terms of sale, claims, condition of the item, shipping information, returns information, etc).



Non-new trade items

After the first use or consumer purchase, a trade item is considered non-new, noting that non-new trade items may not include trade items that have been returned for a refund. Non-new trade items include a wide range of products with varying levels of precision of existing identification, as explained above.

When deciding how to identify a non-new trade item, consideration SHOULD be given to several factors, including:

- Availability/knowledge of existing identification of the non-new trade item (e.g., the original GTIN and original serial number of the trade item that was assigned by the original GTIN allocator)
- Needs of downstream business processes (how do the non-new trade items need to be stocked, ordered, sold, fulfilled, etc.)
- Ability to scan, process and manage identification information at any level of precision beyond GTIN as it is expected that all systems can currently manage GTIN-level identification

Rules for identification of non-new trade items

Individual industries may have specific applications standards for managing identification of refurbished trade items, in which case those standards take precedence. For identification of refurbished components and parts for the rail industry, see the <u>Identification of Components and</u> <u>Parts in the Rail Industry – Application Standard</u>. For all other cases, the following rules apply:

1. If there is no need to identify new and non-new instances of the same trade item separately, and no need to identify each non-new instance of an item with a GTIN and serial number, then identification with the originally assigned GTIN is sufficient.

If the brand owner assigned original GTIN of a trade item is not immediately known, effort SHALL be taken to discover and use this identifier to identify the non-new trade item. If the original GTIN cannot be recovered, a new GTIN SHALL be allocated according to the *GTIN Management Standard* or, for regulated healthcare products, the <u>GS1 Healthcare GTIN Allocation Rules Standard</u>.

- 2. If there is a need to identify new and non-new instances of the same trade item separately, then the following possibilities for the identification of non-new trade items are available:
 - When identification of a non-new trade item can be managed at a serialised instance level by all downstream parties, the following rule applies:
 - If the original GTIN and the original serial number associated with the GTIN are known, and the serial number has not been decommissioned, then they SHALL be used to identify a non-new trade item (for information on end of life see <u>EPCIS</u> <u>Standard</u>). To take advantage of this instance level identification for business processes such as inventory management and price look up, systems will need to be able to use serial number and GTIN in order to access price, condition and other elements of the offer.
 - When identification of a non-new trade item cannot be managed at a serialised instance level by some or all downstream parties:
 - When a party adapts, refurbishes or modifies trade items in a way that results in a new set of trade item declarations (see <u>4.2.2.2</u>), a new GTIN SHALL be allocated. The party may be the original GTIN allocator or a downstream party. In this case, a linkage between the new GTIN and the original GTIN SHALL be maintained and provided to downstream trading partners if requested.
 - In certain instances, non-new trade items are made available for sale in restricted distribution applications, where identification with GTIN may not be necessary. Such closed supply chain environments may use trade item identification described in section <u>2.1.11</u>. For such instances, consultation with your local GS1 Member Organisation is recommended.

Note: It is understood that some businesses use a proprietary combination of the original GTIN of a non-new trade item and other data (such as seller ID or another internal number) that may exist in their system to generate unique identification of a



particular offer of a non-new trade item. Such non-standard approaches are not globallyinteroperable and their use must be mutually agreed. The rules in section 2.1.15 are designed to ensure globally-interoperable identification of non-new trade items

GS1 key

Required

GTIN-12

GTIN-13

GTIN-8

Rules

All GTIN rules described in section 4.2.

Attributes

Required

Not applicable

Optional

For all the GS1 Application Identifiers (AI) that can be used with a GTIN, see section $\underline{3}$.

Data carrier specification

Carrier choices

- UPC-A barcode (carrying GTIN-12 or RCN-12)
- EAN-13 barcode (carrying GTIN-13 or RCN-13)
- UPC-E barcode
- EAN-8 barcode
- GS1 DataBar Retail POS family (carrying GTIN-12 or GTIN-13 represented in a fixed length data string of 14 digits by adding leading zeroes)
- EPC/RFID (see section 3.11 and the most recent version of the EPC Tag Data Standard)

Note: When EPC/RFID is used, it SHALL be in addition to GS1-128 or GS1 DataMatrix or GS1 QR Code. The SGTIN EPC, corresponding to a compound key of AI (01) and AI (21), must be used. When the associated barcode carries AI (21), this SHALL encode the same, brand-owner assigned Serial Number used to encode the Serial Number component of the SGTIN EPC on the EPC/RFID tag, taking care not to change any characters and neither add nor remove any leading zeros (see Section 4.15.1).

