



General Specifications Change Notification (GSCN)

WR #	GSCN Name	Effective Date
WR 25-320	Editorial changes for 2DiR Implementation Guideline to update with new or revised resources and link from Application Standards Profiles (ASPs) in GenSpecs.	Dec 2025

Associated Work Request (WR) Number:

Background:

The *2D Barcodes at Retail Point-of-Sale Implementation Guideline* is an important resource for retail industry and GS1 community, serving as an access point to various technical documents, supporting documents AND tools to facilitate and streamline conformant implementation. Editorial changes are required to update the guideline with several documents and resources supporting 2D in Retail (2DiR) implementation, which have been recently revised or newly published e.g., 2D colour and quality guide, private label position paper, test suites etc.

The *GS1 General Specifications* defines conformance requirements for the future state of applications within Application Standard Profiles (ASP), with an opportunity to link to/reference the above-mentioned guideline to support the 2D migration period and overall implementation of 2D barcodes.

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14. In some cases, all four can be used, but in other cases, only one, two, or three formats are permitted.

- **Mandatory attribute(s):** An identifier is always required and in some applications an attribute is mandatory. For example, variable measure trade items with a GTIN also require an attribute for weight or measure.
- **Optional attribute(s):** Section 3.2 provides a list of all GS1 Application Identifiers and data that is defined by GS1 for use in barcodes. All attributes that support the GS1 identification key in use are optional if not listed as mandatory. The party responsible for labelling the object is responsible for determining if optional attributes are needed.
- **Data carrier choices:** There are various data carriers approved within GS1 AIDC application standard. Each AIDC application standard records which data carriers are conformant. In some cases, there may also be one required data carrier and another that can be used in addition to the first.
- **Barcode size and quality specifications:** Each AIDC application standard that includes a barcode has specifications for size and print quality minimums. Conformity to these specifications and proper placement ensures the barcode has a high likelihood of scanning successfully in the required scan environment.
- **GS1 syntax:** GS1 AIDC data carriers support four-five different syntaxes. Each syntax defines a structured approach to representing data when it is encoded so that it can be correctly interpreted and processed when it is decoded.

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8.2 ASP 1: Fixed measure trade items scanned at retail POS

ASP 1 applies to trade items that are intended for scanning at retail point-of-sale, are fixed measure (i.e., not sold based on variable weight or variable measure) and are not intended for general distribution scanning. Examples include trade items such as milk, soup cans, a hat, a lamp, a tennis racket, a battery pack, or a toy.

- **Note:** ASP 1 does not apply to products sold or dispensed in a controlled environment (e.g., pharmacy, hospital) nor does it apply to books and serial publications where additional identification, data carrier, specifications and/or rules apply.

Table 8-18-18-18-11658-18-18-18-8-18-18-18-1 ASP 1 conformance requirements

Conformance requirements	General retail products
Basis of conformance requirements	Section 2.1.3.1 Fixed measure trade items scanned at retail POS using GTIN-12 or GTIN-13 Section 2.1.3.2 Fixed measure trade items scanned at retail POS using GTIN-12 carried by a UPC-E barcode Section 2.1.3.3 Fixed measure trade items scanned at retail POS using GTIN-8 Section 2.1.3.6 Fixed measure fresh food trade items scanned at retail POS
Identifier choices	GTIN-8, GTIN-12, GTIN-13
Mandatory attribute(s)	N/A
Optional attribute(s)	See section 3.2 for the list of GS1 Application Identifiers that may be used with the identifier
Mandatory choices for a data carrier	EAN-8, EAN-13, UPC-A, UPC-E, GS1 DataBar Omnidirectional, GS1 DataBar Stacked Omnidirectional, GS1 DataBar Expanded, GS1 DataBar Expanded Stacked



Conformance requirements	General retail products
Agreement on conformant data carriers in the future	Any one of the mandatory data carriers or any one of the data carriers below will be conformant in the future once POS system support for these three 2D barcodes below reached pervasive adoption and becomes part of the global application standards. In the migration period, one of the data carriers below may be used in addition to the mandatory data carrier selected. □ GS1 DataMatrix □ Data Matrix (GS1 Digital Link URI) □ QR Code (GS1 Digital Link URI) Please refer to the 2D Barcodes at Retail Point-of-Sale Implementation Guideline for further support on implementing 2D barcodes.
Barcode size and quality specifications	Table 5-44Table 5-44Table 5-44 Symbol specification table 1 contains barcode quality and size specifications for trade items scanned in general retail POS and not general distribution Table 5-46Table 5-46Table 5-46 Symbol specification table 1 addendum 2 for 2D barcodes
Mandatory choices for GS1 syntax	Plain, GS1 element string
Agreement on conformant syntax in the future	Any one of the mandatory GS1 syntaxes or the uncompressed form of GS1 Digital Link URI syntax SHALL be conformant in the future once the POS system support for interoperability between all three GS1 syntaxes has reached pervasive adoption and becomes part of the global application standards.

