



General Specifications Change Notification (GSCN)

The Global Language of Business

WR #	GSCN Name	Effective Date
20-323	Clarifying term Add-on.	

Associated Work Request (WR) Number:

20-207 – Gen Spec Continuous Improvement
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Background: Gen Spec Continuous Improvement

This is an output from the glossary community review resolution clarifying term Add-on.

GS1 General Specification Change:

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

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**Figure 2.1.3.3-1.** GTIN-8 data structure

GS1-8 Prefix			Item reference				Check digit
N ₁	N ₂	N ₃	N ₄	N ₅	N ₆	N ₇	N ₈

The GS1-8 Prefix is a unique string of three digits issued by GS1 Global Office. See section [1.4.3](#) for the GS1-8 Prefixes used in this element string.

The item reference is assigned by the GS1 Member Organisation. The GS1 Member Organisations provide procedures for obtaining GTIN-8s.

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

GS1 key**Required**

- GTIN-8

Rules

All the GTIN rules described in section [4](#).

Attributes**Required**

Not applicable

Optional

For all the GS1 Application Identifiers (AI) that can be used with a GTIN, see section [3](#).

Rules

Not applicable

Data carrier specification**Carrier choices**

- EAN-8 (carrying a GTIN-8)
- GS1 DataBar Retail POS family (carrying a GTIN-8)

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

See section [5.12.3.15-10-3-1](#), *GS1 symbol specification table 1*.

Symbol placement

All the symbol placement guidelines defined in section [6](#).

Unique application processing requirements

For a description of processing requirements, see section [7](#).

2.1.3.4 Hardcover books and paperbacks scanned at retail POS using ISBN, GTIN-13, or GTIN-12**Application description**

When identifying books and paperbacks a company may identify them in the same manner as any other retail trade items (see section [2.1.3](#)). However, the recommended option is to use the International Standard Book Number (ISBN numbering system). The GS1 Prefixes 978 and 979¹ have been allocated to ISBN (<http://www.isbn-international.org/>), which allocates numbers from these 'Bookland' prefixes.

¹ Within GS1 Prefix 979 a subset 9790 has been allocated to the International ISMN Agency for notated music.



Note: ISBNs SHALL NOT be allocated to non-book products even if the products are related to a book (e.g., teddy bears, coffee mugs, T-shirts, etc. related to a book launch). Such non-book products SHALL be identified and barcoded in the same manner as any other retail trade item (see section 2.1.3). A trade item grouping of identical book items would normally be identified according to section 2.1.7.2. However, an ISBN may also be used to create a 14-digit GTIN with an indicator to identify a trade item grouping of identical book items (refer to section 2.1.7.2) provided that the publisher that issues the 14-digit GTIN is a member of a GS1 organisation or is authorised to act through an agreement between its local GS1 Member Organisation and the local organisation representing publishers.

GS1 key

Required

The allowed key formats for this application are:

- ISBN using GS1 Prefix 978 or 979
- GTIN-12
- GTIN-13

Rules

All the GTIN rules described in section 4.

Attributes

Required

Not applicable

Optional

Some publishers may wish to communicate additional information in a barcode in order to meet their internal requirements. For example, publishers may wish to include an edition variant (e.g., unchanged reprint, price increase), which is not distinguished by the ISBN, GTIN-13, or GTIN-12. The GS1 system provides an additional two- or five-digit symbol, called an add-on symbol that can be included on the item just to the right of the main **barcodesymbol**.

A two-digit or five-digit add-on number provides more information about a particular publication of the printed item, but it is not required for the identification of the title itself. This figure shows the format of a two-digit add-on:

Figure 2.1.3.4-1. Two-digit add-on format

Supplementary information	
N ₁	N ₂

The supplementary information consists of numeric data of any structure and meaning. It is the publisher's responsibility to define the numbering scheme.

The data carrier for this element string is the two-digit add-on symbol.

The system recognises this element string by the symbology identifier **JE1**. The two-digit add-on symbol must be jointly used with a UPC-A, UPC-E or EAN-13 barcode. It is never scanned alone, and the data from both barcodes can be used together for processing.

This figure shows the format of a five-digit add-on:

Figure 2.1.3.4-2. Five-digit add-on format

Supplementary information				
N ₁	N ₂	N ₃	N ₄	N ₅

The supplementary information consists of numeric data of any structure and meaning. It is the publisher's responsibility to define the numbering scheme. The data carrier for this element string is the five-digit add-on symbol.



The system recognises this element string by the symbology identifier **JE2**. The five-digit add-on symbol must be jointly used with a UPC-A, UPC-E or EAN-13 barcode. It is never scanned alone, and the data from both barcodes can be used together for processing.

Rules

Add-on symbols involve the following constraints:

- They SHOULD NOT contain information that should rightly be looked up using the item's GTIN-13 (or GTIN-12).
- The reading of the add-on symbol by the retailer's point-of-sale system is optional.
- The use of the add-on symbol is the responsibility of each publisher.

Data carrier specification

Carrier choices

Individual books and paperbacks SHOULD be marked with an EAN-13, UPC-A, or UPC-E barcode that complies with the print quality specifications applicable to all GS1 system barcodes. The EAN/UPC 2-digit or 5-digit Add-on symbols are options used with the above EAN/UPC symbols.

Groupings of identical book items and paperbacks SHOULD be marked with GS1-128 or ITF-14, see section [2.1.7.2](#).



Note: When identifying serial publications, see section [2.1.3.5](#).

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

See section [5.12.3.15-10.3-1](#), *GS1 symbol specification table 1*.

Symbol placement

All the symbol placement guidelines defined in section [6.4](#).

Unique application processing requirements

For description of processing requirements, see section [7](#).

2.1.3.5 Serial publications scanned at retail POS using ISSN, GTIN-13, or GTIN-12

Application description

The first and recommended option is to make use of the International Standard Serial Number (ISSN) system. The GS1 Prefix 977 is used for encoding the ISSN assigned to a particular item without its check digit.

The second option is to identify serial publications in the same manner as any other trade item: using the GTIN-13 or GTIN-12 data structure.

The third option involves using a special GS1 Company Prefix (assigned by a GS1 Member Organisation within its territory), the publication number, and the price of the publication (provided that the national legislation allows this). With this option, the price is placed in clearly defined positions and is directly usable in the country of publication. However, as soon as the item leaves the country, the price has no direct significance, and the GTIN must be interpreted in a general way without being broken down internally.