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

See section <u>5.12.3.1</u>, GS1 symbol specification table 1.

Unique application processing requirements

For a description of processing requirements, see section $\underline{7}$.

Symbol placement

All symbol placement guidelines are defined in section 6.9.



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 <u>2.1.8</u>, which deals the Automatic Identification and Data Capture (AIDC) of medical devices within the micro-logistics cycle of use, cleaning and sterilisation. See section <u>2.1.8</u> for more details.

GS1 key

Required

GRAI

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



Rules

See section <u>4.4</u>.

Attributes

Required

Not applicable

Optional

For all the GS1 Application Identifiers that may be used with a GRAI, see section <u>3.2.</u>

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 (see section 3.11 and the most recent version of the EPC Tag Data Standard)
- Note: When EPC/RFID is used, it SHALL be in addition to one of the above-mentioned barcode symbologies. GRAI must be serialized. When there is a business need, the associated barcode can also carry a serialized GRAI. In that case the value of the serialized GRAI in the EPC/RFID and associated barcode SHALL be the same (see Section 4.15.1).

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

When applying 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 <u>5.12.3.9</u> GS1 symbol specification table 9 and section <u>5.12.3.7</u> GS1 symbol specification table 7 (direct part marking) or section <u>5.12.3.13</u> GS1 symbol specification table 13 (long distance scanning).

Symbol placement

Not applicable.

Unique application processing requirements

For a description of processing requirements, see section \underline{Z} .

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 NOT be reused.



The GIAI comprises the GS1 Company Prefix of the company assigning the asset identifier and an individual asset reference (see section $\underline{3}$). 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 4.4

Attributes

Required

Not applicable

Optional

For all the GS1 Application Identifiers that may be used with a GIAI, see section 3.2.

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 (see section 3.11 and the most recent version of the EPC Tag Data Standard)

Note: When EPC/RFID is used, it SHALL be used in addition to one of the above-mentioned <u>barcode symbologies.</u>

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

When applying 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 <u>5.12.3.9</u> *GS1 symbol specification table* 9 and section <u>5.12.3.7</u> *GS1 symbol specification table* 7 (direct part marking), or section <u>5.12.3.13</u> *GS1 symbol specification table* 13 (long distance scanning).

Symbol placement

Not applicable

Unique application processing requirements

For a description of processing requirements, see section $\underline{7}$.

2.4 Parties and locations

The GLN is a globally unique and unambiguous GS1 identification key that can identify of any type of party or location used in business processes. The use of Global Location Numbers (GLNs) is driven by the exact role of each party and/or location within a given business process.

A GLN identifying a party answers the question of "who" is involved within the use case. This may be a legal entity or function transacting in a business scenario.

- Legal entity 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.
- Function An organisational subdivision or department based on the specific tasks being performed, as defined by the organisation.

A GLN identifying a location is used to answer the question of "where" something has been, is, or will be. A location can be either physical or digital in nature.

- Physical location A site (an area, a structure or group of structures) or an area within the site where something was, is, or will be located.
 - The identification of physical locations is an essential element for supply chain visibility. A GLN assigned to a physical location always has identifiable geographical location reference (e.g., address, geocoordinates) regardless of any business process roles conducted at the site. A physical location may be permanent and remain in a fixed position or mobile where the position can change over time (i.e., mobile blood donation van).
- **Digital location** An electronic (non-physical) address that is used for communication between computer systems.
 - Just as the exchange of physical goods is a transaction between companies, the exchange of data is a transaction between systems, for example the delivery of an invoice can be mapped to an EDI gateway identified by a GLN.

For rules on GLN allocation, see the GS1 GLN Allocation Rules Standard.



2.4.1 Application overview

The GLN is used in applications that share party and location information through automatic identification and data capture (AIDC). Section 2.4 focuses on the use of the GLN in AIDC applications. Four broad categories of use of the GLN exist:

- 1. Identification of a physical location, for example through a label attached to a loading dock or to a shelf location in a warehouse.
- 2. Specification of a location used in transport and logistics processes, for example a ship to location on a logistic label.
- 3. Identification of a party, for example designating a legal entity on a document.
- 4. Specification of a party, for example the invoicing party on a payment slip.

GLN is widely used to share data between systems and is a foundational key in the related GS1 standards. For further information, please consult the relevant GS1 standard.

