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Produce Traceability Initiative Best Practices for Formatting Case Labels

(Revision 1.2)

About this Best Practice Guideline

Best practices are generally accepted, informally-standardized techniques, methods or processes that have proven themselves over time to accomplish given tasks. The idea is that with proper processes, checks and testing, a desired outcome can be delivered more effectively with fewer problems and unforeseen complications. In addition, a "best" practice can evolve to become better as improvements are discovered. The Produce Traceability Initiative (PTI) is a voluntary U.S. produce initiative. The best practice documents are the recommendations created and agreed to by all facets of the produce industry supply chain and PTI Leadership Council.

Consent between trading partners may replace specific recommendations as long as the minimum traceability information requirements are met in good faith.

Revision History

This section itemizes the changes from the last published Best Practice.

<u>Version No.</u>	<u>Date of Change</u>	<u>Changed By</u>	<u>Summary of Change</u>
Original	8/8/09	Supplier Subgroup	Original Best Practice
1.1	10/7/09	Supplier Subgroup	Updated Case Label Diagram and Specifications
1.2	11/4/11	Technology Working Group (TWG)	Added Revision History
1.2	11/4/11	TWG	Added Definition of Best Practice
1.2	11/4/11	TWG	Added Consent Between Trading Partners
1.2	11/4/11	TWG	Updated Cross Reference Terms/Definitions
1.2	11/4/11	TWG	Added Terms of Reference
1.2	11/4/11	TWG	Updated Figures of PTI Case Labels
1.2	11/4/11	TWG	Added RPC Case Labeling Unique Requirements

1.2	11/4/11	TWG	Added RPC Traceability Label Data Requirements
1.2	11/4/11	TWG	Adjusted Case Label Including Pack Date Figure to Show Fixed Length AI In Front of Variable Length AI
1.2	11/4/11	TWG	Added Basic PTI RPC Case Label Figure
1.2	11/4/11	TWG	Added Figure to Show PTI RPC Case Label to Accommodate RPC Tines
1.2	11/4/11	TWG	Added Example of Regulatory Labeling Requirement Figure
1.2	11/4/11	TWG	Added Ideal Properties For RPC Label
1.2	11/4/11	TWG	Added Physical Properties of Labels and Placards
1.2	11/4/11	TWG	Added Section For Linear Barcodes With Unattended, Fixed Position Scanner Applications In General Distribution
1.2	11/4/11	TWG	Updated Suggested Label Placement for Produce Cases
1.2	11/4/11	TWG	Added Bar Code Print Quality
1.2	11/4/11	TWG	Added Guidance For Lot/Batch Number Characters
1.2	11/4/11	TWG	Added Private Label Product Guidance
1.2	11/4/11	TWG	Update List of Reference Documents
1.2	11/4/11	TWG	Added Appendix A: Subset of The International Standard ISO/IEC 646
1.2	11/4/11	TWG	Added print quality verification statement

Objectives

The best practices described in this document are designed to:

- utilize barcodes currently being used in the food industry;
- utilize existing GS1 Standard data elements inside the barcode;
- minimize the amount of information shown on the label to meet the needs to attain whole chain traceability;
- accommodate multiple case sizes;¹
- determine what information is necessary to include on the label;

¹“Case” is our generic term for a “GS1 General Distribution Scanning Item” which includes any item handled as a single unit in the transport and distribution process. This definition covers a wide variety of package types, such as pallets, RPCs, cartons, cases, bins, and totes. These items can be trade items and/or logistic units. See Terms of Reference above.

- determine what information should appear on the label versus what should be shown on the case in a human readable format (e.g. supplier/responsible party’s address, etc.); and
- provide receivers with standards from which they can build their case label scanning systems.

Introduction

The PTI is focused only at “case level” tracking. The term “case” is the physical enclosure in which product is shipped and can be the form of a box, returnable plastic container or RPC, bin, bag, tote, etc. Under some circumstances, the “case” may also be the consumer unit if the product is packed, shipped, displayed and sold to the end user in the same configuration. An example of this could be a “case” of citrus that is put on display for retail sale as a saleable unit in the exact same “case” it was originally packed and shipped from the supplier through the supply chain to the retail store and sold to the consumer.