Figure 2.1.3.5-1. Format of the element string

GS1 Prefix	ISSN (without its check digit)							Variant	Check digit
9 7 7	N ₄	N ₅	N ₆	N ₇	N ₈	N ₉	N ₁₀	N ₁₁ N ₁₂	N ₁₃

The variant digits N₁₁ and N₁₂ may be used to express variants of the same title for issues with a different price or to identify different issues of a daily within one week. Normal title takes value 00.

**GS1 key****Required**

The allowed key formats for this application are:

- ISSN using GS1 Prefix 977
- GTIN-12
- GTIN-13

Rules

All the GTIN rules described in section 4.

Attributes**Required**

Not applicable

Optional

Some publishers may wish to communicate additional information in a barcode in order to meet their internal requirements.

A two-digit or five-digit add-on number provides more information about a particular publication of the printed item, but it is not required for the identification of the title itself.

This figure shows the format of a two-digit add-on:

Figure 2.1.3.5-2. Two-digit add-on format

Supplementary information	
N ₁	N ₂

GS1 recommends the use of the following number assignment:

- Dailies (or more generally publications with several issues a week): The publications of each day of the week are considered separate trade items that must be identified with a separate identification number represented in an EAN-13, UPC-A, or UPC-E symbol. The two-digit add-on number should only be used to represent the applicable week, which, together with the GTIN-13 or GTIN-12, establishes the day within the year.
- Weeklies: Number of the week (01 – 53).
- Bi-weeklies: Number of the first week of the respective period (01 – 53).
- Monthlies: Number of the month (01 – 12).
- Bi-monthlies: Number of the first month of the respective period (01 – 12).
- Quarterlies: Number of the first month of the respective period (01 – 12).
- Seasonal period: First digit = last digit of the year; second digit = 1 spring, 2 summer, 3 autumn, 4 winter.
- Bi-annual period: First digit = last digit of the year; second digit = number of the first season of the respective period.
- Annuals: First digit = last digit of the year; second digit = 5.
- Special intervals: Consecutively numbered from 01 to 99.

The add-on number is carried by a two-digit add-on symbol that is placed to the right of the symbol and parallel to it. The add-on symbol must comply with the print quality specifications applicable to all GS1 system barcodes. For example, the X-dimension applied to the main barcode must also be applied to the add-on symbol.

Serial publications can also use a five-digit add-on number carried by a five-digit add-on symbol. The reading of the add-on symbol at a point-of-sale is optional. The add-on symbol must not be used to encode information that should be contained within the Global Trade Item Number (GTIN). The add-on symbol provides additional information about a particular publication of a printed item,

and it is the publisher's responsibility to define the numbering scheme. This figure shows the format of a five-digit add-on:

Figure 2.1.3.5-3. Five-digit add-on format

Supplementary information				
N ₁	N ₂	N ₃	N ₄	N ₅

Information that can be encoded in the five-digit add-on symbol includes the actual date of issue, in order to differentiate between successive issues.

The five-digit add-on symbol is placed to the right of the main [barcode-symbol](#) and parallel to it. The add-on symbol must comply with the print quality specifications applicable to all GS1 system barcodes. For example, the X-dimension applied to the main symbol also must be applied to the add-on symbol.

Rules

When using a five-digit add-on symbol, a two-digit add-on symbol cannot also be used.

Data carrier specification

Carrier choices

Serial Publications SHOULD be marked with an EAN-13, UPC-A, or UPC-E barcode that complies with the print quality specifications applicable to all GS1 system barcodes. The EAN/UPC two-digit or five-digit add-on symbols are options used with the above EAN/UPC symbols.

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

See section [5.12.3.15-10.3.1](#), *GS1 symbol specification table 1*.

Symbol placement

All the symbol placement guidelines defined in section [6.4](#).

Unique application processing requirements

For a description of processing requirements, see section [7](#).

2.1.3.6 Fixed measure fresh food trade items scanned at retail POS

Application description

Fresh foods includes product categories such as: fruits, vegetables, meat, seafood, bakery and ready-to-serve food such as cheeses, cold cooked or cured meats, and salad, etc.

In this application there are different scenarios:

- Loose produce: Picked as an each – sold as an each.
- Fresh food: Pre-packed with same weight or count.

Loose produce trade items sold as an each

Loose produce are fruits and vegetables which are delivered to the store loose, in boxes or cases. Loose produce can then be displayed on the shelf allowing for the consumer to pick the product quantities needed. If loose produce has been defined to be sold by the each then they are treated in the same way as the retailer sells a can of soup or beans.

From a brand owner's perspective, the trade item is a fixed measure trade item identified with a GTIN with no additional attributes necessary to complete transaction.

Pre-packed fresh food trade items

When fresh foods trade items, whether loose produce or cut from a bulk item or cut into pieces are pre-packaged as a fixed measure trade item then the trade item is also treated like any other fixed measure trade item identified with a GTIN with no additional attributes necessary to complete transaction.



4.16 Multiple barcode management practices for trade items (cross-sector)

When additional barcodes are introduced into an existing scanning environment or business application existing barcodes must remain acceptable. This section provides a set of management practices intended to permit the use of multiple barcodes on the same package.