- 1. Electronic Data Interchange (EDI) uses GLN to identify trading partners and physical locations involved in transactions. Also, the EDI mailbox or network address for companies is often identified with a GLN.
- Global Data Synchronisation Network (GDSN) mandate the use of GLNs to identify each party that provides information to any data pool and who requires information about products and locations.
- 3. Electronic Product Code Information Services (EPCIS) uses GLN to identify involved parties, read points and business locations for capturing and sharing visibility data. For example, a mobile location identified by a GLN can be tracked using the EPCIS standard.

2.4.2 Identification of a physical location

Application description

The following GS1 Application Identifiers enable the identification of a physical location using a data carrier present at the location itself:

- AI (414) Physical location
- AI (254) GLN extension component

AI (414) Physical location

The GLN can be used to identify a physical location represented in a data carrier on the location itself. Physical locations may, for example, be a room, a door of a warehouse, an x-ray room in a hospital, or a control point.

The element string may be used to record and confirm presence at a given location for any purpose. An equivalent field will hold this information in electronic messages.

AI (254) GLN extension component

Business processes cause objects (e.g., products, assets, or other equipment) to move from one physical location to another. The ability to have visibility of these movements is an essential element in any supply chain. These physical locations can be a site such as a distribution centre or a specific location within the site such as a selling floor, a room in a hospital or a yard of a warehouse; it can even be as granular as a specific area on a shelf.

The GLN extension component may be used to identify internal physical locations within a location identified with a GLN, known as sub-locations. A company can alternatively choose to assign a unique GLN, without an extension component, to identify these sub-locations.

The figure below provides an example of how GLN extension component may be used.





Important:

- A GLN extension component SHALL only be used in conjunction with a GLN identifying a physical location.
- The GLN extension component SHALL only be used in applications where there is mutual agreement between all involved trading partners and where the standard being used supports the GLN extension component.
- If the GLN + GLN extension component are used to identify locations within the site, each sublocation identification SHALL follow the GLN Management Rule defined in the <u>GS1 GLN Allocation</u> <u>Rules Standard</u>.

GS1 key

Required

GLN

Rules

GLN rules described in section 4.5.

Attributes

Required

Not applicable

Optional

The GS1 Application Identifier (254) may be used to represent the GLN extension component in conjunction with AI (414).

For more information, see section 3.2 for the list of GS1 Application Identifiers.

Rules

See section <u>4.13</u> *Data relationships* for definitions of invalid pairs and mandatory associations of element strings.



Data carrier specification

Carrier choices

The GS1 data carriers that can be used to represent the GLN or GLN + GLN extension component are:

- GS1-128
- GS1 DataMatrix
- GS1 QR Code
- EPC/RFID (see section 3.11 and the most recent version of the EPC Tag Data Standard)

Note: When EPC/RFID is used, it SHALL be in addition to one of the above-mentioned barcode symbologies. When there is a business need, the associated barcode can carry a GLN extension component (AI (254)). In that case, the value of AI (414) and AI (254) in the EPC/RFID tag and associated barcode SHALL be the same (see Section 4.15.1).

Note: GS1's <u>EPC Tag Data Standard</u> (TDS) defines the SGLN as a Global Location Number (GLN), with or without the optional extension AI (254), which is used to identify physical locations. Examples of such locations include a specific building or unit of shelving within a warehouse. For more information on EPC/RFID carriers see the <u>EPC Tag Data Standard</u>.

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

See section <u>5.12.3.9</u>, *GS1 symbol specification table* 9.

Symbol placement

Not applicable

Unique application processing requirements

For a description of processing requirements, see section $\underline{7}$.

2.4.3 Physical locations in business processes

Application description

The following GS1 Application Identifiers enable the specification of a physical location on a label or document, relative to its role in a business process:

- AI (410) Ship to Deliver to
- AI (413) Ship for Deliver for
- AI (416) Production or service location

AI (410) Ship to - Deliver to

An element string with GS1 Application Identifier AI (410) represents the Global Location Number (GLN) of the recipient of a logistic unit. The GLN refers to the address where a particular transport unit identified with an SSCC is to be delivered. This element string is used in single leg transport operations. A logistic unit may include a barcode carrying the GLN of the unit's intended destination. When scanning this element string, the data transmitted may be used to retrieve the related address and/or to sort the item by destination.

AI (413) Ship for - Deliver for

An element string with GS1 Application Identifier AI (413) is used by the consignee for determining the internal or subsequent final destination of a physical unit.