Frequently in a best practice document sector terms will be used which require definition to align with the greater standards community. See Table 1 for a guide to those terms.

Table 1: Cross-Referenced Terms/Definitions

Listed below are terms used by the produce industry and their cross-references with the GS1 Glossary of Terms:

<u>Sector Term</u>	<u>GS1 Glossary Term</u>	<u>Definition</u>
<ul style="list-style-type: none"> • Each • Base Unit • Saleable Unit 	Trade Item	Any item (product or service) upon which there is a need to retrieve pre-defined information and that may be priced, ordered, or invoiced at any point in any supply chain.
<ul style="list-style-type: none"> • Case • Traded Unit • Bin • Tote • Pallet • RPC* • Tray 	Standard Trade Item Grouping	A standard composition of trade item(s) that are not intended for point-of-sale scanning. The PTI has chosen to use the GTIN-14 for case level traceability.
<ul style="list-style-type: none"> • Pallet • Non-Standard Mixed Case 	Logistics Unit	An item of any composition established for transport and/or storage that needs to be managed through the supply chain.
<ul style="list-style-type: none"> • Pallet 	Unit Load	One or more transport packages or other items contained on a platform making them suitable for transport, stacking, and storage as a unit.

• PTI voice pick code	Not Applicable	The PTI voice pick code is printed on the PTI label, and designed to integrate with voice pick systems popular in large warehouse management systems (WMS). The PTI voice pick code itself is a 4-digit digest of the Global Trade Item Number (GTIN) and Batch/Lot Number (and optionally, Pack/Harvest Date) that is calculated using a well proven, standard algorithm. The voice pick code is included as one of the elements on the PTI case label when the label is printed.
	Global Trade Item Number (GTIN)	The globally-unique GS1 System identification number for products and services. A GTIN may be 8, 12, 13, or 14 digits in length. <u>The GTIN-14 has been selected for use in the PTI.</u>
	Indicator Digit	The leftmost digit of a GTIN in a GTIN-14. The digit '0' indicates a base unit Global Trade Item Number, digits 1 to 8 are used to define a packaging hierarchy of a product with the same Item Reference, and digit 9 indicates a variable measure trade item.
	GS1 Company Prefix	A globally-unique number assigned to companies by GS1 Member Organizations to create the identification numbers of the GS1 System.
	Check Digit	A digit calculated from the other digits of an element string, used to check that the data has been correctly composed or correctly keypunched.
	Item Reference Number	The part of the GTIN allocated by the user to identify a trade item for a given GS1 Company Prefix.
	Application Identifier (AI)	The field of two or more digits at the beginning of an element string that uniquely identifies its format and meaning within the GS1 System.
	AI (01)	The AI (01) indicates that the GS1 AI data field contains a GTIN. The AI is fixed in length and encodes 14 numeric digits only.
	AI (10)	The AI (10) indicates that the GS1 AI data field contains a batch or lot number. The Batch or Lot Number associates an item with information the manufacturer considers relevant for traceability of the trade item to which the element string is applied. The AI is variable in length and encodes a maximum of 20 characters per Appendix A.
	AI (13)	The AI (13) indicates that the GS1 AI data fields contain a packaging date. This date is the date when the goods were packed as determined by the packager. The AI is fixed in length and encodes 6 numeric digits only, in an YYMMDD format.
	AI (15)	The AI (15) indicates that the GS1 AI data fields contain a "best by" date. This date indicates the ideal consumption or best effective use date of a product. The AI is fixed in length and encodes 6 numeric digits only, in an YYMMDD format.
NOTE: Other GS1 AIs available within the GS1 System which can also be utilized within the GS1-128 barcode. For a full list of the GS1 AIs, please see Section 3.0 of the GS1 General Specifications. Rules for concatenating any GS1 AI are covered in Section 4.11 of the GS1 General Specifications, highlighting mandatory associated AIs and invalid pairs of AIs.		

**RPC is the acronym for Reusable Plastic Container*

Case Label Basic PTI Data Elements

At minimum, the GTIN from the brand owner, the Batch/Lot Number from the company packing the case and the PTI voice pick code must be shown in human readable form underneath the barcode.