4.16.1 Multiple barcode management practices for trade items (all sectors)

- 1. Current standards:** All scanning systems SHALL deploy symbology identifiers (see section [5.1.35.1-2](#)) and when using GS1 Application Identifiers, process them according to GS1 rules (see section [7.8](#)).
- 2. GTIN plus attribute(s) flag:** Where applications require additional data be captured in a multiple barcode symbol environment, modifications to systems should be made to automate this requirement to optimise efficiency.
- 3. Adjacent placement:** Wherever two symbols can be used for the same application (POS, POC, general distribution) they SHOULD be placed adjacent to one another. Adjacent placement of symbols SHALL never infringe on symbol Quiet Zones. The orientation (stack or row of symbols) or sequence (which symbol is placed on the left, right, top, or bottom) shall be determined by the brand owner. Where adjacent placement on one panel is not permitted based on space limitations, placement on adjacent panels SHOULD be attempted. This practice does not supersede any section [6](#) symbol placement rule (e.g.: 8 mm (0.3 inch) free space between symbols and panel edge.)
- 4. Non-adjacent placement:** Wherever two symbols are used for different applications (POS, B2C extended packaging), they SHOULD be placed non-adjacent to one another.
- 5. Obscure placement:** Wherever a symbol is used for production control purposes only, it SHOULD be made as obscure as possible or even obstructed on the trade item package.
- 6. Product URL barcode indication:** For barcodes encoding AI (01) (8200) see section [4.15](#) Human readable interpretation rules, rule 9.)
- 7. Use of GS1-128 or GS1 2D symbol as ~~secondary-supplemental~~ symbol with EAN/UPC or ITF-14 as the ~~primary-main~~ symbol.**
In general distribution, where EAN/UPC or ITF-14 is used to encode the GTIN and where a GS1-128 or GS1 2D symbol is used to encode GTIN attributes, the same GTIN SHALL be encoded in all GS1 symbols.
- 8. Use of GS1 2D symbol as ~~secondary-supplemental~~ symbol with GS1-128 as ~~primary-main~~ symbol:**
In general distribution, where GS1-128 is used to encode GTIN and attributes, these element strings at a minimum SHALL be encoded in the GS1 2D symbol.

4.16.2 GS1 multiple barcode management practice for general retail

In addition to the requirements outlined in section [4.16.1](#), the following rule applies to the use of multiple barcodes for general retail.

- **GTIN in GS1 DataBar processing:** In order to facilitate migration away from a multiple barcode environment where one retailer requires EAN/UPC and another GS1 DataBar Expanded, at a minimum, all general retailers SHALL be able to process the AI (01) GTIN from GS1 DataBar Expanded.

4.16.3 GS1 multiple barcode management practices for healthcare

In addition to the requirements outlined in section [4.16.1](#), the following rules apply to the use of multiple barcodes for healthcare.

- 1. GTIN in GS1 DataMatrix and GS1 DataBar processing (retail healthcare):** In order to facilitate migration away from a multiple barcode environment where one retail pharmacy requires EAN/UPC and another retail pharmacy requires GS1 DataMatrix or GS1 DataBar Expanded, at a minimum, retail pharmacies SHALL have the capability to process the AI (01) GTIN from GS1 DataMatrix and GS1 DataBar in addition to the capability for EAN/UPC.

**Figure 5.2.2.4.1-4.** Zero suppression example 3

Example 3	Original data	Zero-suppressed	Rule
	0 3 4 0 0 0 0 5 6 7 3	3 4 5 6 7 0	2c
		B B A A A B	

Figure 5.2.2.4.1-5. Zero suppression example 4

Example 4	Original data	Zero-suppressed	Rule
	0 9 8 4 0 0 0 0 7 5 1	9 8 4 7 5 3	2d
		B B A B A A	



Note: The number sets used to implicitly encode the check digit are shown in the zero-suppressed column.

5.2.2.4.2 Decoding a UPC-E barcode

Derivation of the 12-digit data string from the characters encoded in the UPC-E barcode SHALL be performed according to figure 5.2.2.4.2-1.

Figure 5.2.2.4.2-1. Decoding a UPC-E barcode

Encoded UPC-E barcode digits								Decoded number											
	P1	P2	P3	P4	P5	P6		D1	D2	D3	D4	D5	D6	D7	D8	D9	D10	D11	D12
(0)	X1	X2	X3	X4	X5	0	(C)	(0)	X1	X2	0	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	X3	X4	X5	(C)
(0)	X1	X2	X3	X4	X5	1	(C)	(0)	X1	X2	1	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	X3	X4	X5	(C)
(0)	X1	X2	X3	X4	X5	2	(C)	(0)	X1	X2	2	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	X3	X4	X5	(C)
(0)	X1	X2	X3	X4	X5	3	(C)	(0)	X1	X2	X3	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	X4	X5	(C)
(0)	X1	X2	X3	X4	X5	4	(C)	(0)	X1	X2	X3	X4	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	X5	(C)
(0)	X1	X2	X3	X4	X5	5	(C)	(0)	X1	X2	X3	X4	X5	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	5	(C)
(0)	X1	X2	X3	X4	X5	6	(C)	(0)	X1	X2	X3	X4	X5	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	6	(C)
(0)	X1	X2	X3	X4	X5	7	(C)	(0)	X1	X2	X3	X4	X5	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	7	(C)
(0)	X1	X2	X3	X4	X5	8	(C)	(0)	X1	X2	X3	X4	X5	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	8	(C)
(0)	X1	X2	X3	X4	X5	9	(C)	(0)	X1	X2	X3	X4	X5	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	9	(C)
Notes:																			
■ The symbol characters at positions P1 and P2 through P5 of the UPC-E barcode are represented by X1 and X2 through X5.																			
■ Re-inserted zeroes are indicated by underlining.																			
■ The leading digit for UPC-E barcodes, which is not encoded, is indicated by "0".																			
■ The check digit implicitly encoded in UPC-E barcodes is indicated by "C".																			

5.2.2.5 Add-on symbols

The add-on symbols were designed ~~to encode information supplementary to that in the main barcode for use with EAN/UPC symbols~~ on periodicals, hardback, and paperback books. Because they provide reduced security, use of add-on symbols SHALL be limited to applications where rules in the application specification governing data format and content provide appropriate safeguards.

5.2.2.5.1 Two-digit add-on symbol

A two-digit add-on symbol may be used in specific applications to accompany an EAN-13, UPC-A, or UPC-E barcode. The two-digit add-on symbol is positioned following the right Quiet Zone of the main symbol and consists of the following:



The dimensions of EAN-13, UPC-A, EAN-8 and UPC-E barcodes are referenced to a defined set of dimensions referred to as the nominal size symbol. Refer to section [5.2.6.6](#) for dimensioned drawings of nominal size symbols.


The X-dimension at nominal size is 0.330 millimetre (0.0130 inch).

The width of each bar (dark bar) and space (light bar) is determined by multiplying the X-dimension by the module width of each bar (dark bar) and space (light bar) (1, 2, 3, or 4). There is an exception for characters 1, 2, 7, and 8. For these characters, the bars (dark bars) and spaces (light bars) are reduced or enlarged by one-thirteenth of a module to provide a uniform distribution of bar width tolerances and thus improve scanning reliability.

The reduction or enlargement in millimetres at nominal size of the bars (dark bars) and spaces (light bars) for the characters 1, 2, 7, and 8 in the number sets A, B, and C is shown in figure [5.2.3.1-1](#).