Cross docking is a typical application using this element string. Here, a barcode carrying the element string AI (410) is placed on a logistic unit at the point of creation to direct the goods to the intermediate destination (e.g., a distribution centre). The element string AI (413) is also carried by the barcode to direct the goods to their final destination (e.g., a retail store served by the distribution centre).





AI (416) GLN of the production or service location

An element string with a GS1 Application Identifier AI (416) represents the Global Location Number (GLN) of the production or service location. It may for example be used to specify the location where a trade item or asset was produced or refurbished.

GS1 key

Required

GLN

Rules

All GLN rules described in section 4.5.

Attributes

Not applicable

Data carrier specification

If the GLN is carried in a barcode or EPC/RFID tag on a product, the rules for trade item applications apply, see section 2.1.

If the GLN is carried in a barcode on a GS1 Logistics Label, the rules for logistic unit applications apply, see section 2.2.

Unique application processing requirements

For a description of processing requirements, see section \underline{Z} .



2.4.4 Identification of a party

Application description

GS1 Application Identifier (417) enables the identification of a party using a data carrier.

AI (417) Party GLN

The GLN can be used to identify a party represented in a data carrier on documents, locations, or other places where value could be added. Parties may, for example, legal entity, government body, accounting department, or other business function.

The element string may be used to record and confirm presence of a party for any purpose. An equivalent field will hold this information in electronic messages.

GS1 key

Required

GLN

Rules

All GLN Rules described in section 4.5.

Attributes

Required

Not applicable

Optional

For more information, see section 3.2 for the list of GS1 Application Identifiers.

Rules

See section 4.13 Data relationships.

Data carrier specification

Carrier choices

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

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



Note: GS1's <u>EPC Tag Data Standard</u> (TDS) defines the PGLN as a Global Location Number (GLN) for a party. Examples of such parties include an economic operator or a cost centre. For more information on EPC carriers see the <u>EPC Tag Data Standard</u>.

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

See section <u>5.12.3.9</u>, GS1 symbol specification table 9.



Note: For location marking barcodes may be printed at a higher maximum X-dimension: GS1-128 at 1.016 mm (0.0400 inches), GS1 DataMatrix and GS1 QR Code at 1.520 mm (0.0600 inches).



GS1 key

Required

GTIN

Rules

The base GTIN-14, indicator digit 9 in combination with the Made-to-Order variation number comprises the key for a custom trade item. The base GTIN-14 is comprised of indicator digit 9, GS1 Company Prefix followed by an item reference and a check digit. The Made-to-Order Variation number is variable length, numeric, up to and including six digits.

Attributes

AI (01) is used for the GTIN-14, indicator digit 9, plus AI (242) for the Made-to-Order variation number when the item is considered a trade item. The combination of AI (02) plus AI (242) and AI (37) Count of trade items contained in a logistic unit, is used in conjunction with an (00) Serial Shipping Container Code when marking a logistics unit of custom trade items.

Data carrier specification

Carrier choices

- GS1-128
- GS1 DataBar
- GS1 DataMatrix
- GS1 QR Code

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

See section 5.12.3.4, GS1 symbol specification table 4.

Symbol placement

Not applicable

2.6.9 Global Document Type Identifier for document control

Introduction

The Global Document Type Identifier is the GS1 identification key used to identify documents, electronic messages and digital files for the purposes of document control. Any aspect of referenced modification, version control, specific instance recording would fall into the process of document control, either internal or externally with trade partners, where unique identification is required.

The term "document" is applied broadly to cover any paper(s) or digital file(s). The Global Document Type Identifier (GDTI) can be used to identify any type of document including but not limited to:

- Commercial documents (e.g., invoice, purchase order)
- Documents that infer a right (e.g., proof of ownership)
- Documents that infer an obligation (e.g., notification or call for military service)
- Identification documents (e.g., driver's licence, passport)
- Digital files
- Electronic messages

Application description

Physical documents and electronic messages used in communications with other parties often include a unique number that can be used as a reference. Also, digital files shared with other parties



may require a unique identifier to ensure the use of the right type and version. The issuer of the document is normally responsible for the identification of the document.

The GDTI enables issuers to assign globally unique identifiers to documents and, where applicable, to physically mark these on the physical version(s) in barcode or EPC/RFID format.