- **Note:** A data carrier with GS1 Digital Link URI to support consumer mobile devices may be used in addition to the mandatory POS data carriers selected.

Table 8-28-28-28-21668-28-28-28-28-8-28-28-28-2 ASP 1 cross-application rules

Cross-application rules	Description	Section
GTIN rules	Rules for GTIN management of uniqueness and allocation, and responsibility for allocation.	4.2
	Rules that apply when a company changes legal status as a result of an acquisition, merger, partial purchase, split, or "spin-off."	4.6 1.5
Data relationships	Rules for allowed combinations of element strings on the same physical entity, irrespective of the data carrier(s) applied to the entity.	4.13
Human readable interpretation	Human readable interpretation (HRI) rules used to standardise printing requirements and facilitate training of staff on how to deal with GS1 AIDC data carriers that fail to scan or read.	4.14
Multiple barcode management	Rules for implementing multiple barcodes on the same trade item.	4.15
Barcode placement	Rules for barcode placement on trade items that will be scanned at point-of-sale.	6.3

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**Table 8-38-38-38-31678-38-38-38-38-8-38-38-38-3** ASP 1 related technical specifications

Related technical specifications	Description	Section
GS1 Application Identifiers in numerical order	This section describes the meaning, structure and function of the GS1 system element strings so they can be correctly processed in users' application programmes. An element string is the combination of a GS1 Application Identifier and a GS1 Application Identifier data field. Also see GS1 Application Identifiers browser	3.2
Data carrier specifications	EAN/UPC family technical specifications	5.2
	GS1 DataBar family technical specifications	5.5
Check digit calculations	The algorithm used for check digit calculations	7.9
The GS1 subset of International Standard ISO/IEC 646	Lists all characters allowed for use in GS1 Application Identifier (AI) element strings.	7.11

8.3 ASP 2: Fixed measure trade items scanned at retail POS and in general distribution

ASP 2 applies to trade items that are intended for scanning at retail point-of-sale and are fixed measure (i.e., not sold based on variable weight or variable measure). Unlike ASP 1 they are also intended for general distribution scanning. Examples of these products might be a microwave oven or large bag of animal feed.

Table 8-48-48-48-41688-48-48-48-48-8-48-48-48-4 ASP 2 conformance requirements

Conformance requirements	Fixed Measure POS and General Distribution
Basis of conformance requirements	Section 2.1.4 Fixed measure trade items scanned in general distribution and at retail POS
Identifier choices	GTIN-8, GTIN-12, GTIN-13
Mandatory attribute(s)	N/A
Optional attribute(s)	See section 3.2 for the list of GS1 Application Identifiers that may be used with the identifier
Mandatory choices for a data carrier	EAN-8, EAN-13, UPC-A, UPC-E, GS1 DataBar Omnidirectional, GS1 DataBar Stacked Omnidirectional, GS1 DataBar Expanded, GS1 DataBar Expanded Stacked
Agreement on conformant data carriers in the future	Any one of the mandatory data carriers or any one of the data carriers below will be conformant in the future once POS and general distribution system support for these three 2D barcodes below reaches pervasive adoption and becomes part of the global application standards. In the migration period, one of the data carriers below may be used in addition to the mandatory data carrier selected. □ GS1 DataMatrix □ Data Matrix (GS1 Digital Link URI) □ QR Code (GS1 Digital Link URI) Please refer to the 2D Barcodes at Retail Point-of-Sale Implementation Guideline for further support on implementing 2D barcodes.
Barcode size and quality specifications	Table 5-48 Table 5-48 Table 5-48 , Symbol specification table 3 Table 5-49 Table 5-49 Table 5-49 , Symbol specification table 3 addendum 1 for 2D barcodes



Conformance requirements	Fixed Measure POS and General Distribution
Mandatory choices for GS1 syntax	Plain, GS1 element string
Agreement on conformant syntax in the future	Any one of the mandatory GS1 syntaxes or the uncompressed form of GS1 Digital Link URI syntax SHALL be conformant in the future once the POS system support for interoperability between all three GS1 syntaxes has reached pervasive adoption and becomes part of the global application standards.

