



General Specifications Change Notification (GSCN)

WR #	GSCN Name	Ratification Date
21-342	Retail Application Standard Profiles	Dec 2021

Associated Work Request (WR) Number:

21-001 Future State Application Standard Profiles request

Background:

GS1 Standards provide a basis of industry's agreement over what is (SHALL, MUST) and what is not (SHALL NOT, MAY but not SHOULD, SHOULD but not SHALL) subject to conformance. For example, retailers require suppliers to place an EAN/UPC barcode (carrying a GTIN) on the consumer package and require that GTIN to be used in communications (such as invoices). These agreements allow industry to measure conformance to requirements in a consistent way. Unfortunately, the documentation of conformance requirements in the system of GS1 Standards is not easy to locate or to understand.

Documenting clear conformance requirements and making them easy to find and understand will add value to the GS1 General Specifications, both now and into the future (where we expect a period of significant changes to GS1 AIDC Standards).

The concept of Application Standard Profiles (ASPs) is proposed to meet the needs of the GS1 community by making conformance requirements easy to find and easy to understand (for both existing and future applications).

NOTE: Within the GSCN, Section 8 and all subsections are new text and figures. Because the sections are new, the text does not appear as marked-up text.

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2.1.3 Fixed measure trade items scanned at retail POS

A fixed measure consumer trade item that is intended to be read at high-volume retail POS. The trade item must be identified with a GTIN-8, GTIN-12, or GTIN-13. It must carry a barcode from the EAN/UPC symbology family or the GS1 DataBar® Retail POS family.

To support new applications additional GS1 approved data carriers (encoding additional data with the GTIN) may be applied. For information on how to manage multiple barcodes see section [4.16](#).

[For a summary of all conformance requirements for this AIDC application standard, cross application rules and related technical specifications, see section 8.2.](#)

2.1.3.1 Fixed measure trade items scanned at retail POS using GTIN-12 or GTIN-13

Application description

Figure 2.1.3.1-1. GTIN-12/GTIN-13 data structure

Figure 2.2.2.1-1: GTIN-12/GTIN-13 data structure													
	GS1 Company Prefix						Item reference						Check digit
(GTIN-13)	N ₁	N ₂	N ₃	N ₄	N ₅	N ₆	N ₇	N ₈	N ₉	N ₁₀	N ₁₁	N ₁₂	N ₁₃
	U.P.C. Company Prefix						Item reference						Check digit
(GTIN-12)		N ₁	N ₂	N ₃	N ₄	N ₅	N ₆	N ₇	N ₈	N ₉	N ₁₀	N ₁₁	N ₁₂

The GS1 Company Prefix is allocated by a GS1 Member Organisation to a system user. It makes the ID number unique worldwide but does not identify the origin of the item. Any valid GS1 Company Prefix, other than ones starting with a zero, may be used to issue a GTIN-13 and any valid U.P.C Company Prefix may be used to issue a GTIN-12. The GS1 Prefixes used for this purpose can be found in section [1.4](#).

The item reference is assigned by the system user, who must observe the rules in section [4](#).

The check digit is explained in section [7.9](#). Its verification, carried out automatically by the barcode reader, ensures that the number is correctly composed.

GS1 key

Required

The allowed key formats for this application are:

- GTIN-12
- GTIN-13

Rules

All the GTIN rules described in section [4](#).

Attributes

Required

Not applicable

Optional

For all the GS1 Application Identifiers (AI) that can be used with a GTIN, see section [3](#).

Rules

Not applicable



2.1.4 Fixed measure trade items scanned in general distribution and at retail POS

Trade items intended for general distribution and point-of-sale scanning must carry a barcode of the EAN/UPC or GS1 DataBar symbology. Therefore, these trade items support [GTIN-8s](#), GTIN-12s or GTIN-13s (see section [2.1.3](#)). For symbol X-dimensions, minimum symbol height, and minimum symbol quality, see section [5.12.3.3](#), *GS1 symbol specification table 3*.

Note: Allocation of GTIN-8 to new trade items for this application SHALL conform to section [4.3.7](#)

To support new applications additional GS1 approved data carriers (encoding additional data with the GTIN) may be applied with mutual agreement between trading partners. For information on how to manage multiple barcodes see section [4.16](#).