Figure 5.2.3.1-1. Reduction/enlargement for characters 1, 2, 7, and 8

Character value	Number set A		Number sets B and C	
	Bar (dark bar) mm	Space (light bar) mm	Bar (dark bar) mm	Space (light bar) mm
1	- 0.025	+0.025	+0.025	- 0.025
2	- 0.025	+0.025	+0.025	- 0.025
7	+0.025	- 0.025	- 0.025	+0.025
8	+0.025	- 0.025	- 0.025	+0.025


 **Note:** The existing symbol generation equipment that uses a value of 0.030 millimetre for the reduction/enlargement factor at nominal size will continue to be used for the foreseeable future.

5.2.3.2 Symbol height

For EAN-13, UPC-A, and UPC-E barcodes the height of the symbol at the nominal size is 22.85 millimetres (0.900 inch). For EAN-8 barcodes the height of the symbol at the nominal size is 18.23 millimetres (0.718 inch).

The height of any two-digit or five-digit add-on symbol used must not extend outside the symbol height dimensions of the **primary-main** symbol.

In EAN-13, EAN-8, UPC-A, and UPC-E barcodes, the bars (dark bars) forming the left, centre, and right guard bar patterns SHALL be extended downward by 5x (e.g., 1.65 millimetres (0.065 inch)). This SHALL also apply to the bars (dark bars) of the first and last symbol characters of the UPC-A barcode.

 **Note:** The height of an EAN/UPC barcode no longer includes the human readable interpretation and is the height of the bars only. The measurement of bar height does not include the extended height of either the guard patterns in EAN/UPC barcodes or the first and last symbol characters of a UPC-A barcode.

Symbol height is not modular.

5.2.3.3 X-dimension (magnification factor)

In the past the term "magnification factor" was extensively used to specify the size of a barcode. This technique relied upon setting a nominal size (100 percent) that was directly related to a given X-dimension. Since January 2000, the more precise term "X-dimension" has been used to specify permissible symbol sizes (see section [5.125-10](#)). The X-dimension of an add-on symbol SHALL be the same as the X-dimension of its associated main symbol.



5.2.3.4 Quiet Zone

The minimum Quiet Zone width required by the main barcode symbol is 7x. However, other minimum Quiet Zone dimensions are specified for some symbol types due to the size and location of their human readable interpretation. These dimensions are noted in figure 5.2.3.4-1.

Figure 5.2.3.4-1. Quiet Zone widths by version

Symbol version	Left Quiet Zone		Right Quiet Zone	
	Modules	mm*	Modules	mm
EAN-13	11	3.63	7	2.31
EAN-8	7	2.31	7	2.31
UPC-A	9	2.97	9	2.97
UPC-E	9	2.97	7	2.31
Add-ons (EAN)	7-12	2.31-3.96	5	1.65
Add-ons (U.P.C.)	9-12	2.97-3.96	5	1.65

* This is an example using an X-dimension of 0.330 millimetres.



Note: A useful device to help maintain the Quiet Zone in some production processes is to include a less than (<) and/or greater than (>) character in the human readable interpretation field, with its apex aligned with the edge of the Quiet Zone. If this device is used, the character(s) SHALL be positioned in accordance with the appropriate drawings in section 5.2.6.6.

5.2.3.5 Symbol length

The symbol length in modules, including the minimum Quiet Zones, SHALL be as indicated in the figure below.

Figure 5.2.3.5-1. Symbol length in modules

Symbol type	Length
EAN-13	113
UPC-A	113
EAN-8	81
UPC-E	67
Two-digit add-on	25
Five-digit add-on	52
EAN-13 or UPC-A and two-digit add-on	138
UPC-E and two-digit add-on	92
EAN-13 or UPC-A and five-digit add-on	165
UPC-E and five-digit add-on	119

5.2.3.6 Positioning of the add-on symbol

The add-on symbol SHALL NOT encroach on the right Quiet Zone of the main symbol. The maximum separation SHALL be 12X. The bottom edge of the bars (dark bars) in the add-on symbol SHALL be horizontally aligned with the bottom edge of the guard bars of the main symbol.

5.2.4 Reference decode algorithm

Decode algorithms are used by scanning equipment to convert the bar and space patterns of the barcode into data characters. As a matter of policy, GS1 makes no attempt to specify or standardise equipment beyond stating that it should be capable of reading symbols produced in accordance with the specifications laid out in this manual.



5.105.12 Barcode production and quality assessment

5.10.15.12.1 Introduction

This section has been evolving to meet the changes to data carriers and their use within the GS1 system. Some of those changes are, for example, dimension requirements, the introduction of new symbols (e.g., GS1 DataBar and Composite Component), and the shift from the use of analogue film masters to digital barcode files.

Consideration should be given to how these changes affect barcode production and the maintenance of quality in the production process.

5.10.25.12.2 Dimensional specifications and operational requirements

Over the years, operational requirements of GS1 system users have influenced the dimensional specifications of GS1 system symbols, and these dimensional specifications have in turn influenced the development of scanning system optics and printing processes. The dimensional requirements for each application area defined in section 2 are set out in the GS1 symbol specification tables (SSTs) (see section [5.12.35.10.3](#)). Each SST provides the following barcode specification detail:

- The barcode(s) specified by the GS1 system for each application area.
- The minimum, target, and maximum X-dimension (narrow element width) for the symbol, based on the scanning environment. Please note that a smaller X-dimension may result in a lower scanning performance.
- The minimum and target barcode height, based on the scanning environment. Please note that reducing the symbol height may result in a lower scanning performance.
- The Quiet Zone width and, for [primary-main](#) and [secondary-supplemental](#) symbols, the minimum and maximum separation between the two symbols. (These measurements are expressed as multiples of the X-dimension in the form nX.)
- The minimum ISO quality specification expressed as **g.g/aa/www**, where **g.g** is the minimum overall symbol grade to one decimal place (on a 4.0 scale), **aa** is the effective measuring aperture in thousandths of an inch, and **www** is the wavelength of the light source in nanometres.



Note: Please refer to section 2 for any specific application standard (such as section [2.1.6](#), *Healthcare secondary packaging*, and section [2.6.14](#), *Permanently marked items*) that may supplement or supersede these symbol specification tables for specific application areas.

Before determining the exact symbol specification required, additional factors, such as the scanning environment, SHALL be considered. These are summarised in section [5.12.2.15.10.2.1](#).

