Produce Traceability Initiative (PTI)
Best Practices for Formatting Case Labels

(Revision 2.1)

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 if the minimum traceability information requirements are met in good faith.

Revision History

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

Version No.	Date of Change	Changed By	Summary of Change
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 Preceding the 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
1.3	07/17/17	TWG	Added clarification on case sensitivity on how Batch/Lot number affects PTI voice pick code
1.3	07/17/17	TWG	Updated Objectives to read "recording systems" in lieu of "Scanning systems".
1.3	07/17/17	TWG	Updated Lot/Batch Numbers to use only upper case for lot numbers.
1.3	07/17/17	TWG	Updated CRC-16 Hash Computation to include the GS1 lot number as letter case sensitive, and therefore so is the PTI voice pick code.
1.3	07/17/17	TWG	Updated Figure 3a: Basic PTI RPC Case Label to show the proper placement of the barcode above the RPC tines for unencumbered scanning.
1.3	07/17/17	TWG	Added note regarding potential trading partner requests for supply chain information, beyond the scope of traceability, to be added to the PTI Label. Page 7

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1.4	01/11/19	TWG	Page 8: Updated Figure 1. Removed "basic" PTI label. Updated label sample and added title "Industry Standard PTI Data Elements"
1.4	01/11/19	TWG	Page 9: Updated Figure 2 with new label sample
1.4	01/11/19	TWG	Page 10 – Added CFIA Links
1.4	01/11/19	TWG	Page 10 – Updated Figure 3 sample label to include date in GS1-128 barcode. This was missing date in previous sample.
1.4	01/11/19	TWG	Added language for Romaine labeling recommendations, including Harvest information
1.4	04/10/19	TWG	Removed language for Romaine labeling recommendations
1.4	04/10/19	TWG	Updated figure 3A to include pack date in mmm/dd format
2.0	05/08/20	TWG	Removed old simplified label and replaced with new example and corresponding chart.
2.0	05/08/20	TWG	Added language for font size and style and dual language; added grid containing information on font size
2.0	05/08/20	TWG	Added additional information on inclusion of UPC/PLU, human readable date, and grown in information.
2.1	12/17/20	TWG	Barcode revised for font size accuracy.

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;

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[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 record keeping 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 in 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.

The use of the updated case label described below is strongly recommended for use within the produce industry and has been endorsed by a number of U.S. and Canadian buyer organizations. (Please see the PTI website for a list of supporting organizations.)

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:

Sector Term	GS1 Glossary Term	Definition
• 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.
• 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.
• 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.

• 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 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. The GTIN-14 has been selected for use in the PTI.
	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 (13)	The AI (13) indicates that the GS1 AI data fields contain a **pack or harvest 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. *produce industry definition
	AI (10)	The AI (10) indicates the GS1 AI data fields contain a batch or lot number. The data is alphanumeric and is variable field length up to 20
	AI (15)	The AI (15) indicates that the GS1 AI data fields contain a "**best if used by/use by/best before" 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. *produce industry definition

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

Figure 1: PTI Basic Case Label

Sample Case Label:

(Please note font sizes used are in Swis721 Cn BT – If a different font is used please strive to maintain a similar size.)

GS1-128 Barcode including:
GTIN, Date (AI 13 or 15), Lot Number (Font Size 10)

Human Readable Date
Harvest Date OR Pack
Date OR Best if Used
By /Use By/Best
Before Date
(Font Size 9)
Date Font Size 14

FINAL

(01) 3 0071430 01105 9 (13) 201205 (10) 2071231339

STRAWBERRIES/BAIES FRAISES
DOLE 4EA x 2LB

Pack Date/ Empaqueté le
Dec 05

Grown In/Cultivé en California, USA

Grade A/Catégorie A

Dole Fresh Vegetables, Monterey, CA 93940

0 07143 00115 4

24 **83**

Voice Pick
Code
(Black Text in
White Box)
(Font Sizes:
Small numbers
14, large 24)

Name/Variety of Item (Font Size 18),
Size/Packaging (Font Size 18), Grown in State/Province
Country (Font Size 14), Grade (if required Font Size 10),
& Responsible Party (Font Size 12)

PLU Number for Case Containing Bulk
Items OR
UPC Barcode for Cases Containing
Prepacks

Clarification on Recommended Data Elements:

GENERAL
The label depicts what is commonly used in trade today. This label is recommended to be used on all cases including corrugate, RPCs, crates and bins. Certain target markets may also have other master shipping container labeling requirements. Suppliers may receive requests from specific trading partners to add additional information to the Standard PTI label that go beyond use for traceability purposes. These may include, but are not limited to, private label specifications or information required to meet state regulatory requirements. Each request should be openly discussed and approved between trading partners.