[For a summary of all conformance requirements for this AIDC application standard, cross application rules and related technical specifications, see section 8.3.](#)

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2.1.12 Variable measure trade items scanned at retail POS

This section describes applications for variable measure trade items that are scanned at retail point-of-sale. Two main applications exist:

- Variable measure fresh food trade items using a GTIN and additional attributes encoded with GS1 DataBar Expanded or GS1 DataBar Expanded Stacked, GS1 DataMatrix, or GS1 QR Code. See section [2.1.12.1](#).
- Variable measure trade items using a Restricted Circulation Number (RCN) encoded with the EAN/UPC symbology family. See section [2.1.12.2](#).



Note: GTINs SHALL be encoded with AI (01). Restricted Circulation Numbers (RCNs) SHALL NOT be encoded with AI (01) as RCNs are not GTINs.

To support new applications additional GS1 approved data carriers (encoding additional data with the GTIN) may be applied with mutual agreement between trading partners. For information on how to manage multiple barcodes see section [4.16](#).

[For a summary of all conformance requirements for this AIDC application standard, cross application rules and related technical specifications, see section 8.4.](#)

2.1.12.1 Variable measure fresh food trade items scanned at retail POS using GTIN

Application description

Like a fixed measure trade item, a variable measure trade item is an entity with predefined characteristics, such as the nature of the product or its contents. Unlike a fixed measure trade item, a variable measure trade item has one measure that varies continuously while other characteristics remain the same. In the case of fresh food trade items variable measure may be weight, length, number of items contained, or volume. There are different ways to handle the process for variable measure fresh food. For example:

- Consumer puts loose produce items into a bag and a barcoded label is produced and attached by the consumer.
- Staff attaches a barcode label, produced in store to pre-packed loose produce trade item.
- At the POS, loose produce is weighed and the price is calculated.

It is at the discretion of the retailer how the price is calculated and which process is chosen.

Variable measure fresh food

Variable measure loose produce trade items are trade items which may be identified with a GTIN and additional data. The retailer decides how to handle Variable measure fresh food trade items sold at POS. Generally, the individual item(s) (i.e. loose produce) are put into a bag by the customer or by staff and are scanned (if a label is generated in store) or weighed at POS to generate the price. The attributes of variable measure trade items are barcoded when the trade item is weighed or measured in store. If the variable measure trade item is weighed at POS when presented to the cashier the price is generated in the register and directly added to the other products to complete the transaction.

Variable measure pre-packed fresh food trade items

These are Variable measure fresh foods trade items, either loose produce or cut from a bulk item, that are pre-packaged with differing weight or other variable measure using GTIN and attributes. The label put on the trade item encoding GTIN plus variable measure information and/or price is determined by the retailer.

2.1.13 Trade item extended packaging applications

The information obtained from a consumer trade item's packaging can be extended when consumers using mobile devices scan barcodes on the package, which leads them to more information or an application. This standard provides a standardised packaging solution, which will lead to brand owner authorised information.

Independent of whether a trade item is retail or non-retail, fixed or variable measure, if it is sold to the end consumer and utilises GTIN-based identification, then it is within the scope of this application.

This application standard has three approaches to enable extended packaging applications,

- GS1 Digital Link URI syntax ([2.1.13.1](#))
 - For new extended packaging applications, the GS1 Digital Link URI syntax is encoded in QR Code or Data Matrix.
- GS1 element string (AI-based) syntax ([2.1.13.2](#))
 - Prior to the GS1 Digital Link standard, GS1 approved two approaches to reach extended packaging applications that were available within the GS1 system of standards.
 - An indirect mode of look-up via GTIN

This relies upon mobile device applications (apps) to use the GTIN encoded in EAN/UPC, GS1 DataBar, GS1 DataMatrix, or GS1 QR Code. This approach remains valid, but its implementation is limited by the lack of support for attributes of GTIN and the need to conduct a look-up to find a Web-based resource (indirect mode).
 - A direct mode of look-up utilising GS1 element string (AI-based) syntax approach that relies upon AIs (01) and (8200) to produce a product URL

This uses the GTIN and an additional GS1 Application Identifier (8200) to produce a product URL. This approach can be used to reach brand owner authorised information or applications via direct mode, but implementation has been limited at the global level by the need for an app to construct the URL from the decoded data.

[For a summary of all conformance requirements for this AIDC application standard, cross application rules and related technical specifications, see section 8.5.](#)

2.1.13.1 GS1 Digital Link URI syntax for extended packaging applications for trade items

The GS1 Digital Link standard (DL) provides a packaging solution that can lead to brand owner authorised information. It uses a Web URI syntax to encode GS1 data, (e.g., GTIN and attribute data) in QR Code or Data Matrix barcodes. Although the GS1 Digital Link standard offers a compressed form of the GS1 Digital Link URI syntax, this application SHALL use the uncompressed form. For example, GTIN 09506000134369 can be encoded in a QR Code or Data Matrix to form a GS1 DL URI <https://example.com/01/09506000134369>.