Figure 1: PTI Basic Case Label

(a) Basic PTI Data Elements:



(b) Basic & Optional PTI Data Elements:



Label (a) depicts the minimum information needed for traceability purposes at the case level and should only be used when the product and pack style are printed on the same facing as the label is placed; label (b) depicts what is commonly used in trade today. Certain target markets may also have other master shipping container labeling requirements. Note: human-readable information should be bilingual if shipping to a major Canadian retailer/food service operation. Confer with your international trading partners for any specific in-country labeling requirements.

RPC Labeling Unique Requirements

Because they are reusable, RPCs will be circulated through the supply chain many times. To date RPC marking has been accomplished in two methods: 1) card stock which is slipped into the RPC tines; and 2) adhesive labels.

RPC Traceability Label Data Elements

The RPC traceability label has all the components required for the standard PTI case label, with the addition of information that would normally be printed on the carton. The RPC label should contain the following data elements:

- GTIN;
- Batch/Lot Number;
- Commodity and Variety;
- Pack/Size;

- PTI voice pick code;
- Party responsible for distribution Name and Address; and
- Country of Origin.

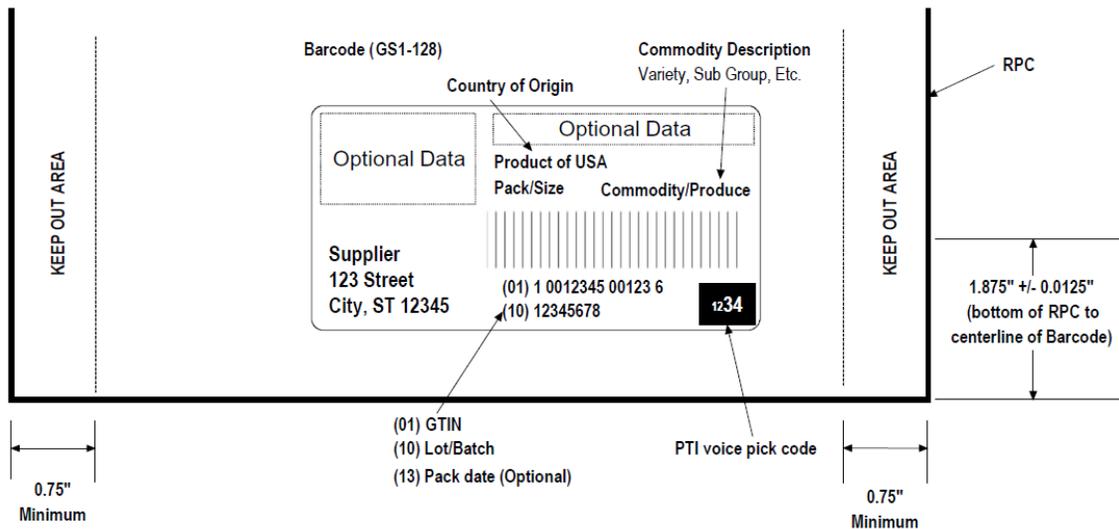
The RPC label also has a designated area for additional regulatory information as required or special requests by trading partners. (See Figure 4.)

Figure 2: PTI Case Label Including Pack Date



NOTE: In a pack house/shed pack environment, if the Batch/Lot Number is not unique by pack or harvest date, you must include the pack/harvest date as well. The Application Identifier for the pack/harvest date is (13) as shown in the example above.

Figure 3a: Basic PTI RPC Case Label



NOTES:

- Non-traceability information such as Supplier Information, Pack/Size, Commodity Description and Country of Origin are included here to accommodate a single RPC label which meets most trade and regulatory requirements.
- In a pack house/shed pack environment, if the Batch/Lot Number is not unique by pack or harvest date, you must include the pack/harvest date as well. The Application Identifier for the pack/harvest date is (13) as shown in the example above.

Physical Properties of RPC Labels and Placards

RPCs are circulated through the supply chain many times. Because of this, RPC labels have some specific physical property requirements to ensure they adhere through the entire supply chain and then wash off at the sanitizing stations of the RPC pooler.