FONT STYLE & SIZE
To ensure clarity and legibility, the font style of Swis721 Cn BT is recommended. If a different font style or size needs to be substituted, please strive to maintain a similar style and size. It is understood that additional requirements (e.g. state regulations) may lead to additional text, which may impact font size – if that is the case, suppliers should ensure their trading partners are aware of deviations.

LANGUAGE

Since the PTI label is designed to comply with buyer requirements in both the United States and Canada, French is included on the label. If your product will only be distributed within the United States, dual language marking can be eliminated.   If the case is to be used at the retail display level in Canada the label should be removed prior to display or the label must be compliant with Canadian language requirements.

UPC & PLU
The decision to use a UPC code or PLU code on the case label will be based on the type of code that corresponds with the item inside the case. This is typically an either/or situation, however there are some specific instances where an item may have both the UPC and PLU on the consumer item; if that occurs, both should appear on the case label.

HUMAN READABLE DATE
The decision to use Harvest Date, Pack Date, or Best if Used By/Use By/Best Before Date may vary based on trading partner requirements. Regardless of which date format used, the format on the case label should match the date format used on the item inside the case.

GROWN IN INFORMATION
Case Marking of Single-Ingredient Commodities: In the United States and Canada, the province/state (or region for romaine, as defined by the romaine task force) is required – for all other countries *Grown In* would only require the country. If the commodity was sourced from multiple origins, list each of them.

Case Marking of Items Containing Multiple Ingredients:
- When case contents include multiple ingredients, but **do not include romaine**, indicate "multiple:" and list the countries of origin.
    - For example, case marking of a salad blend containing iceberg, carrots, and red cabbage would indicate "Grown in/ Cultive en: Multiple; USA, CA, MX".
- When multi-ingredient contents **do include romaine**, indicate "multiple/rom:" and list countries of origin. This will indicate to the supply chain that romaine is contained in the case, and, in the event an advisory is issued, the case should be opened to identify growing regions printed on the consumer labeling.
    - For example, a salad blend containing iceberg, romaine, carrots and red cabbage, all grown in the USA, would indicate "Grown in/ Cultive en: Multiple/rom; USA
- *Members of the romaine supply chain are likely familiar with the provenance labeling described below, in which the "grown in" region(s) are provided on the* ***consumer unit*** *and are present for* ***romaine only***. *As noted above, case marking should bear origin information for the breadth of commodities, not just romaine. When cases contain romaine and no other commodities, the "grown in" regions listed on the case should be consistent with the regions recommended by the romaine task force which have been indicated on consumer labeling since early 2019. Additional details on Romaine labelling and a map that identifies the*
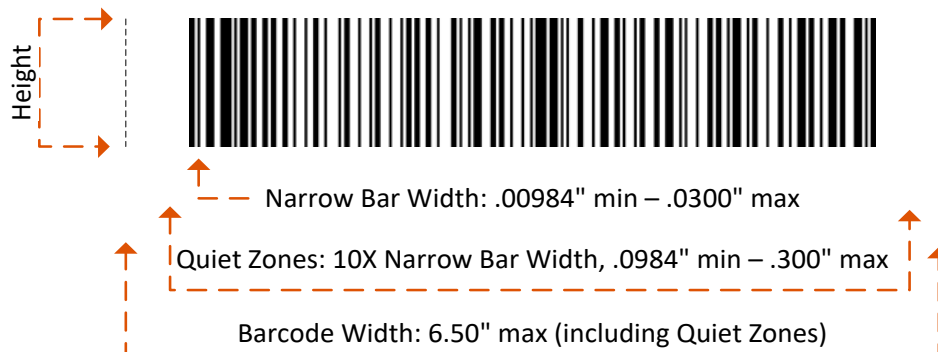
boundaries of the regions listed below can be found on the [PMA Website](#) included in the References section.

Growing Region*	*Abbreviation*
o *Yuma**	*Yuma*
▪ *"Yuma" includes Bard and Winterhaven CA.*	
o *Phoenix*	*Phoenix*
o *Southern Arizona*	*South AZ*
o *Northern Arizona*	*North AZ*
o *Northern California*	*North CA*
o *Salinas*	*Salinas*
o *Santa Maria*	*Santa Maria*
o *Southern California*	*South CA*
o *Imperial Valley*	*Imperial Vly*
o *Coachella*	*Coachella*
o *Central Valley*	*Central Vly*
o *Northern Mexico*	*North MX*
o *Central Mexico*	*Central MX*
o *Southern Mexico*	*South MX*
o *Other regions*	*use 2 letter state, province or territory*

