



GSMP:

General Specifications Change Notification (GSCN)

GSCN #	GSCN Name	Issue Date	Status
15-306	Application Identifier rules and processing logic	Aug 2016	Ratified

Associated Work Request (WR) Number:

WR 15-306

Background:

To develop an accurate and clearer description of how data should be processed from GS1 symbols that use GS1 AIs.

GS1 General Specification Change:

The recommended changes are highlighted in the attached excerpt from the GS1 General Specifications, v16.

Disclaimer

GS1®, under its IP Policy, seeks to avoid uncertainty regarding intellectual property claims by requiring the participants in the Work Group that developed this **General Specifications Change Notification** to agree to grant to GS1 members a royalty-free licence or a RAND licence to Necessary Claims, as that term is defined in the GS1 IP Policy. Furthermore, attention is drawn to the possibility that an implementation of one or more features of this Specification may be the subject of a patent or other intellectual property right that does not involve a Necessary Claim. Any such patent or other intellectual property right is not subject to the licencing obligations of GS1. Moreover, the agreement to grant licences provided under the GS1 IP Policy does not include IP rights and any claims of third parties who were not participants in the Work Group.

Accordingly, GS1 recommends that any organization developing an implementation designed to be in conformance with this Specification should determine whether there are any patents that may encompass a specific implementation that the organisation is developing in compliance with the Specification and whether a licence under a patent or other intellectual property right is needed. Such a determination of a need for licencing should be made in view of the details of the specific system designed by the organisation in consultation with their own patent counsel.

THIS DOCUMENT IS PROVIDED "AS IS" WITH NO WARRANTIES WHATSOEVER, INCLUDING ANY WARRANTY OF MERCHANTABILITY, NONINFRINGEMENT, FITNESS FOR PARTICULAR PURPOSE, OR ANY WARRANTY OTHER WISE ARISING OUT OF THIS SPECIFICATION. GS1 disclaims all liability for any damages arising from use or misuse of this Standard, whether special, indirect, consequential, or compensatory damages, and including liability for infringement of any intellectual property rights, relating to use of information in or reliance upon this document.

GS1 retains the right to make changes to this document at any time, without notice. GS1 makes no warranty for the use of this document and assumes no responsibility for any errors which may appear in the document, nor does it make a commitment to update the information contained herein.

GS1 and the GS1 logo are registered trademarks of GS1 AISBL.



5.9.4.6 Advice for selecting the symbology

Any use of GS1 QR Code should comply with GS1 system global application standards and be restricted to those applications defined by the GS1 system for GS1 QR Code. GS1 QR Code will not replace other GS1 system symbologies. Existing applications that are satisfactorily utilising EAN/UPC symbols, ITF-14 symbols, GS1-128 symbols, GS1 DataBar symbols, GS1 DataMatrix or GS1 composite symbols should continue to use them.



Note: Scanning systems that need to read GS1 QR Code symbols must be 2D imaging scanners and be appropriately programmed to read the GS1 system versions of ISO/IEC 18004 QR Code 2005.

5.9.4.7 Human readable interpretation of GS1 QR Code symbols

For human readable interpretation rules see section [4.144.14](#).

Formatted: Font: Italic

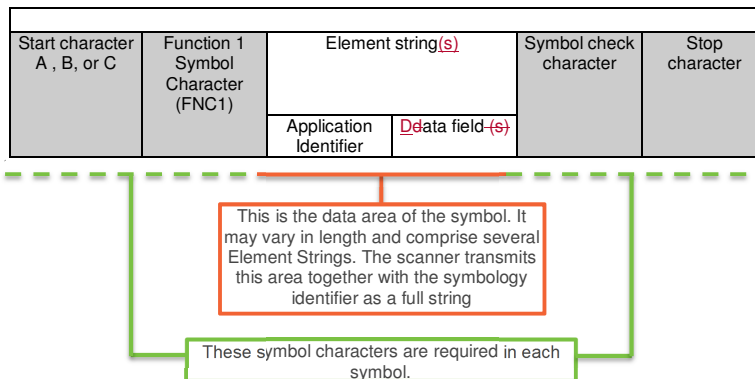
5.10 Appendix: Rules for encoding/decoding element strings in GS1 symbologies using GS1 Application Identifiers