Ideal properties for RPC labeling include:

- For placards:
 - Heavyweight paper, 80-110 lbs
 - Coated face stock
 - Optional adhesive strips to secure the placard to RPC
 - Barcode printing to enable scanning
- For labels:
 - Synthetic or coated face stock to perform in wet conditions
 - Water-soluble adhesive
 - Adhesive should release at 140°F water temperature
 - Recommended use of a FDA-approved food grade adhesives
 - Barcode printing to enable scanning

Figure 3b: PTI RPC Case Label to Accommodate RPC Tines

To accommodate tines used to hold RPC cards or labels, it may be necessary to adjust the label format to facilitate scanning of the barcode and reading of the voice pick code. Example here.



Figure 4: Example of a Regulatory Labeling Requirement



Case Labeling Best Practices

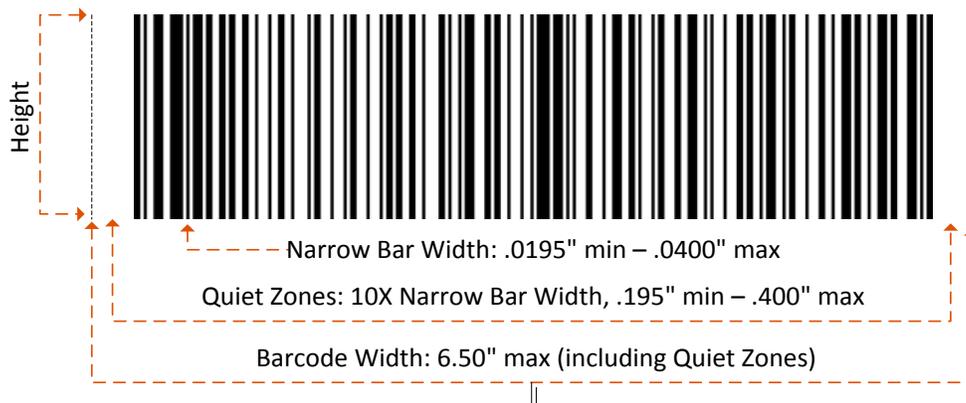
1. Use the GS1-128 barcode per the most recent version of the GS1 General Specifications (“General Specifications”).
 - 1a. For linear barcodes with attended, handheld scanner applications in general distribution (such as depicted in Figures 1-4), the PTI case label will follow the GS1 General Specifications referenced at the end of this document and as shown in Figure 5a. This case label barcode’s narrowest bar width will range from 9.84 mils to 30.00 mils or 0.00984” (0.250 mm) to 0.0300” (0.750 mm), with a minimum barcode height of 0.50” (12.70 mm).

Figure 5a: GS1-128 Barcode



- 1b. For linear barcodes with unattended, fixed-position scanner applications in general distribution, the PTI case label will follow the GS1 General Specifications referenced at the end of this document and shown in Figure 5b. This case label barcode’s narrowest bar width will range from 19.5 mils to 40.0 mils or 0.0195” (0.495 mm) to 0.0400” (1.016 mm), with a minimum barcode height of 1.25” (32.00 mm).

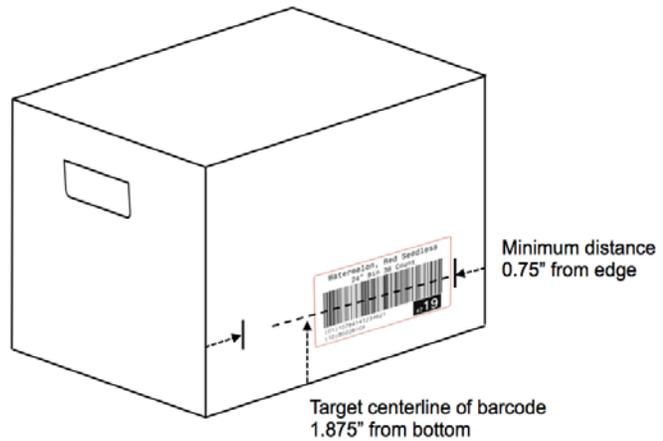
Figure 5b: GS1-128 Barcode



Notes:

- The statements above identify the acceptable minimum heights as specified by GS1 by method of scanning. Your barcode heights may exceed these minimums.
- Per the GS1 General Specifications, the maximum GS1-128 barcode width (including quiet zones) is 6.5" (165.1 mm).
- For more information on how to properly create GS1-128 barcodes, see section 5.5 –“Barcode Production and Quality Assessment” of the GS1 General Specifications.