Examples of documents that can be identified with the GDTI include, but are not limited to:

- Land registration papers
- Tax demands
- Proof of shipment/receipt forms
- Custom's clearance forms
- Insurance policies
- Internal invoices
- National press documents
- Educational papers
- Transporting company documents
- Mail company documents
- Images

GS1 key

Required

GDTI

The GS1 Application Identifier to indicate the Global Document Type Identifier (GDTI) is AI (253), see section 3.2.

Rules

See section <u>4.7</u>, *GDTI rules*.

Attributes

Required

Not applicable

Optional

For all the GS1 Application Identifiers that may be used with an GDTI, see section 3.2

Data carrier specification

Carrier choices

- GS1-128
- GS1 DataMatrix
- GS1 QR Code
- EPC/RFID (see section 3.11 and the most recent version of the EPC Tag Data Standard)

Note: When EPC/RFID is used, it SHALL be in addition to GS1-128 or GS1 DataMatrix or GS1 QR Code. GDTI must be serialized. When there is a business need, the associated barcode can also carry a serialized GDTI. In that case the value of the serialized GDTI in the EPC/RFID and associated barcode SHALL be the same (see Section 4.15.1).

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

See section <u>5.12.3.9</u>, GS1 symbol specification table 9.



2.6.12.2 Identification requirements

Components/Parts that meet the requirements described above can be identified by a C/P Identifier that has the following characteristics:

- The C/P Identifier comprises a GS1 Company Prefix and C/P reference assigned by the GS1 Company Prefix holder.
- The C/P reference format is variable length. The Component/Part reference SHALL only consist of numeric, alphabetic upper-case or special characters "#", "-", or "/"
- The total length of the identifier SHALL NOT exceed 30 characters.
- The C/P Identifier would be classified as a "GS1 key" according to the current GS1 definitions. However it is not to be used in open supply chains but can be used as primary identifier in barcoding applications, EPC/RFID and EPCIS.

GS1 key

Required

CPID

The GS1 Application Identifier to indicate the Component/Part Identifier (CPID) is AI (8010), see section 3.2.

Rules

The C/P Identifier would be classified as a "GS1 key" according to the current GS1 definitions. However it is not to be used in open supply chains.

Attributes

Required

Not applicable

Optional

The C/P Identifier may be supplemented by an optional serial number. The format of the serial number is numeric only, maximum 12 digits. See GS1 Application Identifier (8011) Component/Part Identifier in section 3.9.11 and also for all the GS1 Application Identifiers that may be used with a CPID, see section 3.2.

Data carrier specification

Carrier choices

- GS1-128
- GS1 DataMatrix
- GS1 QR Code
- EPC/RFID (see section 3.11 and the most recent version of the EPC Tag Data Standard)

Note: When EPC/RFID is used, AI (8011), Component/Part Identifier serial number, must be used in addition to AI (8010). When there is a business need, the associated barcode can also carry AI (8011). In that case, the value of AI (8010) and AI (8011) in the EPC/RFID tag and associated barcode SHALL be the same (see Section 4.15.1).

Data carrier specifications are to be provided by the OEM to its partners.

Symbol placement

Not applicable



Unique application processing requirements

Not applicable

2.6.13 Global Model Number (GMN)

Application description

The GS1 Global Model Number (GMN) is the GS1 identification key that may be used to identify a product model (e.g., medical device family, apparel style, consumer electronics model) based on attributes common to the model as defined by the brand owner in accordance with industry guidelines (where available) or regulation. The product model is the basis from which related trade items are derived. GMN comprises the GS1 Company Prefix, a model reference and check character pair. The model reference utilises characters from GS1 AI encodable character set 82 and its structure is left to the discretion of the brand owner who assigns it. (see section 3.9.13)

This GS1 identification key, once assigned to one product model, SHALL NOT be reissued to another product model. The GMN SHALL NOT be used to identify a trade item. A GMN is an attribute of a trade item identified with a GTIN. A GMN is directly correlated to one or more GTINs, a GTIN SHALL only be associated with one GMN.

The Global Model Number can be used by any industry but for regulated healthcare medical devices the following applies:

Regulated healthcare medical devices

For regulated healthcare medical devices, the GMN is the GS1 identification key to support the implementation of the Basic UDI-DI requirements.

For regulated healthcare medical devices, the Basic UDI-DI serves as the key element in the UDI regulatory database for medical devices.

By providing an identifier for a medical device family, the GMN will link medical device trade item(s) identified by GTIN(s) in the UDI database to pre-market and post-market activities (e.g., certificates, declaration of conformity, vigilance, market surveillance and clinical investigations).