5.10.1 The basic structure of GS1 barcodes using GS1 Application Identifiers and concatenation

~~All~~ GS1 barcode symbologies that use GS1 Application Identifiers generally have a particular symbol character to indicate that the data is encoded according to the GS1 Application Identifier rules. For example, the GS1-128 symbology uses the Function 1 Symbol Character (FNC1) in the position immediately following the start character. This ~~double-start character~~ pattern is reserved for GS1 system applications worldwide and. ~~This makes it possible to distinguish GS1-128 barcodes from Code 128 symbols encoding extraneous non-GS1 barcodes data.~~

Commented [CJ13]: WR15-306

Figure 5.10.1-1. Example GS1-128 barcode structure



All GS1 barcode symbologies that use GS1 Application Identifiers allow several element strings to be encoded in one barcode, a process called concatenation. Concatenation is advantageous because it means that the symbol's double start, symbol check and stop characters symbology elements are only needed once, and the space required for the symbol is smaller than when separate barcodes are used to encode each element string. It also improves scanning accuracy, allowing for single scanning rather than multiple scanning. The various element strings are transmitted from the barcode reader as a single full string.

The various element strings, which are transmitted from concatenated barcodes, have to be analysed and processed. All element strings need to be delimited unless they have a pre-defined length or appear at the end of the symbol (encoded immediately before the symbol check character).



All pre-defined length element strings are contained in [Figure 5.10.1-2](#). To simplify this procedure and reduce the symbol size, the lengths of some element strings are pre-defined (see [Figure 5.10.1-2](#) [Figure 5.10.1-2](#)). Element strings that are not contained in [Figure 5.10.1-2](#) and that do not appear at the end of the symbol (encoded immediately before the symbol check character) must be delimited to separate them from the element string that follows.

The delimiter or separator character SHALL be a Function 1 Symbol Character in GS1-128 symbology, GS1 DataBar Expanded Versions and GS1 Composite symbology. The delimiter in GS1 DataMatrix and SHOULD be a Function 1 Symbol Character but may also be the character <GS>, known as Group Separator (ASCII value 29). The delimiter in GS1 QR Code SHALL be the character <GS> in GS1 DataMatrix symbology and GS1 QR Code symbology.

[Figure 5.10.1-2](#) [Figure 5.10.1-2](#) contains all element strings Application Identifiers that have a pre-defined length and, therefore, SHOULD not be terminated by a delimiter do not require a Function 1 Symbol Character (FNC1) separator.

Figure 5.10.1-2. Element strings with pre-defined length using Application Identifiers

First two digits of the Application Identifier	Number of characters (Application Identifier and data field)
00	20
01	16
02	16
(03)	16
(04)	18
11	8
12	8
13	8
(14)	8
15	8
16	8
17	8
(18)	8
(19)	8
20	4
31	10
32	10
33	10
34	10
35	10
36	10
41	16



Note: [Figure 5.10.1-2](#) [Figure 5.10.1-2](#) is limited to the listed numbers and will remain unchanged. Those numbers in parentheses are not yet assigned. Application Identifiers starting with two digits that are not included in [Figure 5.10.1-2](#) [Figure 5.10.1-2](#) have a variable length even if the definition of the Application Identifier specifies a fixed length data field.

Formatted: GS1_Link Char, Font: Not Bold, Italic

Formatted: GS1_Link Char, Font: Not Bold, Italic

Formatted: GS1_Link Char, Font: Not Bold, Italic

Formatted: GS1_Link Char, Font: Not Bold, Italic



5.10.2 Concatenation

5.10.2.1 Pre-defined length element strings

Concatenated element strings constructed from Application Identifiers with a pre-defined length **SHOULD not use** ~~do not require~~ a separator character **following the element string of pre-defined length**. Each element string is immediately followed by either the next Application Identifier or the symbol check character and stop character.

For example, concatenation of net weight (4.00 kilograms) with the associated Global Trade Item Number (GTIN) 95012345678903 **SHOULD not include** ~~does not require~~ the use of a separator character.

- (01) has a pre-defined element string length of 16 digits.
- (31nn) has a pre-defined element string length of 10 digits.

Figure 5.10.2.1-1. Data encoded in two GS1-128 symbols



Figure 5.10.2.1-2. Data encoded in one concatenated GS1-128 symbol



5.10.2.2 Non pre-defined length (variable length) element strings

An element string that does not start with two characters defined in figure 5.10.1-2 SHALL be terminated by a separator character, unless it is the last element string to be encoded, when a separator character **SHOULD not be used**. Concatenating element strings of variable length, including all Application Identifiers that do not start with two characters contained in figure 5.10.1-2, involves the use of a separator character. The separator character used is the Function 1 Symbol Character (FNC1). It is placed immediately after the last symbol character of a non pre-defined length (variable length) element string and is followed by the Application Identifier of the next element string. If the element string is the last to be encoded, it is followed by the Symbol Check and stop characters ~~and not the FNC1 separator character~~.