5.10.2.15.12.2.1 Role of the symbol's dimensional specifications

The four major dimensional specifications are the symbol's minimum, target, and maximum X-dimensions, and the symbol's minimum bar height. These dimensional characteristics are always specified for a particular operating environment. The minimum and maximum X-dimensions are determined by the scanner's operating range (field of view). The target X-dimension is the ideal size for a particular application, and is only affected by the choice between linear or two-dimensional symbols (when the application allows for both symbol types). The barcode's height is determined by the ergonomic aspects of product handling when using a scanner. These dimensional specifications are critical for the efficient use of all scanners.

5.10.2.25.12.2.2 Omnidirectional scanning and the term magnification

The EAN/UPC symbology was originally designed for omnidirectional scanners. For this type of scanner, the specifications define a fixed relationship between the symbol's width and height. The term "fixed aspect ratio" is used to refer to this fixed proportion. For example, an EAN-13 symbol with an X-dimension of 0.330 mm (0.0130 inch), its nominal dimension, has a width of 37.29 mm (1.468 inch) and a bar height of 22.85 mm (0.900 inch).. The term magnification has been used to



5.10.3-15.12.3.1 Symbol specification table 1 - Trade items scanned in general retail POS and not general distribution

Figure 5.12.3.1-1. GS1 symbol specification table 1

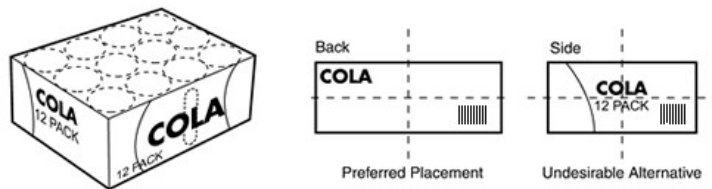
Primary Main symbol(s) specified	X-dimension mm (inches)			(**) Minimum symbol height for given X mm (inches)			Quiet Zone		Minimum quality specification
	(*) Minimum	Target	Maximum	For minimum X-dimension	For target X-dimension	For maximum X-dimension	Left	Right	
EAN-13	0.264 (0.0104")	0.330 (0.0130")	0.660 (0.0260")	18.28 (0.720")	22.85 (0.900")	45.70 (1.800")	11X	7X	1.5/06/660
EAN-8	0.264 (0.0104")	0.330 (0.0130")	0.660 (0.0260")	14.58 (0.574")	18.23 (0.718")	36.46 (1.435")	7X	7X	1.5/06/660
UPC-A	0.264 (0.0104")	0.330 (0.0130")	0.660 (0.0260")	18.28 (0.720")	22.85 (0.900")	45.70 (1.800")	9X	9X	1.5/06/660
UPC-E	0.264 (0.0104")	0.330 (0.0130")	0.660 (0.0260")	18.28 (0.720")	22.85 (0.900")	45.70 (1.800")	9X	7X	1.5/06/660
GS1 DataBar Omni-directional (****)	0.264 (0.0104")	0.330 (0.0130")	0.660 (0.0260")	12.14 (0.478")	15.19 (0.598")	30.36 (1.195")	None	None	1.5/06/660
GS1 DataBar Stacked Omni-directional (***) (****)	0.264 (0.0104")	0.330 (0.0130")	0.660 (0.0260")	25.10 (0.988 ")	31.37 (1.235")	62.70 (2.469")	None	None	1.5/06/660
GS1 DataBar Expanded	0.264 (0.0104")	0.330 (0.0130")	0.660 (0.0260")	8.99 (0.354")	11.23 (0.442")	22.44 (0.883")	None	None	1.5/06/660
GS1 DataBar Expanded Stacked (****)	0.264 (0.0104")	0.330 (0.0130")	0.660 (0.0260")	18.75 (0.738")	23.44 (0.923")	46.86 (1.845")	None	None	1.5/06/660
GS1 DataMatrix	0.375 (0.0148)	0.625 (0.0246)	0.990 (0.0390)	Height is determined by the X-dimension and data that is encoded			1X on all four sides		1.5/08/660
GS1 QR Code	0.375 (0.0148)	0.625 (0.0246)	0.990 (0.0390)	Height is determined by the X-dimension and data that is encoded			4X on all four sides		1.5/08/660

Primary Main Symbol(s) Specified Plus Add-on 2 or 5	X-dimension mm (inches)			(**) Minimum symbol height for given X mm (inches)			Quiet Zone	Min separation between symbols	Max separation between symbols	Quiet Zone	Min. Quality Spec.
	(*) Minimum	Target	Maximum	For min. X-dimension	For target X-dimension	For max. X-dimension					
EAN-13 + 2	0.264 (0.0104")	0.330 (0.0130")	0.660 (0.0260")	18.28 (0.720")	22.85 (0.900")	45.70 (1.800")	11X	7X	12X	5X	1.5/06/ 660
EAN-13 + 5	0.264 (0.0104")	0.330 (0.0130")	0.660 (0.0260")	18.28 (0.720")	22.85 (0.900")	45.70 (1.800")	11X	7X	12X	5X	1.5/06/ 660
UPC-A + 2	0.264 (0.0104")	0.330 (0.0130")	0.660 (0.0260")	18.28 (0.720")	22.85 (0.900")	45.70 (1.800")	9X	9X	12X	5X	1.5/06/ 660
UPC-A + 5	0.264 (0.0104")	0.330 (0.0130")	0.660 (0.0260")	18.28 (0.720")	22.85 (0.900")	45.70 (1.800")	9X	9X	12X	5X	1.5/06/ 660
UPC-E + 2	0.264 (0.0104")	0.330 (0.0130")	0.660 (0.0260")	18.28 (0.720")	22.85 (0.900")	45.70 (1.800")	9X	7X	12X	5X	1.5/06/ 660
UPC-E + 5	0.264 (0.0104")	0.330 (0.0130")	0.660 (0.0260")	18.28 (0.720")	22.85 (0.900")	45.70 (1.800")	9X	7X	12X	5X	1.5/06/ 660

individually must carry a unique barcode for each consumer package variation or aggregation. To avoid confusion at the point-of-sale, the multipack barcode SHALL be the only visible symbol when both the multipack and individual items are symbol-marked. The binder of the multipack acts as a screen to obscure the symbols on the individual items.