Figure 6a: Suggested Label Placement for Produce Cases



2. Use recommended label placement.

Refer to figures 6a and 6b for guidance in placing labels on produce cases. Figure 6a is an example of suggested case label placement for either the end panel (width) or length panel.

For cartons and outer cases, symbol placement will vary slightly in practice; target placement for the bottom of the barcode symbol is 1.25" (32.00 mm) from the natural base of the item, assuming a barcode height of 1.25" (32.00 mm), which results in a center line of 1.875" (47.6 mm) from the base of the item. The barcode height may vary, but the target centerline should remain the same. The symbol, including its quiet zones, should be at least 0.75" (19.00 mm) from any vertical edge to avoid damage.

The barcodes on units intended for general distribution should be upright (i.e. in picket fence orientation) and placed on the sides of the unit. Each case shall have at least one barcode, and two are

Figure 6b: Suggested Label Placement for Shallow Trays



recommended when these symbols are pre-printed (i.e., not on-demand print-and-apply or on-demand direct print). As not all products are packed in an identical way, this general rule may not apply to unusual packaging types (e.g., low height items, display cases, bags). The barcodes should be kept away from any vertical edges so that the barcodes are less likely to be accidentally damaged in transit.

If the height of a case or tray is less than 2.0” (50.00 mm), making it impossible to print a full height barcode with the human-readable interpretation below the bars, or if the construction of the unit is such that the full symbol height cannot be accommodated, the following options should be considered in this order of preference:

- Place the human-readable interpretation to the left of the symbol, outside the compulsory quiet zones.
- When the height of the unit is less than 1.25” (32.00 mm), the symbol may be placed on the top of the package. The symbol should be placed with the bars perpendicular to the shortest side, no closer than 0.75” (19.00 mm) from any edge.

For additional details on label placement for cases, cartons and trays, please refer to Section 6.8 of the most recent version of the GS1 General Specifications. **The placement guidance offered here is a recommendation; however, certain formats (e.g. some RPCs, produce bags) will not allow conformance to this best practice. Receiver scanning systems and procedures will need to be flexible enough to accommodate these formats.**

The GS1-128 barcode may either be printed onto a label and affixed to the case or printed directly onto the case and located per section 6.8 of the General Specifications (see diagram above), provided that the barcode conforms to the minimum print quality grade requirements as outlined below.

3. **Comply with minimum print standards.** To be effectively used across the supply chain, the GS1-128 barcode shall conform to minimum print quality standards.
 - a. Specifically, the **GS1-128 barcode shall have a minimum print quality value of 1.5 or above** as defined by the GS1 General Specifications and ISO/IEC 15416: “Bar Code Print Quality Test Specification – Linear Symbols”.
 - b. The barcode verifier used to measure print quality shall conform to ISO/IEC 15426-1: Bar code verifier conformance specification -- Part 1: Linear symbols.”
 - c. To ensure all GS1 System barcodes will scan across the global supply chain, GS1 and other trade associations developed a standard impartial method to objectively determine the print quality of a barcode. Under the GS1 General Specifications, the print quality level mandated is an ISO/IEC 15416 overall grade of 1.5 or higher.

A print quality verifier should be utilized to grade print quality. Several print quality verifiers are commercially available; when purchasing a barcode verifier, confirm the instrument conforms to the following standards:

- ISO/IEC 15416 methodology;
- ISO/IEC 15426 quality requirement; and
- GS1 General Specifications for GS1 System application.

Print quality verification against the GS1 Standards can ensure the correct print quality grade, size, and prevent quiet zone errors, Function Code 1 Characters, and structure of GS1 Application Identifiers. There are also verification programs available to verify your GS1-128 barcode. It is strongly recommended to contact your local GS1 Member Organization, trading partner or solution provider to assist in reporting on print quality.

4. **Encode specified information only.**

The only information that needs to be encoded in the GS1-128 barcode is:

- The AI for the GTIN (01), followed by the GTIN itself; and
- The AI for Batch/Lot Number (10), followed by the Batch/Lot Number itself.