The following points highlight the relationship between Basic UDI-DI (GMN) and UDI-DI (GTIN.)

- Basic UDI-DI (GMN) is used for medical device registration and is assigned independent of packaging/labelling and is different from the identifier for trade items in the supply chain (UDI-DI(GTIN)).
- All Basic UDI-DI (GMN) level attributes (in the UDI regulatory database) are common for all GTINs associated with it.
- All attributes across all UDI-DIs (GTINs) associated with one Basic UDI-DI (GMN) may not be common.
- The Basic UDI-DI (GMN) is used for device registration in the registration database. The UDI-DI (GTIN) is used for trade item identification in the UDI database. UDI-DI (GTIN) and Basic UDI-DI (GMN) allocation may occur before, in parallel, or after each other and attribution and/or linkage between the entities is only possible once both entities exist. For this reason, allocation of UDI-DI (GTIN) and Basic UDI-DI (GMN) shall be made independent of one another.
- Brand owners are responsible for the assignment of Basic UDI-DI (GMN) and UDI-DI (GTIN.)

GS1 key

Required

GMN

The GS1 Application Identifier to indicate the Global Model Number is AI (8013), see section 3.2.

Rules

See section 4.12.



- The Global Model Number SHALL NOT be used as a replacement for the GTIN.
- The GTIN SHALL NOT be used as a replacement for the Global Model Number.

For regulated healthcare medical devices, the following applies:

- At any given time, the relationship between Basic UDI-DI (GMN) and UDI-DI (GTIN) is 1:n (can be one to one or one to many), meaning a Basic UDI-DI (GMN) can be related to more than one UDI-DI (GTIN).
- Basic UDI-DI (GMN) SHALL NOT be used for supply chain identification or transactional purposes (e.g., labels, orders, deliveries, payments). Only the UDI-DI (GTIN) SHALL be used in the supply chain.
- UDI-DI (GTIN) SHALL NOT be used as a replacement for Basic UDI-DI (GMN).
- In documentation, Basic UDI-DI (GMN) shall be displayed as a single data field, but formatting such as bold or italics may be used within text representation of the identifier to increase efficiency and accuracy of key-entry. Spaces are not permitted as characters in the Basic UDI-DI (GMN).

For construction industry, the following apply:

• The Global Model Number may be processed as stand-alone information where applicable or with a GTIN on the same item. See sections 2.1.7 and 4.15 for the use of the GMN together with GTIN.

Attributes

Not applicable

Data carrier specification

GMN is a GS1 identification key not intended for use in a data carrier except for the construction industry.

For regulated healthcare medical devices, the Basic UDI-DI (GMN) SHALL NOT be used in any labelling, physical marking, or GS1 AIDC data carrier on trade items associated with the Basic UDI-DI (GMN). The GMN MAY be included on documents or certificates, and in that case the rules for data content, format and data title in <u>3.9.13</u> apply.

Carrier choices

For the construction industry the following carrier choices apply:

- GS1 DataMatrix
- GS1 QR Code
- EPC/RFID (within user memory only)

Note: If the item is also scanned as a retail trade item a barcode that conforms to retail specifications is required.

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

See section <u>5.12.3.4</u>, GS1 symbol specification table 4.

Symbol placement

Not applicable

Unique application processing requirements

For a description of processing requirements, see section 7.



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.). 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 <u>EPC/</u>RFID tagging: The process of applying an <u>EPC/</u>RFID tag that is intended to remain permanently affixed to the item, part, or asset.

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 4.2, and GIAI and GRAI in section 4.4.

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	Кеу	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 <u>3.11</u> and the most recent version of the <u>EPC Tag Data Standard</u>.



Optional

See section $\underline{3}$ 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 (see section 3.11 and the most recent version of the EPC Tag Data Standard)

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

Figure 2.6.14-2. Carrie	r choices for	regulated health	ncare retail con	sumer 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



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



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 life cycle. 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 section 5.6.3.2).

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

Durable labelling and marking:

For long distance scanning see section <u>5.12.3.13</u>, GS1 symbol specification table 13.

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

Symbol placement

General principles on placement of barcodes are described in section $\underline{6}$.

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 $\underline{7}$ and section $\underline{5.12.4.3}$.

2.6.15 Encoding transport process information

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 supply chain 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 <u>GS1 Encoding</u> <u>Transport Process Information Implementation Guideline</u>.

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 4.3.