- Special note for can multipacks: Avoid placing the symbol on the top or bottom of the container, since cans have a tendency to cause impressions in the corrugated cardboard and distort the symbol. These can impressions in the symbol may reduce scannability.
- Barcode placement: identify the front of the package/container. (Refer to section [6.3.2](#) for instructions on how to identify the package front):
 - Preferred placement: on the lower right quadrant of the back, near the edge, respecting the proper Quiet Zone areas around the barcode.
 - Undesirable alternative: on the lower right quadrant of another side, near the edge, respecting the proper Quiet Zone areas around the barcode.
 - Edge rule: See section [6.3.3.3](#).

Figure 6.4.10-1. Symbol placement on multipacks



6.4.11 Publishing items

Publishing items represent printed materials sold individually for consumer use including books, magazines, newspapers, and tabloids. Barcode placement on published items varies depending on type. In addition, the main [barcodes-symbol](#) on books and paperbacks must appear on the outside cover of the book (to facilitate payment).

- Package characteristics: printed paper media that is bound, stapled, or folded.
- Unique considerations: in addition to the regular barcode, some publishing items have add-on symbols that carry supplementary information such as an Issue Code. Barcode placement on published items varies depending on the media type. If an add-on symbol is used, it must be located to the right of the regular barcode and parallel to it.
- Barcode placement: identify the front of the package/container. (Refer to section [6.3.2](#) for instructions on how to identify the package front):
 - Preferred placement:
 - Books: on the lower right quadrant of the back, near the spine, respecting the proper Quiet Zone areas around the barcode.

Figure 6.4.11-1. Symbol placement on books

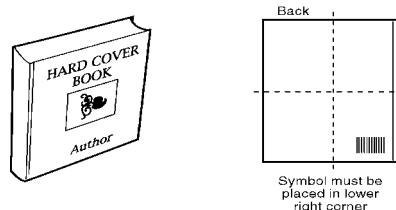
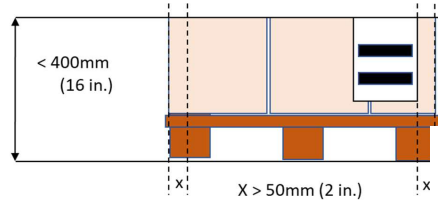


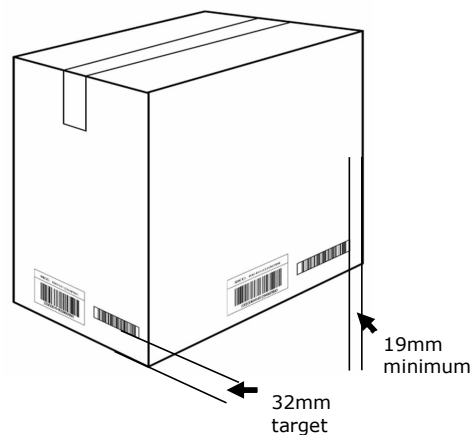
Figure 6.7.1.1-2. Symbol placement on pallets lower than 400 mm (16 inches)



6.7.1.2 Symbol placement on cartons and outer cases

For cartons and outer cases, symbol placement will vary slightly in practice, however the target placement for the bottom of the barcode is 32 millimetres (1.25 inches) from the natural base of the item. The symbol, including its Quiet Zones, SHOULD be at least 19 millimetres (0.75 inch) from any vertical edge to avoid damage.

Figure 6.7.1.2-1. Symbol placement on cartons and outer cases

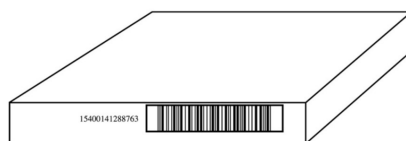


6.7.1.3 Symbol location on shallow trays and cases

If the height of a case or tray is less than 50 millimetres (2.0 inches), making it impossible to print a full height barcode with the human readable interpretation below the bars (see section 4.15 for HRI rules), or if the construction of the unit is such that the full symbol height cannot be accommodated, the following options SHALL be considered in this order of preference:

- Place the human readable interpretation adjacent to the symbol, outside the compulsory Quiet Zones.

Figure 6.7.1.3-1. Human readable interpretation to left of symbol



- When the height of the unit is less than 32 millimetres, the symbol may be placed on the top of the package. The symbol SHALL be placed with the bars perpendicular to the shortest side, no closer than 19 millimetres (0.75 inch) from any edge.

Figure 6.7.1.3-2.



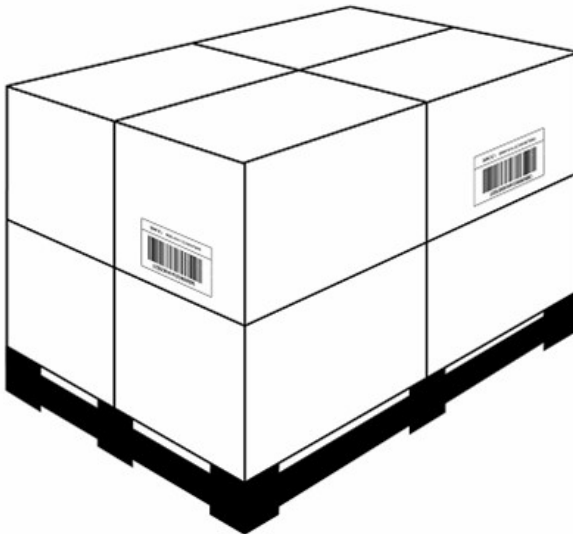
Sometimes two barcodes are used on variable measure units. If it is necessary to remove the human readable interpretation from beneath the unit, the human readable interpretation of the main symbols SHALL be placed to the left of the bars of the main symbol. The human readable interpretation of the ~~add-on~~supplemental symbol SHALL be placed to the right of the bars of the ~~add-supplemental on~~ symbol.

6.7.2 Recommendation to include a barcode on two sides

At least one side of all general distribution scanning items SHALL display the barcode information. The following is recommended:

- For outer cases or cartons (trade item groupings identified with a GTIN) it is recommended that the barcode is duplicated on a second side of the item when the printing process (e.g., pre-printing on corrugated cartons) makes this cost effective.
- For pallets (logistic units identified with an SSCC) it is recommended that two identical logistic labels are placed on adjacent sides. If possible one logistic label should be on one short side and the second identical logistic label on the adjacent right-hand side as shown in the diagram below.