Lot Number assignment considerations:

- **Shed Packed Product:** It is recommended that **shed packed** product be assigned a Batch/Lot Number that is unique for each packer's packing facility that does not cross a date boundary and be established with consideration to the potential scope of a subsequent recall of product if multiple field origins are included in a particular Batch/Lot. In the case where a shed packer elects to cross a date boundary on a Batch/Lot Number, a Pack/Harvest Date (AI 13) or Best Sell By Date (AI (15)) should be encoded following the Batch/Lot Number in the GS1-128 barcode with the appropriate AI and the Pack/Harvest or Sell By date should be printed in human-readable format under the barcode on the PTI label.
- **Field Packed Product:** It is recommended that **field packed** product be assigned a Batch/Lot Number that is location specific and be established with consideration to the potential scope of a subsequent recall of product if a date boundary is crossed.

- **Lot/Batch Numbers:** Certain characters **must not** be used in the Batch/Lot Number. These characters are shown below. For the complete list of acceptable Batch/Lot Numbers see, Appendix A: Subset of the International Standard ISO/IEC 646.

<u>Symbol</u>	<u>Name</u>
#	cross hatch
@	“at” sign
\$	dollar sign
^	caret
\	backslash
~	tilde
	vertical line
[opening square bracket
]	closing bracket
{	opening curly brace
}	closing curly brace
[SP]	Space
£	Pound Sign
¤	Currency Sign
`	Grave Accent

5. Display the human readable GTIN and Batch/Lot Number directly below the GS1-128 barcode.

To improve readability, it is recommended that the GTIN should be printed on one line and the Batch/Lot Number should show on the line underneath. Human readable information that will be used by warehouse personnel as part of either put-away or picking should be sized such that the text is legible from several feet away in a warehouse setting.

6. Serial numbers should not be used in place of GTINs.

Doing so would negate the use of a pallet label, and would require receivers to scan each and every case. The amount of extra storage needed to store a different number for every case would increase exponentially, as well as rendering the use of the Hybrid Pallet Label impractical.

7. Country of Origin should be included on the PTI RPC case label.

On all other case types, if the Country of Origin is applied separately or printed directly, all of the information should be on the same facing of the case as the PTI label. Shippers should be aware of requirements of the market to which they are shipping.

- 8. If the commodity and additional description (e.g., Variety, Variety Group, Color) is on the label, it should appear above or below the GS1-128 barcode.**
Otherwise, this information must be printed or stickered on the same facing of the case as the label. The font size of this information must be large enough for warehouse or store personnel to read easily.
- 9. The pack configuration (e.g. 10/4-lb bags) may appear on the label.**
On all other cases this information must be printed or stickered on the same facing of as the label. The font size of this information should be large enough for warehouse or store personnel to read easily.
- 10. For RPCs, conveying all the required information via a card or single label that appears on the RPC is preferable to having separate labels for individual pieces of information.**
- 11. The PTI case label should appear on at least one side of the case.**
Some trading partners may require more than one side, especially when using RPCs. Please communicate with your trading partners.
- 12. The PTI voice pick code (CRC-16 Hash) should be included in the lower right hand corner of the case label.** The example in this Best Practice shows the code in reversed font for enhanced visibility in a distribution center environment; this is recommended but not required.
See Figure 7 for instructions for CRC computation.

Continued on the next page

Private Label Product

Private label brand owners when specifying the use of their GTIN should have in place sufficient controls to prevent multiple packers of the same GTIN from duplicating Batch/Lot Numbers to ensure the number combination is unique.

Figure 7: CRC-16 Hash Computation

The PTI voice pick code is a 4-digit number computed using the GTIN, Lot and optional Date from a PTI case label representing a hash of this information. This computation is performed as follows:

- 1) Compute Plain Text:
 - a) Plain Text is the 14-digit GTIN appended by the Lot Code and the Date (where present) in that order.
 - b) Do not include the Application Identifier, prefixes or parentheses.
 - c) Do not include spaces between the GTIN, Lot and Date fields.
 - d) Date, if present, is presented in YYMMDD format, with zero packing and no “/” characters
- 2) Compute ANSI CRC-16 Hash of the Plain Text ASCII bytes using the standard CRC-16 hash with the polynomial of $X^{16} + X^{15} + X^2 + 1$
- 3) Compute the voice pick code from the Hash by taking the four least significant digits in decimal form (Hash mod 10000).
- 4) Print the two least significant digits large, and the most significant digits small.
- 5) Example: This input data:
GTIN = (01) 10850510002011
Lot = (10) 46587443HG234
Plain Text = 1085051000201146587443HG234
CRC-16 Hash = 26359

Yields this result:
Voice pick code – 6359
Large Digits = 59
Small Digits = 63

Communicating Variances

If you vary from these best practices, it is important to communicate to your trading partners the nature and timing of the variance so they can establish manual work processes or modify their scanning systems.

