



The Global Language of Business

# GS1 Human Readable Interpretation (HRI) Implementation Guideline

Guideline to how to apply Human Readable Interpretation  
(HRI) on GS1 barcodes

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## Log of Changes

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1.2	Apr 2018	Yoshihiko Iwasaki	WR18-036 updates to bring-up to date and fully in line with the GS1 General Specifications
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# 1 Introduction

The objective of this guide is to explain in simple terms how to manage the Human Readable Interpretation (HRI) associated with GS1 barcodes. Human Readable Interpretation represents the same GS1 subset of 82 ISO/IEC 646 encodable characters (see [GS1 General Specification](#) section 7.11) in a GS1 data carrier and printed below, beside or above a barcode. HRI serves as a fall-back option in situations where there is a need to manually interpret or process barcoded data. The HRI rules enable industry to create consistent packaging designs that can be distributed to multiple countries and used in the same way.

Refer to [GS1 General Specifications](#), section 4.14 for human readable text rules on HRI and non-HRI.

## 1.1 Purpose and scope

The purpose of this document is to provide an easy-to-follow guideline for the application of Human Readable Interpretation as it relates to its use with barcodes. Each HRI Rule is explained in simple terms along with examples or figures.

## 1.2 Who can use this document?

The intended audience of the document is:

- Manufacturers
- Retail and healthcare industry users such as retail checkout staff, nurses, warehouse staff
- Printing and design companies such as package designers and barcode software design companies.

## 2 GS1 barcodes

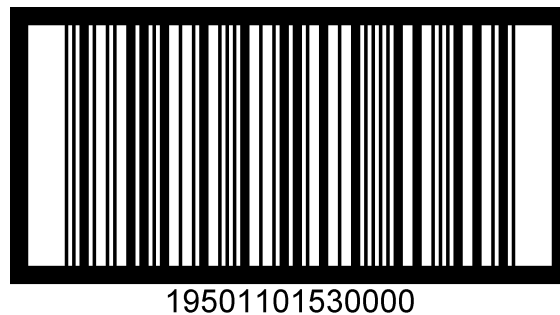
This section provides an overview of all GS1 barcodes to which the HRI rules in this document apply. All barcode examples follow the dimensional specifications as specified in the symbol specification tables ([GS1 General Specifications](#), section 5).

### 2.1 EAN/UPC



**Figure 2-1** Examples of EAN/UPC barcodes

### 2.2 ITF-14



**Figure 2-2** Example of ITF-14 barcode

### 2.3 GS1-128



**Figure 2-3** Example of GS1-128 barcode

## 2.4 GS1 DataBar



Figure 2-4 Example of GS1 DataBar barcodes

## 2.5 GS1 DataMatrix & Data Matrix



Figure 2-5 Examples of GS1 DataMatrix (left) and Data Matrix (right) barcodes

## 2.6 GS1 QR Code & QR Code



Figure 2-6 Examples of GS1 QR Code (left) and QR Code (right) barcodes

## 2.7 GS1 Composite symbology

Example of GS1 DataBar Limited Composite barcode with CC-A:




**Figure 2-7** Example of GS1 Composite barcode.

### 3 Human Readable Interpretation rules

Human readable interpretation (HRI) rules are provided to standardise printing requirements and facilitate training of staff on how to deal with GS1 AIDC data carriers that fail to scan or read.

When considering the practical implementation and application of HRI during the creation of the product packaging, many factors must be taken into account to determine if and how HRI is included with the symbol. These factors may include the type of product being labelled or marked, product use, available space for marking, alternate data availability, regulatory or legal requirements, technical constraints, etc.

 **Note:** The rules in this section are based on the [GS1 General Specifications](#) in particular sections 4 and 5. Rules and phrases that are direct quotes from the *GS1 General Specifications* rules are shown in italics.