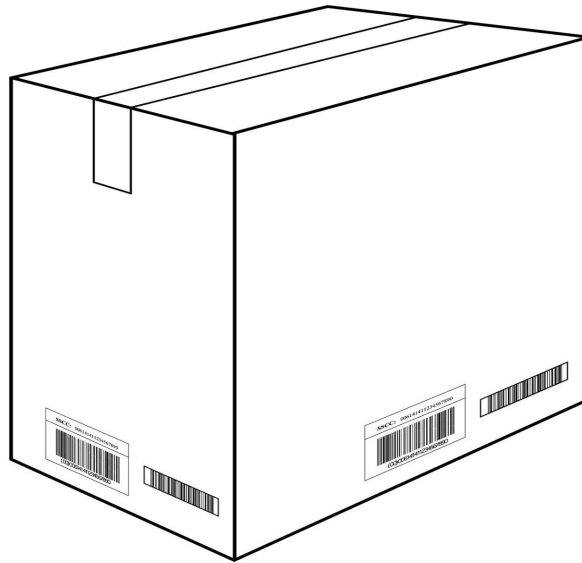
Figure 6.7.2-1. Two identical barcodes



6.7.3 ~~Add-on~~Supplemental symbols

If the unit is already marked with a symbol, any ~~add-on-supplemental~~ symbol SHALL be placed so as not to obscure the ~~primary-barcode~~main symbol. The preferred location for the symbol in this case is to the side of the ~~primary-barcode-main symbol~~ so that a consistent horizontal location is maintained. Maintain Quiet Zones for both symbols.

Figure 6.7.3-1. Placement of add-on symbols



When it is possible for both parts of the data content to be represented in a GS1-128 barcode, concatenation into one symbol MUST be considered. Barcodes for general distribution scanning containing data essential for complete product identification (e.g., trade measurements) SHALL always be aligned with and to the right of the other barcode.



8.1 GS1 glossary of terms and definitions

The glossary lists the terms and definitions that are applied in this document. Please refer to the www.gs1.org/glossary for the online version.

Term	Definition
2-dimensional symbology	Optically-readable symbols that must be examined both vertically and horizontally to read the entire message. Two-dimensional symbols may be one of two types: matrix symbols and multi-row symbols. Two-dimensional symbols have error detection and may include error correction features.
acceptance criteria	An allowance for a small measurement variation between commercial verifiers or operators during barcode verification testing.
active-potency	Represents the measured actual ("Active") potency of a biologic such as haemophilia products.
add-on symbol	A barcode used to encode information supplementary to that in the main EAN/UPC barcode.
adjacent symbols	Multiple barcodes placed next to one another without infringing on Quiet Zones.
aggregated packaging (per EU 2018/574)	Any packaging containing more than one unit packet of tobacco products. For GS1, this may be either a trade item grouping or logistics unit.
AIM DotCode	A two-dimensional barcode symbology rendered by printing dots per the AIM DotCode Specification.
allocation	The association of an issued GS1 Prefix, GS1 Company Prefix, or GS1 identification key with auto its corresponding entity or object in accordance with the GS1 rules and policies.
alphanumeric (an)	Describes a character set that contains alphabetic characters (letters), numeric digits (numbers), and other characters, such as punctuation marks.
aperture	A physical opening that is part of the optical path in a device such as a scanner, photometer, or camera. Most apertures are circular, but they may be rectangular or elliptical.
asset type	A component of the Global Returnable Asset Identifier (GRAI), assigned by the asset owner or manager, in order to create a unique GRAI.
attribute	A An element string that provides additional information about an entity identified with a GS1 identification key, such as batch number associated with a Global Trade Item Number (GTIN).
autodiscrimination	The capability of a reader to automatically recognise and decode multiple barcode symbologies.
automatic identification and data capture (AIDC)	A technology used to automatically capture data. AIDC technologies include barcodes, smart cards, biometrics and RFID.
auxiliary patterns	Components of the EAN/UPC symbology. The centre guard bar pattern, the left guard bar pattern, and the right guard bar pattern are examples of these.
bar gain/loss	The increase/decrease in bar width due to effects of the reproduction and printing processes.
barcode	A symbol that encodes data into a machine readable pattern of adjacent, varying width, parallel, rectangular or square dark bars and pale light spaces.
barcode verification	The assessment of the printed quality of a barcode based on ISO/IEC standards using ISO/IEC compliant barcode verifiers.
Basic Unique Device Identifier – Device Identifier (UDI-DI) UDI-DI	The Basic UDI - DI is a unique identifier specific to a medical device product family. It is represented by GS1's Global Model Number (GMN).
base unit	In a hierarchy of trade item groupings, the consumer trade item level or unit of use.
batch/lot	The batch or lot number a ssociates an item with information the manufacturer considers relevant for traceability of the trade item. The data may refer to the trade item itself or to items contained in it.
bearer bars	Bar abutting the tops and bottoms of the bars in a barcode or a frame surrounding the entire symbol, intended to equalise the pressure exerted by the printing plate over the entire surface of the symbol and/or to prevent a short-partial scan by the barcode reader.
brand owner	The organisation that owns the specifications of a trade item, regardless of where and by whom it is manufactured. The brand owner is normally responsible for the management of the Global Trade Item Number (GTIN).
carrier (logistics)	The party that provides freight transportation services or a physical or electronic mechanism that carries business information.