Commented [CJ14]: WR15-306

Commented [CJ15]: WR15-306

For example, concatenation of price per unit of measure (365 currency units) and batch number (123456) **requires the MUST** use of a separator character immediately after the price per unit of measure.

Figure 5.10.2.2-1. Data encoded in two GS1-128 symbols

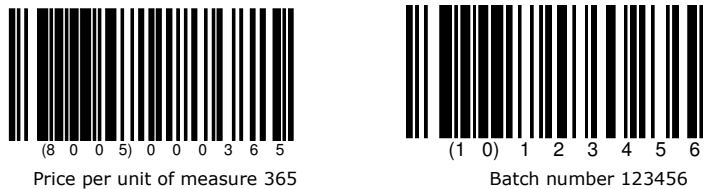
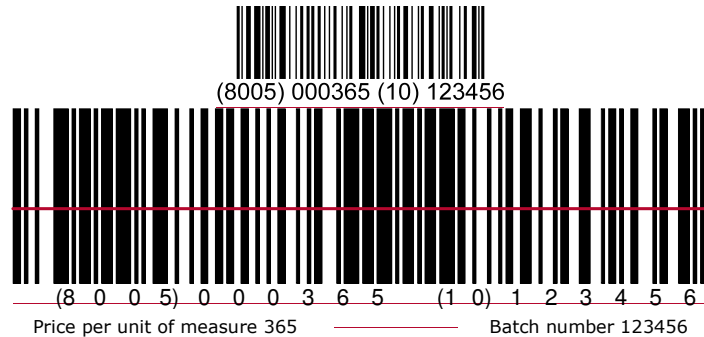


Figure 5.10.2.2-2. Data encoded in one concatenated GS1-128 symbol



Note: The FNC1 is not shown in human readable interpretation.

5.10.2.3 Other considerations when using concatenation

Concatenation is an effective means for presenting multiple element strings in a single barcode and is used to conserve label space and optimise scanning operations when permitted by the application standard (e.g., concatenation **SHALL not be used with the GS1-128 barcode containing the SSCC on cartons or outer cases**). SSCC concatenation may be used on pallets providing the label size used permits printing of the barcode with the correct specifications at or above the target X-dimension in GS1 system symbol specification table 5.

When concatenating a mixture of pre-defined length and variable length and other element strings, arranging the pre-defined element strings together ahead of **SHOULD** appear before the variable length element strings usually results in a shorter linear barcode.

The **FNC1** separator character appears in the decoded data string as <GS> (ASCII character 29, 7-bit character set ISO/IEC 646). A separator character **SHOULD not be used** **FNC1 is not required** at the end of the last element string **encoded in a GS1 barcode** represented in a GS1 symbologies using GS1 Application Identifiers.

Notwithstanding the above, the processing routine **SHALL allow to tolerate** a single separator character **FNC1** immediately following any entered by error after an element string **or, whether necessary or not, and process the data in accordance with section 7.8 Processing of data from a GS1 symbology using GS1 Application Identifiers contained in Figure 5.10.1-2.**

Figure 5.10.2.3-1. Example of GS1 DataBar Expanded Stacked barcode that uses concatenation

Commented [CJ16]: WR16-154

Commented [CJ17]: WR15-306



(01)90614141000015(3202)000150

Concatenation may not be desirable in all circumstances (e.g., GS1 Logistics Labels are often constructed using multiple rows of barcode), in such cases the barcode containing the additional attribute data encoded using GS1 Application Identifiers SHOULD be printed in close proximity to the barcode containing the GS1 identification key.