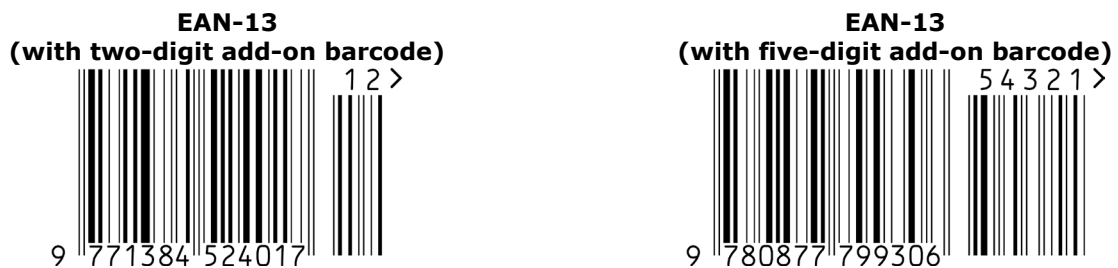
#### 3.1 Where to print the HRI?

##### 3.1.1 EAN/UPC symbology

For EAN/UPC symbologies the following rule applies: *The human readable digits SHALL be printed underneath the main barcode and above the add-on barcode. [GENSPECS – section 5.2.5].*



**Figure 3-1** Some correct examples of EAN/UPC barcodes, the HRI is placed at the bottom



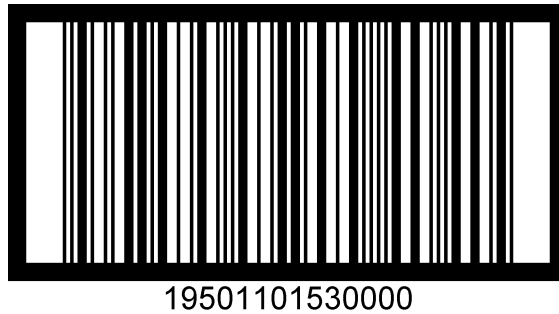
**Figure 3-2** Some examples of EAN/UPC barcodes with an add-on barcode. The HRI of the add-on barcode is placed above it

##### 3.1.2 Other linear symbologies

For symbologies other than EAN/UPC, including symbologies that support multiple GS1 element strings, the following rules apply.

*Whether a GS1 AIDC data carrier encodes a GS1 identification key, GS1 key attributes, or a combination of both, the HRI SHOULD be placed below the barcode and grouped together wherever physically possible while maintaining the HRI legibility and minimum barcode height (as specified in the appropriate symbol specification table). [GENSPECS , section 4.14, rule 1 clause a].*

*When HRI is grouped together (for example, all HRI data is grouped below the barcode or all HRI data is grouped above the barcode), HRI shall always follow the encoding sequencing of the GS1 AIDC data carrier. [GENSPECS , section 4.14, rule 1 clause c]*




**Figure 3-3** Example of an ITF-14 barcode, HRI is placed at the bottom of barcode



**Figure 3-4** Example of a GS1-128 with multiple GS1 element strings, HRI is grouped together and placed below the barcode



**Figure 3-5** Example, HRI grouped together and placed below the GS1 DataBar Expanded barcode:

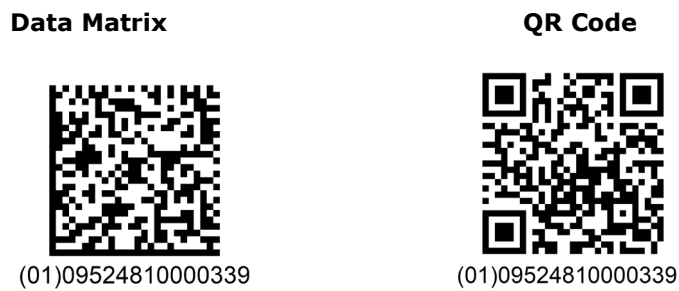
 **Note:** Encoding sequencing is the order in which the data encoded in the data carrier. For example, if the order of the AIs encoded in the data carrier is 01, 17, 10, the HRI will appear in the following order (01), (17), (10).