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Term	Definition
kit	A collection of different regulated healthcare items assembled for use in a single therapy.
leading zero(es)	Adding zeroes in the leftmost position(s) of a data string when GTIN-8, GTIN-12, or GTIN-13 are encoded in an GS1 AIDC data carrier, message, or database. Digits (always zeroes) which must be placed in the leftmost position(s) of a data string when GTIN-8, GTIN-12, or GTIN-13 are encoded in an GS1 AIDC data carrier that requires 14-digits or when used for the same intent in other data structures such as GRAI.
levels of AIDC marking	A graduated system of AIDC marking. The graduated system is defined as minimum, enhanced and highest levels of AIDC marking.
linear barcode	Barcode symbology using bars and spaces in one dimension.
local assigned code (LAC)	A particular use of the UPC-E barcode for restricted distribution.
location reference	A component of a Global Location Number (GLN) that allows the party defining the location to create a unique GLN, assigned by the party that defined the location to create a unique GLN.
logistic measures	Measures indicating the outside dimensions, total weight, or volume inclusive of packing material of a logistic unit. Also known as gross measures.
logistic unit	An item of any composition established for transport and/or storage that needs to be managed through the supply chain. It is identified with a Serial Shipping Container Codean (SSCC).
main symbol	The barcode containing the identification number of the item (e.g., GTIN, SSCC). Used to determine the placement of any additional barcode information.
loose produce	Fruits and vegetables which are delivered to the store loose, in boxes or cases, and then put into a bag or selected individually by the customer for purchase.
magnification	Different sizes of barcodes based on a nominal size and a fixed aspect ratio; stated as a percentage or decimal equivalent of a nominal size.
measure verifier digit	A digit calculated from the measure field in a Restricted Circulation Number (RCN) encoded using the EAN/UPC symbology. U that is used to check that the data has been correctly composed.
medical device	Any instrument, apparatus, implement, machine, appliance, implant, in vitro reagent or calibrator, software, material or other similar or related article, intended by the manufacturer to be used, alone or in combination, for human beings for any medical purpose.
minimum level of AIDC marking (for regulated healthcare trade items)	A level within a graduated system of AIDC trade item marking that provides GTIN with no attribute information.
model reference	A component of the Global Model Number (GMN) assigned by the brand owner to create a unique GMN.
module	The narrowest nominal width unit of measure in a barcode. In certain symbologies, element widths may be specified as multiples of one module. The nominal width (& height for 2D barcodes) of a single module is equivalent to the X-dimensionnominal width unit of measure in a barcode. In certain symbologies, element widths may be specified as multiples of one module. Equivalent to X-dimension.
modulo 10	The name of the algorithm – a simple checksum formula in the public domain – used to create a check digit for those GS1 identification keys that require one.
modulo 103 GS1-128 symbol check character	A number, which results from a modulo calculation, that is encoded in the GS1-128 barcode as a self-checking symbol character. It is created automatically by software as a symbol overhead character and is not expressed in the human readable interpretation.
multiple unit blister/package	Immediate package for a medicine with more than one single unit. Package which fully encloses the pill/caplet/capsule. Each dosage form may be individually packaged. The individually blistered dosage forms are attached to each other in one strip.
National Healthcare Reimbursement Number (NHRN)	National and/or regional identification numbers used on pharmaceutical and/or medical devices where required by national or regional regulatory organisations for product registration purposes and/or for the management of healthcare provider reimbursement.
National Trade Item Number (NTIN)	A coding scheme, administered in the healthcare sector by a national organisation for which a GS1 Prefix has been issued to permit its uniqueness within the GTIN pool but without assurance of full compatibility with GTIN functionality. The result is a product identification number assigned by a third party (not the brand owner or manufacturer). Example: the CIP (Club Inter Pharmaceutique) in France administered by the French Health Products Safety Agency (AFSSAPS).

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Term	Definition
shipment	A grouping of logistics and transport units assembled and identified by the seller (sender) of the goods travelling under one despatch advice and/or Bill of Lading to one customer (recipient).
short life items	An item, preparation or reconstituted product with limited use/shelf life, such as in healthcare a cytotoxic medicine, that has undergone some manipulation, such as addition of a diluent, in order to make it administrable to a specified patient.
single shipping/retail consumer trade item	A retail consumer trade item that is also regarded as a shipping item and is one to a carton (e.g., a bicycle or a television).
single unit	Single item of medicine/medical device without any package, for example the single tablet in a blister or bottle, the syringe as such.
single unit package/blister	A healthcare primary package that contains one discrete pharmaceutical dosage form, i.e. a tablet, a certain volume of a liquid or that is the immediate package for a medical device like a syringe. A number of single units attached to each other, but are easily separated through a perforation would be included. may be attached to each other, but are easy to separate through a perforation.
special characters	Special characters that are designated by the symbology specification.
sterile packaging system	A combination of the sterile barrier system (the minimum package that prevents ingress of microorganisms and allows aseptic presentation of the product at the point of use) and the protective packaging (configuration of materials designed to prevent damage to the sterile barrier system and its contents until the point of use).
subject of care	Any person who uses or is a potential user of a health-care service, subjects of care may also be referred to as patients or health-care consumers.
substrate	The material on which a barcode is printed or otherwise applied.
supplier	The party that produces, provides, or furnishes an item or service.
Supplemental symbol	A GS1-128 barcode used in combination with EAN/UPC, ITF-14 or GS1-128 where additional information is required beyond the barcode that carries the GS1 kkey (main barcodesymbol).
symbol	The combination of symbol characters and features required by a particular symbology, including Quiet Zone, start and stop characters, data characters, and other auxiliary patterns, which together form a complete scannable entity; an instance of a symbology and a data structure.
symbol character	A group of bars and spaces in a symbol that is decoded as a single unit. It may represent an individual digit, letter, punctuation mark, control indicator, or multiple data characters (see also codeword).
symbol check character	A symbol character or set of bar/space patterns included within a GS1-128 or GS1 DataBar symbol, the value of which is used by the barcode reader for the purpose of performing a mathematical check to ensure the accuracy of the scanned data. It is not shown in human readable interpretation. It is not input to the barcode printer and is not transmitted by the barcode reader.
symbol contrast	An <i>ISO/IEC 15416</i> parameter that measures the difference between the largest and smallest reflectance values in a Scan Reflectance Profile (SRP).
symbology	A defined method of representing numeric or alphabetic characters in a barcode; a type of barcode.
symbology element	A character or characters in a barcode used to define the integrity and processing of the symbol itself (e.g., start and stop patterns). These elements are symbology overhead and are not part of the data conveyed by the barcode.
symbology identifier	A sequence of characters generated by the decoder (and prefixed to the decoded data transmitted by the decoder) that identifies the symbology from which the data has been decoded.
trade item	Any item (product or service) upon which there is a need to retrieve predefined information and that may be priced, or ordered, or invoiced at any point in any supply chain.
trade item grouping	A predefined composition of trade item(s) that is not intended for point-of-sale scanning. It is identified with a GTIN-14, GTIN-13, or GTIN-12.
trade measures	Net measures of variable measure trade items as used for invoicing (billing) the trade item.
transport process information	A set of information relevant to the processing, delivery or return of a transport unit. For example, transport process information would include address details.
transport unit	A logistic unit within the context of transport processes.

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