References

- **GS1 General Specifications**, <http://www.gs1.org/barcodes/technical/genspecs>
- **GS1 Barcode Verification:**
http://www.gs1.org/docs/barcodes/GS1_Bar_Code_Verification.pdf
- **ISO/IEC 15416:2000** Information technology – Automatic identification and data capture techniques – Barcode print quality test specification – Linear symbols.
http://www.iso.org/iso/catalogue_detail?csnumber=27659
- **ISO/IEC 15426-1:2006** Information technology – Automatic identification and data capture techniques – Bar code verifier conformance specification – Part 1: Linear symbols.
www.iso.org/iso/catalogue/catalogue_tc/catalogue_detail.htm?csnumber=43643

Appendix A: Subset of the International Standard ISO/IEC 646

<u>Graphic Symbol</u>	<u>Name</u>	<u>Coded Representation</u>	<u>Graphic Symbol</u>	<u>Name</u>	<u>Coded Representation</u>
!	Exclamation mark	2/1	M	Capital letter M	4/13
"	Quotation mark	2/2	N	Capital letter N	4/14
%	Percent sign	2/5	O	Capital letter O	4/15
&	Ampersand	2/6	P	Capital letter P	5/0
'	Apostrophe	2/7	Q	Capital letter Q	5/1
(Left parenthesis	2/8	R	Capital letter R	5/2
)	Right parenthesis	2/9	S	Capital letter S	5/3
*	Asterisk	2/10	T	Capital letter T	5/4
+	Plus sign	2/11	U	Capital letter U	5/5
,	Comma	2/12	V	Capital letter V	5/6
-	Hyphen/Minus	2/13	W	Capital letter W	5/7
.	Full stop	2/14	X	Capital letter X	5/8
/	Solidus	2/15	Y	Capital letter Y	5/9
0	Digit zero	3/0	Z	Capital letter Z	5/10
1	Digit one	3/1	–	Low line (Underscore)	5/15
2	Digit two	3/2	a	Small letter a	6/1
3	Digit three	3/3	b	Small letter b	6/2
4	Digit four	3/4	c	Small letter c	6/3
5	Digit five	3/5	d	Small letter d	6/4
6	Digit six	3/6	e	Small letter e	6/5
7	Digit seven	3/7	f	Small letter f	6/6
8	Digit eight	3/8	g	Small letter g	6/7
9	Digit nine	3/9	h	Small letter h	6/8
:	Colon	3/10	i	Small letter i	6/9
;	Semicolon	3/11	j	Small letter j	6/10
<	Less-than sign	3/12	k	Small letter k	6/11
=	Equals sign	3/13	l	Small letter l	6/12
>	Greater-than sign	3/14	m	Small letter m	6/13
?	Question mark	3/15	n	Small letter n	6/14
A	Capital letter A	4/1	o	Small letter o	6/15

<u>Graphic Symbol</u>	<u>Name</u>	<u>Coded Representation</u>	<u>Graphic Symbol</u>	<u>Name</u>	<u>Coded Representation</u>
B	Capital letter B	4/2	p	Small letter p	7/0
C	Capital letter C	4/3	q	Small letter q	7/1
D	Capital letter D	4/4	r	Small letter r	7/2
E	Capital letter E	4/5	s	Small letter s	7/3
F	Capital letter F	4/6	t	Small letter t	7/4
G	Capital letter G	4/7	u	Small letter u	7/5
H	Capital letter H	4/8	v	Small letter v	7/6
I	Capital letter I	4/9	w	Small letter w	7/7
J	Capital letter J	4/10	x	Small letter x	7/8
K	Capital letter K	4/11	y	Small letter y	7/9
L	Capital letter L	4/12	z	Small letter z	7/10