Figure 5.10.2.3-2. Example of mixed GS1 symbologies (GTIN encoded in UPC-E, Best before date in Composite)





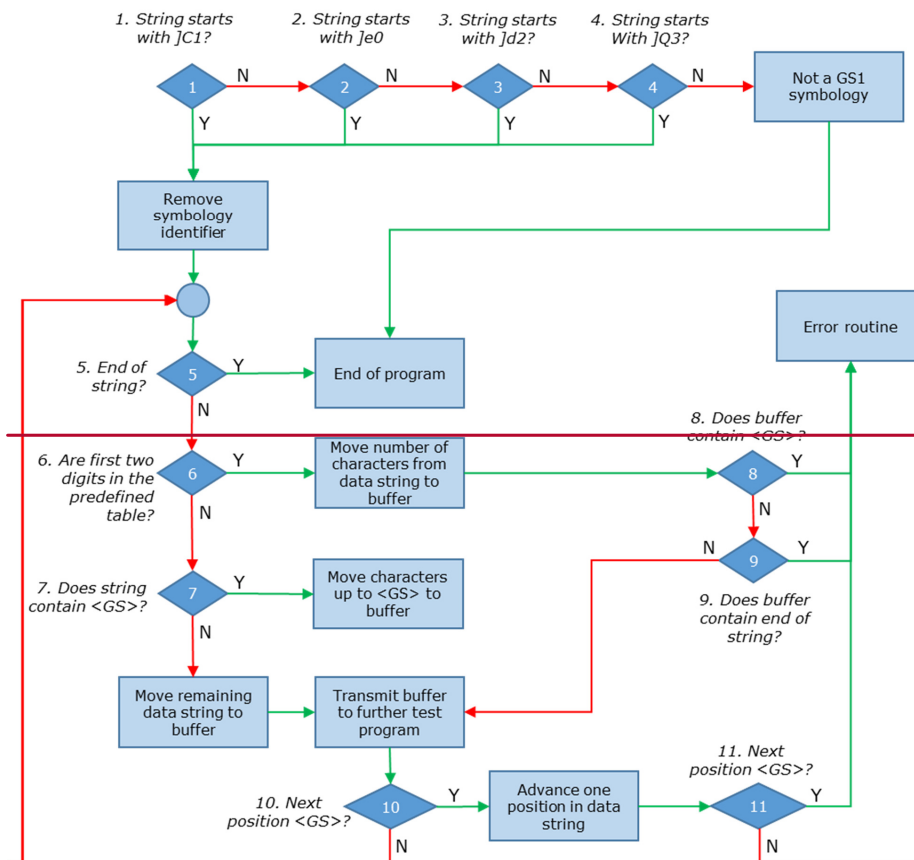
7.7.2 Element strings represented in a GS1 symbology using GS1 Application Identifiers

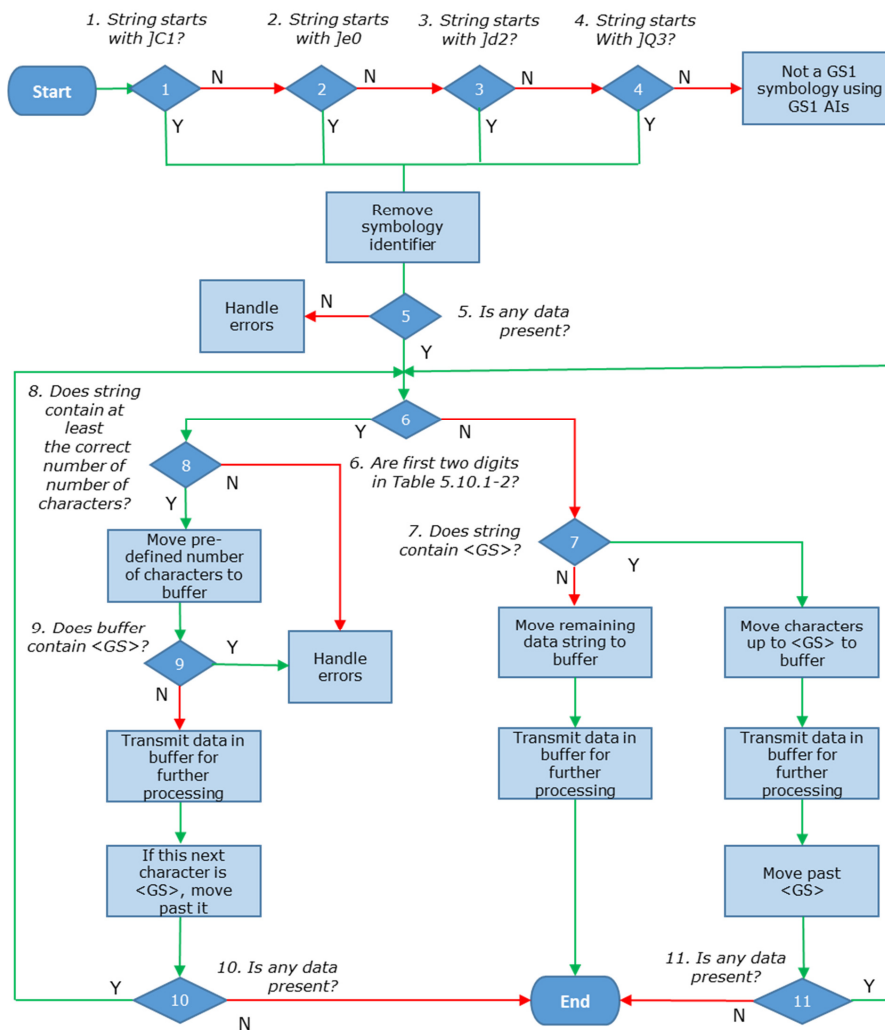
The element strings encoded in any GS1 symbology that uses GS1 Application Identifiers (such as GS1-128, GS1 DataMatrix, GS1 DataBar, GS1 QR Code and GS1 Composite) are composed of one or more GS1 Application Identifiers and one or several data fields. The Application Identifier denotes the contents and structure of the respective data fields. Full details are contained in section 3.