Note: A data carrier with GS1 Digital Link URI to support consumer mobile devices may be used in addition to the mandatory POS data carriers selected.

Table 8-58-58-58-51698-58-58-58-8-58-58-58-5 ASP 2 cross-application rules

Cross-application rules	Description	Section
GTIN rules	Rules for GTIN management of uniqueness and allocation, and responsibility for allocation.	4.2
	Rules that apply when a company changes legal status as a result of an acquisition, merger, partial purchase, split, or "spin-off."	4.6.1.5
Data relationships	Rules for allowed combinations of element strings on the same physical entity, irrespective of the data carrier(s) applied to the entity.	4.13
Human readable interpretation	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.	4.14
Multiple barcode management	Rules for implementing multiple barcodes on the same trade item.	4.15
Barcode placement	Rules for barcode placement on trade items that will be scanned at point-of-sale.	6.3
	Rules for barcode placement on trade items that will be scanned in general distribution environments.	6.7

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Table 8-68-68-68-61708-68-68-68-8-68-68-68-6 ASP 2 related technical specifications

Related technical specifications	Description	Section
GS1 Application Identifiers in numerical order	This section describes the meaning, structure and function of the GS1 system element strings so they can be correctly processed in users' application programmes. An element string is the combination of a GS1 Application Identifier and a GS1 Application Identifier data field. Also see GS1 Application Identifiers browser .	3.2
Data carrier specifications	EAN/UPC family technical specifications	5.2
	GS1 DataBar family technical specifications	5.5
Check digit calculations	The algorithm used for check digit calculations	7.9



Related technical specifications	Description	Section
The GS1 subset of International Standard ISO/IEC 646	Lists all characters allowed for use in GS1 Application Identifier (AI) element strings.	7.11

8.4 ASP 3: Variable measure trade items scanned at retail POS

ASP 3 applies to trade items that are intended for scanning at retail point-of-sale, are variable measure (i.e., are sold based on variable weight or variable measure) and are not intended for general distribution scanning. Examples include fruits, vegetables, dairy items, bakery items, meat and poultry sold by weight or measure.

Table 8-78-78-78-71718-78-78-78-78-8-78-78-78-7 ASP 3 conformance requirements

Conformance requirements	Variable measure fresh food using GTIN + count/weight	Variable measure fresh food using restricted circulation number (RCN)
Basis of conformance requirements	Section 2.1.12.1 Variable measure fresh food trade items scanned at retail POS using GTIN	Section 2.1.12.2 Variable measure fresh food trade items scanned at retail POS using RCN
Identifier choices	GTIN-12, GTIN-13	RCN-12, RCN-13
Mandatory attribute(s)	SHALL have at least one of the following GS1 Application Identifiers: AI (30) / AI (31nn) / AI (32nn) / AI (35nn) / AI (36nn)	N/A
Optional attribute(s)	See section 3.2 for the list of GS1 Application Identifiers that may be used with the identifier	N/A
Mandatory choices for a data carrier	GS1 DataBar Expanded, GS1 DataBar Expanded Stacked	EAN-13, UPC-A
Agreement on conformant data carriers in the future	Any one of the mandatory data carriers or any one of the data carriers below will be conformant in the future once POS system support for these three 2D barcodes below reaches pervasive adoption and becomes part of the global application standards. In the migration period, one of the data carriers below may be used in addition to the mandatory data carrier selected. □ GS1 DataMatrix □ Data Matrix (GS1 Digital Link URI) □ QR Code (GS1 Digital Link URI) Please refer to the 2D Barcodes at Retail Point-of-Sale Implementation Guideline for further support on implementing 2D barcodes.	N/A



Conformance requirements	Variable measure fresh food using GTIN + count/weight	Variable measure fresh food using restricted circulation number (RCN)
Barcode size and quality specifications	Table 5-44 Table 5-44 Table 5-44 Symbol specification table 1 contains barcode quality and size specifications for trade items scanned in general retail POS and not general distribution Table 5-46 Table 5-46 Table 5-46 Symbol specification table 1 addendum 2 for 2D barcodes	Table 5-44 Table 5-44 Table 5-44 Symbol specification table 1 contains barcode quality and size specifications for trade items scanned in general retail POS and not general distribution
Mandatory choices for GS1 syntax	GS1 element string	Plain
Agreement on conformant syntax in the future	GS1 element string or the uncompressed form of GS1 Digital Link URI syntax SHALL be conformant in the future once the POS system support for interoperability between these syntaxes has reached pervasive adoption and becomes part of the global application standards.	N/A

- **Note:** A data carrier with GS1 Digital Link URI to support consumer mobile devices may be used in addition to the mandatory POS data carriers selected.