Attributes

Required

Not applicable



Optional

To provide optional transport process information, see figure below for a listing of GS1 Application Identifiers. For all the GS1 Application Identifiers that may be used with an SSCC in support of encoding transport process information and their format, see section 3.2.

AI	Data Content	Permits Non-Latin Characters
420	Ship-to / Deliver-to postal code with a single postal authority	
4300	Ship-to / Deliver-to company name	Х
4301	Ship-to / Deliver-to contact	Х
4302	Ship-to / Deliver-to address line 1	х
4303	Ship-to / Deliver-to address line 2	х
4304	Ship-to / Deliver-to suburb	Х
4305	Ship-to / Deliver-to locality	х
4306	Ship-to / Deliver-to region	х
4307	Ship-to / Deliver-to country code	
4308	Ship-to / Deliver-to telephone number	
4309	Ship-to / Deliver-to GEO location	
4310	Return-to company name	Х
4311	Return-to contact	Х
4312	Return-to address line 1	х
4313	Return-to address line 2	Х
4314	Return-to suburb	х
4315	Return-to locality	х
4316	Return-to region	х
4317	Return-to country code	
4318	Return-to postal code	
4319	Return-to telephone number	
4320	Service code description	х
4321	Dangerous goods flag	
4322	Authority to leave	
4323	Signature required flag	
4324	Not before delivery date time	
4325	Not after delivery date time	
4326	Release date	
4330	Maximum temperature in Fahrenheit (expressed in hundredths of degrees)	
4331	Maximum temperature in Celsius (expressed in hundredths of degrees)	
4332	Minimum temperature in Fahrenheit (expressed in hundredths of degrees)	
4333	Minimum temperature in Celsius (expressed in hundredths of degrees)	
7041	UN/CEFACT freight unit type	

Figure 2.6.15-1. Application Identifiers used to support the transport process



To encode non-Latin characters within the alphanumeric value, use percent-encoding as defined within $\underline{\text{RFC 3986}}$. A space character should be encoded as a single plus symbol, +.

Rules

All transport process information rules see section $\underline{7}$.

For general human readable interpretation rules see section 4.14.

Data carrier specification

Carrier choices

- GS1-128
- GS1 DataMatrix
- GS1 QR Code
- EPC/RFID (see section 3.11 and the most recent version of the EPC Tag Data Standard)

The mandatory data carrier used to represent the SSCC on individual logistic units is the GS1-128 barcode symbology.

As indicated by figure 2.6.15, 2D barcodes MAY be included in addition to the GS1-128 symbol. When used, the 2D barcode SHALL include all element strings included in the GS1-128 symbol(s) and MAY include additional element strings.

If a logistic unit does not have at least one surface area greater than an A6 or $4" \times 6"$ logistic label (see section <u>6.6.4.5</u>), a GS1 DataMatrix or GS1 QR Code MAY be used by itself on a logistic label, though a GS1-128 containing a SSCC is still recommended. If a logistic label is used with only a GS1 DataMatrix or GS1 QR Code, care must be taken to ensure trading partners are able to scan this barcode.

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

For GS1-128, GS1 DataMatrix and GS1 QR Code, see section 5.12.3.5 GS1 symbol specification table 5.

Symbol Placement

All the symbol placement guidelines in section $\underline{6}$.

Unique application processing requirements

For a description of processing requirements, see section $\overline{2}$. Note that some transport process information may include accented / non-Latin characters and space characters which are not available in the subset of *ISO/IEC 646 International Reference Version* defined in figure $\overline{7.11}$ -1 used for all GS1 Application Identifier (AI) element strings. Encoding these characters can be accomplished using percent encoding as defined in RFC 3986 while using existing characters from the subset of *ISO/IEC 646 International Reference Version* defined in figure $\overline{7.11}$ -1. Note that space character can be encoded as a plus symbol (+) as an alias of %20.

2.6.16 Digital Signature (DigSig)

Application description

Digital signatures provide the ability to check:

- The data has not been changed (tamper detection)
- The provenance of the data, i.e., who digitally signed the data (non-repudiation)

ISO/IEC 20248: *Information technology — Automatic identification and data capture techniques — Digital signature data structure schema* (<u>https://www.iso.org/standard/81314.html</u>) specifies a method to add a digital signature, and other verifiable data, to a barcode or <u>EPC/RFID</u> data construct by which the verification of the following can be achieved without the need to connect to an external data source:

The link with the physical object by using physical features and security marks.