### 3.1.3 Data Matrix and QR Code symbologies

The next examples show the HRI grouped together under the barcode, but across multiple lines of text and minimum HRI for retail:



**Figure 3-6** Examples the HRI grouped together under the barcodes



**Figure 3-7** Examples the required HRI for retail under the barcodes

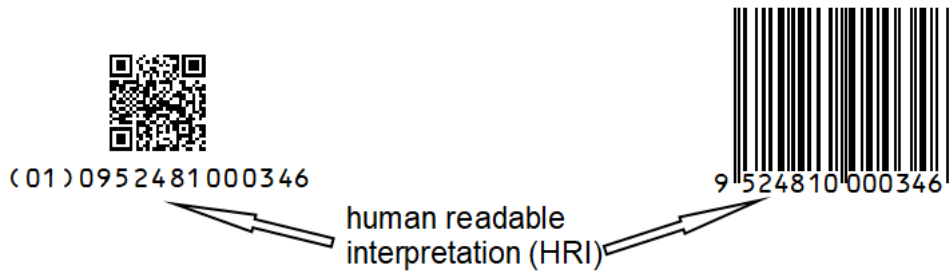
### 3.2 What to do if the barcodes are adjacent in Retail?

The 14-digit GTIN HRI is not required for any 2D barcode displayed on the packaging when it is adjacent to a linear barcode with HRI or if the 2D barcode is intended for consumer engagement. When a 2D barcode will be the only barcode for the GTIN, it SHALL display the 14-digit GTIN HRI as shown in Figure 3-9

When a linear EAN-8, EAN-13 or UPC-A barcode and 2D barcode are adjacent on a general retail consumer trade item, HRI for the GTIN is only required for the linear barcode. If the linear EAN-8, EAN-13, UPC-A or UPC-E barcode and 2D barcode are unable to be adjacent, then the GTIN SHOULD accompany both.



**Figure 3-8** Example of adjacent barcode HRI



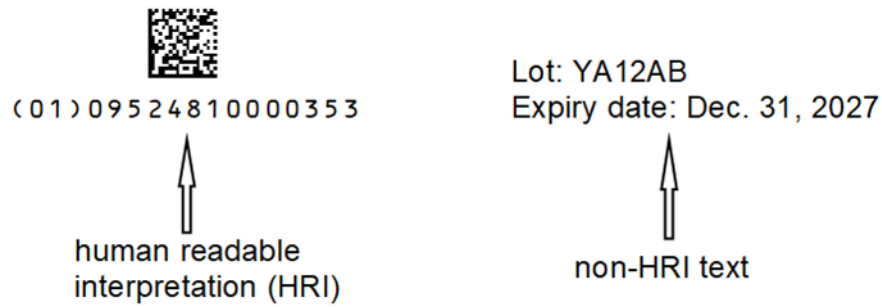
**Figure 3-9** Example of non-adjacent barcode HRI

When a UPC-E barcode and 2D barcode are adjacent on a general retail consumer trade item, HRI for the GTIN is required and SHOULD accompany both. UPC-E encodes a GTIN-12 using a zero-suppression process described in [General Specification section 5.2.2.4](#).



**Figure 3-10** Example of adjacent UPC-E barcode HRI

HRI beyond GTIN is not required when using barcodes encoded with GS1 element string or GS1 Digital Link URI syntax on general retail consumer trade items. If additional GS1 element strings are used by downstream trading partners (e.g., retailer and/or consumers), they SHOULD appear on the object in human readable text.



**Figure 3-11** Example of HRI and non-HRI placement

### 3.3 What to do if the HRI does not fit under the barcode?

#### 3.3.1 Place the HRI above or to the side

For all symbologies, except for EAN/UPC barcodes, the HRI MAY be printed above, to the left, or to the right of the barcode.

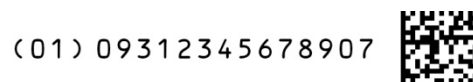
In such cases, the HRI SHALL always be printed adjacent to (obviously associated with) the GS1 AIDC data carrier while protecting Quiet Zones. [GENSPECS, section 4.14, rule 1 clause a].



**Figure 3-12** Example, the HRI is placed above the ITF-14 barcode



**Figure 3-13** Example of a GS1 DataBar Expanded Stacked barcode with HRI placed to the right barcode



**Figure 3-14** Example of a GS1 DataMatrix barcode with HRI placed to the left

### 3.4 What to do if the Human Readable Interpretation line is too long?

A single data element shall not be broken into two lines of HRI, for example the data for a serial number would appear on one line of HRI. [GENSPECS , section 4.14, rule 1 clause e].