Table 8-88-88-88-81728-88-88-88-8-88-8-88-8 ASP 3 cross-application rules

Cross-application rules	Description	Section
GTIN rules	Rules for GTIN management of uniqueness and allocation, and responsibility for allocation.	4.2
	Rules that apply when a company changes legal status as a result of an acquisition, merger, partial purchase, split, or "spin-off."	4.6 1.5
Data relationships	Rules for allowed combinations of element strings on the same physical entity, irrespective of the data carrier(s) applied to the entity.	4.13
Human readable interpretation	Human readable interpretation (HRI) rules are used to standardise printing requirements and facilitate training of staff on how to deal with GS1 AIDC data carriers that fail to scan or read.	4.14
Multiple barcode management	Rules for implementing multiple barcodes on the same trade item.	4.15
Barcode placement	Rules for barcode placement on trade items that will be scanned at point-of-sale.	6.3

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Table 8-98-98-98-91738-98-98-98-9-98-9-98-9 ASP 3 related technical specifications

Related technical specifications	Description	Section
GS1 Application Identifiers in numerical order	This section describes the meaning, structure and function of the GS1 system element strings so they can be correctly processed in users' application programmes. An element string is the combination of a GS1 Application Identifier and a GS1 Application Identifier data field. Also see GS1 Application Identifiers browser	3.2



Related technical specifications	Description	Section
Data carrier specifications	EAN/UPC family technical specifications	5.2
	GS1 DataBar family technical specifications	5.5
Check digit calculations	The algorithm used for check digit calculations	7.9
The GS1 subset of International Standard ISO/IEC 646	Lists all characters allowed for use in GS1 Application Identifier (AI) element strings.	7.11

8.5 ASP 4: General retail consumer trade item with extended packaging

Information on a trade item can be extended when the consumer scans an **AIDC data carrier barcode** to reach web resources online. For example, a shopper scans a box of packaged pasta to find a selection of recipes. For new extended packaging applications, a web-enabled approach using GS1 Digital Link URI syntax and **an AIDC data carrier such as QR Code, or Data Matrix, EPC/RFID or NFC tag** is used. For this reason, the ASP focuses solely on the forward-looking approach. Prior to the GS1 Digital Link URI standard, two approaches were available to reach extended packaging applications that were available within the GS1 system of standards. All legacy implementations of these approaches remain conformant but new implementations SHALL use the GS1 Digital Link URI approach.

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Table 8-108-108-108-101748-108-108-108-8-108-108-108-10 ASP 4 conformance requirements

Conformance requirements	General retail products GS1 Digital Link URI
Basis of conformance requirements	Section 2.1.13.1 GS1 Digital Link URI syntax for extended packaging applications for trade items
Identifier choices	GTIN-8, GTIN-12, GTIN-13
Mandatory attribute(s)	N/A
Optional attribute(s)	See section 3.2 for the list of GS1 Application Identifiers that may be used with the identifier
Mandatory choices for a data carrier	QR Code (GS1 Digital Link URI), Data Matrix (GS1 Digital Link URI) Please refer to the 2D Barcodes at Retail Point-of-Sale Implementation Guideline for further support on implementing 2D barcodes.
Optional choices for additional data carriers	NFC tags MAY be used in addition to the mandatory data carrier selected and SHALL encode the GS1 Digital Link URI using a Well-Known Type URI record as defined in the NFC Forum URI Record Type Definition Technical Specification. Identifier Code 2 (https://www.nfc-forum.org/specifications/uri_record_type_definition/2) or Identifier Code 4 (https://www.nfc-forum.org/specifications/uri_record_type_definition/4), SHALL be used as defined in the NFC Forum URI Record Type Definition Technical Specification.
Agreement on conformant data carriers in the future	EPC/RFID tags MAY be used as an additional data carrier alongside the mandatory choices until the requirements of Policy B11 are met (e.g., 90%+ of smart devices can read EPC/RFID tags). Once these requirements are satisfied, EPC/RFID can be included among the mandatory data carrier options which means an EPC/RFID tag can be used as an alternative to the current mandatory choices.
Barcode size and quality specifications	Table 5-46 Table 5-46 Table 5-46 Symbol specification table 1 addendum 2 for 2D barcodes contains barcode quality and size specifications for 2D barcodes with GS1 Digital Link URI

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