 By using the unique and secured chip ID, it is possible to detect if the data on a specific <u>EPC/</u>RFID tag has been cloned from another tag.

An ISO/IEC 20248 data construct is commonly known as a DigSig, a named thing with a specific meaning, while "digital signature" in lower case refers to the general and common digital signature.

Digital signatures can be stored within an AIDC data carrier or retrieved from an online resource. Application Identifier (8030) indicates that its value is an ISO/IEC 20248 DigSig data structure, which is an efficiently compressed data envelope that contains a digital certificate ID, digital signature, timestamp, as well as data. The signature is calculated over some data values that may be present within the DigSig envelope, as well as other data values that need to be sourced from elsewhere, such as entering a PIN number or reading a code from a security marking (e.g., hologram, UV ink mark) on the product, before attempting to verify the signature. In this way, ISO/IEC 20248 supports a strong binding between the digital signature and the physical object to which the data corresponds.

An alternative approach using an online digital signature can support a similarly strong binding to the physical object if the digitally signed data uses properties defined within the GS1 Web vocabulary - see https://gs1.org/voc/AuthenticityDetails. In a similar manner to ISO/IEC 20248, it is possible to include a value within the calculation of the digital signature, while omitting it from the data payload, forcing the verifying party to retrieve the missing data value from elsewhere, e.g., from a known PIN number or from a code read from a security marking on the physical object. Formats for online digital signatures include JSON Web Signatures (JWS), XML Signatures or Verifiable Credentials. Resolver infrastructure for GS1 Digital Link can be used (e.g., with linkType=gs1:jws) to find sources of digitally signed data for a GS1 Digital Link URI (or for its equivalent element string).



Note: For regulated healthcare trade items, Digital Signature (DigSig) SHALL NOT be used in any labelling, physical marking, or GS1 AIDC data carrier on associated trade items.

The following keys are viable keys for use with a Digital Signature (DigSig).

GS1 Key

Required

The following key formats are allowed in this application:

- GTIN-8
- GTIN-12
- GTIN-13
- GTIN-14
- ITIP
- SSCC
- GRAI
- GIAI
- GSRN (Provider)
- GSRN (Recipient)
- GCN
- GDTI
- CPID

Rules

All application rules, for the relevant GS1 key, are described in section $\underline{4}$.



Attributes

Required

AI (8030) Digital Signature (DigSig)

Instance level identification is required in addition to AI (8030), see Table 4-1 Entities identified by GS1 identification keys (simple or compound) within the <u>GS1 System Architecture document</u>.

Optional

Not applicable

Rules

Not applicable

Data carrier specification

Carrier choices

The data carriers required to carry a DigSig are listed below however specifications for data carriers are established with the application standards for the GS1 Identification keys. In some applications, one of the data carriers below are permitted without needing any other data carriers on the entity being identified. In other application standards, one of the data carriers below are permitted in addition to another data carrier that is incapable of encoding DigSig (e.g., EAN/UPC, GS1-128, ITF-14, GS1 DataBar)

- GS1 DataMatrix
- GS1 QR Code
- Data Matrix (GS1 Digital Link URI)
- QR Code (GS1 Digital Link URI)
- EPC/RFID (see section 3.11 and the most recent version of the EPC Tag Data Standard)

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

To determine which Symbol Specification Table is applicable, please refer to the relevant application standard for the required GS1 key, in section 2.

Symbol placement

Not applicable

Unique application processing requirements

For a description of processing requirements, see section $\underline{7}$.

2.6.17 Restricted application – highly individualised device identifier via Master Unique Device Identifier – Device Identifier (MUDI-DI)

Application description

MUDI-DI meets a EUDAMED registration requirement for highly individualised medical devices. The first published regulatory requirement covers contact lenses, per both Made-to-Stock (standard contact lenses per regulation (EU) 2017/745 as amended 7 October 2023) and Made-to-Order contact lenses. Future regulation may cover additional device types. MUDI-DI permits consolidated EUDAMED registration of standard contact lenses with similar clinical parameters according to identifiers specified per the two scenarios below:

For devices that are currently identified by GTIN, MUDI-DI, not GTIN, serves as the UDI-DI. For MUDI-DI the Highly Individualised Device Registration Identifier (HIDRI): AI (8014) is used instead of GTIN for device registration within EUDAMED. The Highly Individualised Device Registration Identifier (HIDRI) is a restricted application use of the GS1 Global Model Number (GMN). GTINs allocated according to existing rules associated with AI (01) for Made-to-Stock