**Figure 3-15** Example of correct HRI, all AIs and their corresponding values are placed on the same line

The rule also implies that the AI should not be separated from its corresponding data. In cases where space constraints do not permit all HRI to fit on one line, the AI and its corresponding data should be moved to the next line.

A correct example, HRI is split across multiple lines but the AIs and corresponding data are kept together:



**Figure 3-16** Example of HRI is split across multiple

The example below demonstrates how a single data element AI (17) is incorrectly broken into two lines of HRI.



**Figure 3-17** Example of HRI improperly split across multiple

#### 3.4.1 Use a combination of top, bottom, and side to place the HRI

For symbologies that can contain multiple GS1 element strings, the HRI for GS1 identification keys and attributes MAY be separated (for example by placing the HRI for the GS1 identification key below the barcode and the HRI of the attributes HRI above the barcode). In that case, *the preference for GS1 key HRI placement is always below the barcode [GENSPECS , section 4.14, rule 1 clause d].*

In this example the HRI of the GTIN AI (01) is placed under the GS1 DataBar Expanded barcode, while the expiry date AI (17) and the batch/lot number are placed above it:



**Figure 3-18** Example the HRI of the above and below GS1 DataBar barcode

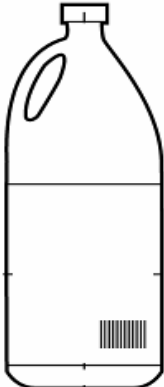

The same example but now with a GS1-128 barcode:



**Figure 3-19** Example the HRI of the above and below GS1-128 barcode

### 3.5 What to do if the barcode is printed in ladder orientation?

**Table 3-1** Barcodes can be printed in picket fence or ladder orientation:

Picket Fence Orientation	Ladder Orientation
	

*If the barcode is printed in ladder orientation on the product, the HRI SHOULD remain clearly associated with the barcode and may appear below, to the left, or to the right of the barcode respecting Quiet Zones. [GENSPECS , section 4.14, rule 1 clause b].*



**Note:** The terms under, left and right are used relative to the barcode orientation, as illustrated in the figure below:



**Figure 3-20** Example of barcode with HRI printed in ladder orientation. [GENSPECS figure 4-4]



**Figure 3-21** Example of correct HRI placement with a GS1-128 barcode printed in ladder orientation

### 3.6 What is the best font to use for printing the HRI?

A clearly legible font *SHALL* be used (e.g., OCR-B as defined in ISO 1073-2) and the character set as defined in [GENSPECS section 7.11]. Reasonable alternative type fonts and character sizes are acceptable provided the interpretation is clearly legible. [GENSPECS , section 4.14, rule 2 clause a]

Below is an example of OCR-B font:

(01) 04512345678906

### 3.7 How to represent the GS1 Application Identifiers in HRI?

GS1-128, GS1 DataBar Expanded, GS1 DataBar Expanded Stacked, GS1 DataMatrix and GS1 QR Code apply GS1 Application Identifiers (AIs) to encode the data in a barcode. The AI values must be represented as HRI between parentheses.

Parentheses *SHALL* surround AIs in HRI but are not encoded in the GS1 AIDC data carrier. [GENSPECS , section 4.14, rule 2 clause c]

The example below shows the correct representation of the AIs. The parentheses (brackets) around the AIs are only present as HRI and not encoded in the barcode.



**Figure 3-22** Example of parentheses around AIs

✔ **Note:** The AIs as shown in HRI do not always fully match what is encoded in the barcode. For example, in some of the GS1 DataBar barcodes AI (01) is implied by the barcode type and the '01' value is not encoded as such.

