



GSMP:
General Specifications Change Notification (GSCN)

WR #	GSCN Name	Effective Date
16-524	GS1-128 code set explanation	15-05-2017

Associated Work Request (WR) Number:

Background:

Suboptimal creation of GS1-128 barcodes

Companies are still creating GS1-128 barcodes using code sets A, B and C suboptimally, and the advice provided in section 5.4.7.7 about creating GS1-128 barcodes does not take into account the restrictions that GS1 provides for GS1 system users. This means that some GS1-128 barcodes encode unnecessary symbol characters, which results in barcodes that are too wide for some label sizes, or printed with an X-dimension that is too small for the application.

Section 5.4.7.7 sets out the requirements for Code 128, but GS1-128 has fewer options, so ideally this section should reflect this fact.

Section 5.4.7.6 also provides information about Code 128 which could more helpfully be changed to refer to GS1-128.

Section 5.4.7.7 is virtually a copy of Appendix E of ISO/IEC 15417 Code 128 specification, and this provides too much complex information for GS1-128 users. Sections 5.4.1 (GS1-128 symbology characteristics) and 7.11 (The GS1 subset of ...ISO/IEC 646) can be used to determine that code set A and the shift character do not need to be used.

Recommending, but not making it mandatory, that users always begin with Start C and FNC1, and then change only to code set B to encode single digits, letters, and punctuation marks) will help to reduce the number of GS1-128 barcodes that are created suboptimally, and without FNC1.

Using code set A (the only code set that includes <GS>) would not cause a GS1-128 to be rejected when verified or scanned.

GS1 General Specification Change:

5.4.7.6 Additional features of GS1-Code-128 (normative)

5.4.7 6.1 Symbol check character

The GS1-Code-128 symbol check character SHALL be calculated according to the following rules.

1. Retrieve the symbol character value from figure 5.4.3.2-1.
2. Each symbol character position is given a weight. The start character is weighted 1. Then, beginning on the left with the first symbol character following the start character, the weights are 1, 2, 3, and 4 to...n for all subsequent symbol characters up to, but not including, the symbol check character itself; n denotes the number of symbol characters representing data or special information in the symbol, exclusive of the start and stop characters and symbol check character.



Note: Both the start character and the first symbol character following the start character (the Function 1 Symbol Character (FNC1) for all GS1-128 barcodes) are weighted by one.

3. Each symbol character value is multiplied by its weight.
4. The products of the calculations in step 3 are totalled.
5. The sum of the products is divided by 103.
6. The remainder derived from the calculation in step 5 is the symbol character value of the symbol check character.


Figure 5.4.7.6.1-1 shows how to calculate the symbol check character value for the batch number 2503X using the GS1-128 barcode.

Figure 5.4.7.6.1-1. Symbol check character value calculation example

Characters	Start C	FNC1	10	25	03	Code B	X
Character values (Step 1)	105	102	10	25	3	100	56
Weights (Step 2)	1	1	2	3	4	5	6
Products (Step 3)	105	102	20	75	12	500	336
Sum of products (Step 4)		1150					
Divide by 103 (Step 5)		1150 / 103 = 11					
Remainder = symbol check character value		17					

(*) Application Identifier (10) is defined as batch or lot number.

The symbol check character SHALL be positioned immediately after following the final data ~~or special~~ character and before the stop character.

 **Note:** The symbol check character SHALL NOT be shown in the human readable interpretation.

5.4.7.7 Recommended use of symbol characters ~~Use of start, code set, and shift characters to minimise GS1-128 symbol length (informative)~~

The same data may be represented in by different GS1-128 barcodes through the use of different combinations of Start A, Start B, Start C, FNC1, Code A, Code B, Code C and Shift characters. ~~Start, code set, and shift characters.~~

The following steps may rules should normally be implemented in printer control software to minimise the number of symbol characters needed to represent a given data string (and, therefore, reduce the overall symbol length).

- ~~Begin with~~ Determine the start character:
 - If the data consists of two digits, use characters S start character ~~C and FNC1~~.
 - ~~If the data begins with four or more numeric data characters, use start character C.~~
 - ~~If an ASCII symbology element (e.g., NUL) occurs in the data before any lowercase character, use start character A.~~
 - ~~Otherwise, use start character B.~~
- If ~~start character C is used and~~ the data begins with an odd number of digits numeric data characters, insert a Code set A or code set B character before the last digit, ~~following rules 1c and 1d to determine between code sets A and B.~~
- If in code set B there are four or more consecutive digits, numeric data characters occur together when in code sets A or B and:
 - If there is an even number of digits, numeric data characters, then insert a Code set C character before the first digit numeric digit to change to code set C.
 - If there is an uneven odd number of digits, numeric data characters, then insert a Code set C character immediately after the first digit numeric digit to change to code set C.

- ~~When in code set B and an ASCII symbology element occurs in the data:~~
- ~~If following that character, a lowercase character occurs in the data before the occurrence of another symbology element, then insert a shift character before the symbology element.~~
- ~~Otherwise, insert a code set A character before the symbology element to change to code set A.~~
- ~~When in code set A and a lowercase character occurs in the data:~~
- ~~If following that character, a symbology element occurs in the data before the occurrence of another lowercase character, then insert a shift character before the lowercase character.~~
- ~~Otherwise, insert a code set B character before the lowercase character to change to code set B.~~
- When in code set C and a non-numeric character occurs in the data, insert a code set BA or code set B character before that character, and follow rules 1c and 1d to determine between code sets ~~A~~ and ~~B~~.



Note: Code set A may still be used to create GS1-128 barcodes but it encodes fewer data character options than code set B. Code set C encodes a pair of digits as one symbol character so it is more space efficient when encoding four or more consecutive digits. In these rules, the term "lowercase" is used for convenience to mean any code set B character with Code 128 Symbol character values 64 to 95 (ASCII values 96 to 127) (e.g., all lowercase alphanumeric characters plus `{|}~DEL). The term "symbology element" means any code set A character with Code 128 Symbol character values 64 to 95 (ASCII values 00 to 31). There is no need to use code set A to encode <GS> as a separator character because FNC1 may be used for this purpose.



Note: If the Function 1 Symbol Character (FNC1) occurs in the first position following the start character, or in an odd-numbered position in a numeric field, it SHOULD be treated as two digits for the purpose of determining the appropriate code set.