7.8 Processing of data from a GS1 symbology using GS1 Application Identifiers

Commented [CJ18]: WR15-306

Figure 7.8-1. Data processing overview





This system logic holds true for any GS1 symbology using GS1 Application Identifiers. The symbology identifiers listed in figure 7.8-1 are:

-]C1 = GS1-128.
-]e0 = GS1 DataBar and GS1 Composite symbols.
-]d2 = GS1 DataMatrix.
-]Q3 = GS1 QR Code.



7.8.1 General

Any GS1 symbology using GS1 Application Identifiers may represent several element strings in concatenated form (see section 5).

For processing as shown in figure 7.3-1, it is necessary to separate each element string, which is performed by the processing routine illustrated in figure 7.8-1.

7.8.2 Element strings with pre-defined lengths using Application Identifiers

Commented [CJ19]: WR15-306

Representation of more than one element string in a GS1 symbology using GS1 Application Identifiers ~~may~~ requires the use of a separator character between the different element strings to mark their end. ~~When the data is encoded, this~~ This is normally the Function 1 Symbol Character (FNC1) or, in the case of some types of GS1 DataBar, is part of the symbology specification. For details, see section 5.

However, in order to enable printing of ~~shorter-smaller~~ barcodes, some element strings have been pre-defined in length, so that their end is determined, ~~and a separator character SHOULD not be used, and the FNC1 is not needed~~. These element strings are shown in the pre-defined table shown in section 5.10. ~~All other element strings, even if defined as fixed length in section 3, are not of pre-defined length and are formally variable length fields which require a separator character if followed by another element string.~~

7.8.3 ~~The value of the decoded separator character~~Function 1 Symbol Character (FNC1)

Commented [CJ20]: WR15-306

~~When it is only when~~ used as a separator character ~~is~~ the Function 1 Symbol Character (FNC1). ~~is~~ transmitted in the decoded data string as <GS> (ASCII character 29, seven-bit character set ISO 646).

~~If <GS> is used as the separator character in GS1 DataMatrix or GS1 QR Code, its transmitted value will remain as <GS>.~~ All element strings ~~of variable length and those of fixed length not stated-included~~ in the pre-defined table shown in section 5.10 ~~must~~ MUST be delimited when followed by another element string in a single barcode.

~~The delimiter SHALL be a Function 1 Symbol Character in GS1-128 symbology, GS1 DataBar Expanded Versions and GS1 Composite symbology and SHOULD be a Function 1 Symbol Character in GS1 DataMatrix symbology and GS1 QR Code symbology.~~ A delimiter ~~SHOULD not be used is not required~~ at the end of the last element string represented in a barcode or for certain AI combinations defined by the symbology specification (e.g., some types of GS1 DataBar).

7.8.4 National Healthcare Reimbursement Number (NHRN)

Some national or regional regulatory organisations may require pharmaceuticals and/or medical devices be identified with locally specific National Healthcare Reimbursement Numbers (NHRNs). For compliance with these national/regional regulatory or industry requirements where the GTIN does not meet current need, the trade item SHALL be identified with GTIN and AIs (710), (711), (712), and (713) National Healthcare Reimbursement Number.

One or more NHRNs may be associated with a single GTIN and encoded within the appropriate GS1 Data carrier in order to meet multiple market business needs. See figure 7.8.4-1 for examples of multiple NHRNs.

Additional individual NHRN AIs can only be assigned by GS1 and only in response to a work request being submitted into the GSMP system.