### 3.8 How to represent symbology and control characters in HRI?

*HRI SHALL be limited to GS1 element strings and will not include GS1 AIDC data carrier overhead such as separator characters. [GENSPECS , section 4.14, rule 2 clause b]*

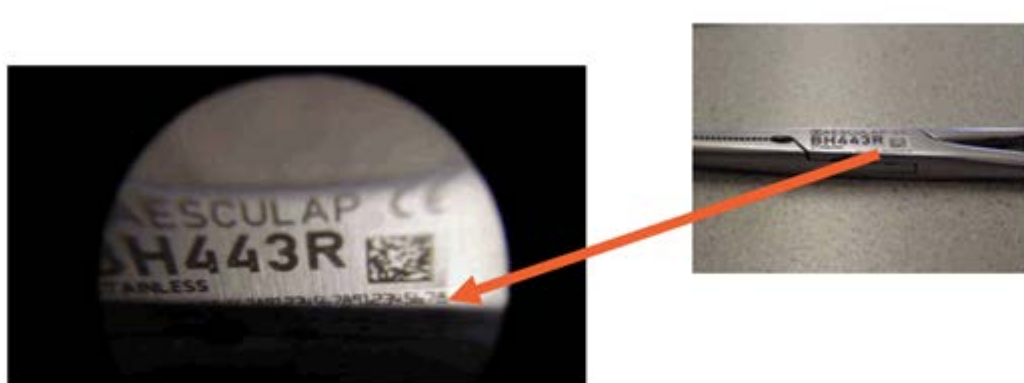
All GS1 AIDC data carriers require the use of specific technical encoding characters. These special characters allow scanning software to identify that the barcode conforms to GS1 encoding standards and so enables the correct decoding of data elements.

Examples of such characters are Start and Stop Characters, FNC1, control characters <GS> and data separators. These characters are not represented in the HRI since they are intended only for use by automated scanning software

### 3.9 Do I always need to print the HRI?

*HRI SHALL appear except in rare circumstances for specific applications where there are extreme space constraints (e.g., direct part marking). If the GS1 AIDC data carrier cannot be read or scanned and the HRI does not appear on the label, package, or item, non-HRI text SHOULD be used as backup information. [GENSPECS , section 4.14, rule 1 clause g]*

✔ **Note:** For Healthcare applications specific rules have been defined to address some of these aspects. [see GENSPECS , sections 4.14 and 4.14.1]



**Figure 3-23** Example of a GS1 DataMatrix directly marked on an item, space limitations inhibit full representation of the HRI

## 4 Glossary

Please refer to the [www.gs1.org/glossary](http://www.gs1.org/glossary) for the latest version of the glossary.

Term	Acronym /Abbreviation	Definition
AIDC data carrier		Generic term for a barcode, RFID tag, or NFC tag; a means of physically affixing machine-readable data to a physical entity
attribute		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).
GS1 Application Identifier	GS1 AI	The field of two or more digits at the beginning of an element string that uniquely defines its format and meaning.
GS1 Digital Link URI		A Web URI syntax for expressing GS1 identifier keys and attributes in a format using GS1 Application Identifiers and GS1 Application Identifier data fields as specified in the GS1 Digital Link standard.
GS1 element string		A syntax for expressing GS1 identifier keys and attributes in a format using GS1 Application Identifiers and GS1 Application Identifier data fields.
GS1 identification key	GS1 key	Numeric or alphanumeric strings that incorporate a GS1 Prefix, GS1 Company Prefix or GS1-8 Prefix and are the basis of the unique GS1 identifiers defined for use in an area of GS1 system application such as trade, logistics, or asset management. They may identify a class of entities (e.g., a trade item) or an instance of an entity (e.g., a logistic unit). The term GS1 identification key is for broad communications such as for marketing, licensing, policy etc
human readable interpretation	HRI	Characters, such as letters and numbers, which can be read by persons and are encoded in GS1 AIDC data carriers confined to a GS1 standard structure and format. The human readable interpretation is the encoded data. Start, stop, shift and function characters, as well as the symbol check character, are not shown in the human readable interpretation
human readable text		Refers to HRI and/or non-HRI text collectively, when referencing data that is encoded into a data carrier.
non-human readable interpretation text	non-HRI	Characters such as letters and numbers that can be read by persons and may or may not be encoded in GS1 AIDC data carriers and are not confined to a structure and format based on GS1 standards (e.g., a date code expressed in a national format that could be used to encode a date field in a GS1 AIDC data carrier, brand owner name, consumer declarations).
Quiet Zone		A clear space which precedes the start character of a barcode and follows the stop character of a linear barcode or surrounds a 2D barcode.