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).
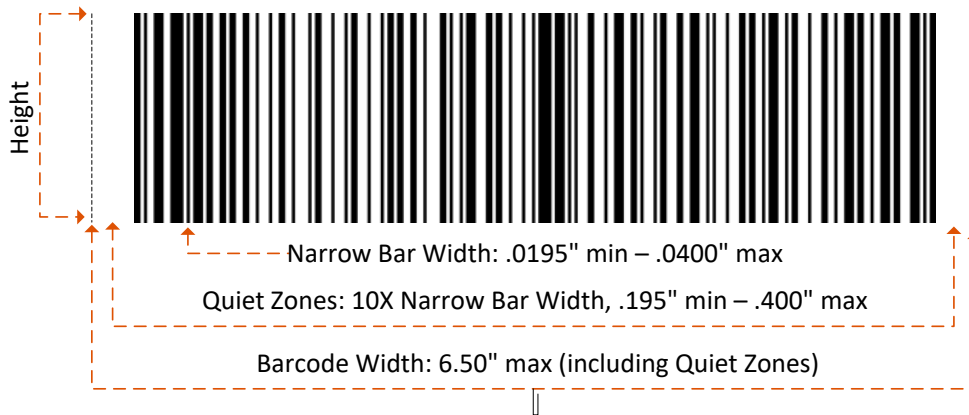
Figure 5a: GS1-128 Barcode

Narrow Bar Width: .00984" min – .0300" max

Quiet Zones: 10X Narrow Bar Width, .0984" min – .300" max

Barcode Width: 6.50" max (including Quiet Zones)

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).
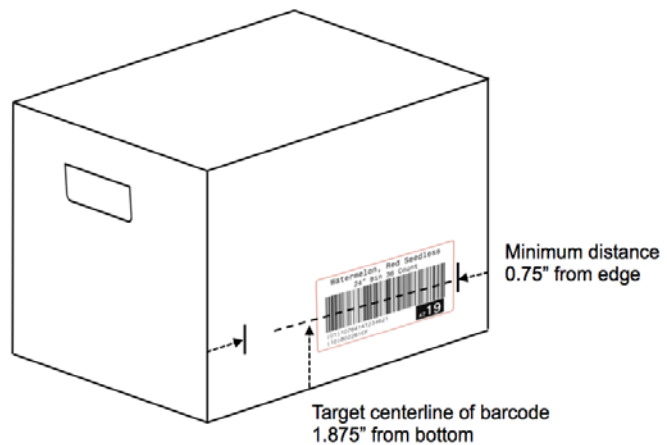
Figure 5b: GS1-128 Barcode

Narrow Bar Width: .0195" min – .0400" max

Quiet Zones: 10X Narrow Bar Width, .195" min – .400" max

Barcode Width: 6.50" max (including Quiet Zones)

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

Minimum distance 0.75" from edge

Target centerline of barcode 1.875" from bottom

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.

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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.

Figure 6b: Suggested Label Placement for Shallow Trays

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 **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 6.7 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 the barcode conforms to the minimum print quality grade requirements as outlined below.

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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 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 Date 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.

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- **Lot/Batch Numbers:** The GS1 lot number is letter case sensitive. It is recommended the use of upper-case letters in lot numbers to avoid confusion; this also makes the human readable portion batch/lot number easier to read 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.

Symbol	Name
#	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.

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 case on the pallet. 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.

   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.

7. **The PTI voice pick code (CRC-16 Hash) should be included in the lower right-hand corner of the case label.**

The role of the VoiceCode voice pick code is to provide a quick and simple way to identify a case with a given GTIN/Lot/Date in a warehouse environment to reduce the cost and simplify

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the process of tracing cases. The VoiceCode is printed on the PTI label and designed to integrate with voice pick systems popular in large warehouse management systems (WMS).

See Figure 7 for instructions for CRC computation.

The GS1 lot number is letter case sensitive, and therefore so is the PTI voice pick code.

<u>**Figure 7: CRC-16 Hash Computation**</u>
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

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.

Communicating Variances

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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/iso_catalogue/catalogue_tc/catalogue_detail.htm?csnumber=43643
- **Safe Food for Canadian Labeling Regulations**

- **PMA:** https://www.pma.com/content/articles/2018/11/qa-romaine

- **United Fresh:** https://www.unitedfresh.org/questions-answers-on-voluntary-romaine-origin-harvest-date-labelling/

- **FDA**: https://www.fda.gov/NewsEvents/Newsroom/PressAnnouncements/ucm626716.htm

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

Graphic Symbol	Name	Coded Representation	Graphic Symbol	Name	Coded Representation
!	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

Produce Traceability Initiative Best Practices for Formatting Case Labels Revision 2.0
Updated: May 8, 2020
Source: www.producetraceability.org

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Graphic Symbol	Name	Coded Representation	Graphic Symbol	Name	Coded Representation
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