Note: The example.com domain name (reserved in RFC 2606 [<https://tools.ietf.org/html/rfc2606>]) is used in the example as a place holder for any domain name.



8 Application Standard Profiles

<u>8.1 Introduction.....</u>	<u>507</u>
<u>8.2 ASP 1: Fixed measure trade items scanned at retail POS</u>	<u>509</u>
<u>8.3 ASP 2: Fixed measure trade items scanned at retail POS and in general distribution ...</u>	<u>512</u>
<u>8.4 ASP 3: Variable measure trade items scanned at retail POS</u>	<u>514</u>
<u>8.5 ASP 4: Retail consumer trade item with extended packaging</u>	<u>517</u>



8.1 Introduction

Implementation of GS1 standards is voluntary unless related to a specific regulation. Even so, when a company requires or claims conformance to GS1 standards, it is important to understand exactly what conformance means. The AIDC application standards in Section 2 specify the application scope, required identifier, mandatory/optional attributes, data carrier (e.g., EAN/UPC, GS1 DataMatrix) options, data carriers specifications (e.g., print quality, size range), and rules such as GS1 identification key allocation). For example, retailers require suppliers to place an EAN/UPC barcode (carrying a GTIN) on the consumer package as the retailer requires the GTIN for POS and inventory transactions such as orders and invoices. So the EAN/UPC barcode must also be printed to a minimum quality specification to ensure it can fulfil its purpose. In this way, GS1 standards, agreed on and implemented by industry, provide the basis to measure conformance to trading partner requirements in a consistent way.

AIDC Application Standards Profiles (ASPs) make conformance requirements easier to find and understand. They are organised across applications in a modular way. For example, there are many AIDC application standards in Section 2 that relate to fixed measure products scanned at retail point-of-sale, but two ASPs covers them all. The intended audience for ASPs are those specifying what is to be implemented and all involved in ensuring a conformant implementation takes place. This could be a supplier of a consumer product making sure the right identifier, attributes, barcode, and barcode size/quality are implemented on the package, but it could also be a quality control function assessing the package. It could also be a solution provider who is ensuring their barcode design, printing, verification, or scanning systems accommodate the identifiers, attributes, barcodes, and sizes specified by ASPs relevant to the product they are offering.

Beyond documenting current AIDC application standard conformance requirements mentioned above, ASPs provide:

- References to rules that apply across application standards such as multiple barcode management rules, GS1 identification key allocation rules, symbol placement rules and more.
- References to technical standards related to the application such as the GS1 Application Identifier list, Symbology Specifications and more.
- Capability to document industry agreements on future conformance requirements so that industry can plan and build a future state that provides greater clarity and interoperability, less divergence, and a managed migration until the new capability is pervasive enough to serve as an alternative to the current standard. For example, the retail sector may determine 2D barcodes could add significant value to an application area, GS1 can use an ASP to document their agreement on which 2D barcodes they want, what size/quality is required, rules for the migration period to support backward compatibility, and more.
- Potential to simplify specifications for hardware and software purchases by referencing conformance requirements for ASPs relevant to the performance of a system.

ASPs are not organised in a hierarchy nor grouped logically. They are documented in a modular approach per industry priority and listed sequentially as they are approved. This modular approach will permit persistent ASP references. For example, ASP referential integrity within vendor requirement documents or system purchase agreements that use ASPs to specify requirements will remain relevant independent of future ASP additions.

As a key to understanding the following ASP tables, detailed descriptions are provided as guidance:

- **Basis of Conformance Requirements:** Each ASP is based on one or more normative AIDC application standards. These are typically found in Section 2 of the GS1 General Specifications but may also be stand-alone documents. References to the section or documents are recorded in Section 8.0 and within this table.
- **Identifier Choices:** AIDC application standards contain a required GS1 identification key such as GTIN for trade items, SSCC for logistic units, GLN for physical locations and more. In the case of GTIN, there may be up to four different formats, GTIN-8, GTIN-12, GTIN-13, and GTIN-14. In some cases, all four can be used, but in other cases, only one, two, or three formats are permitted.
- **Mandatory Attribute(s):** A GS1 Identification Key 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):** GS1 General Specifications 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.
- **Carrier 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.
- **Data Format/Syntax (Identifier syntax):** GS1 AIDC data carriers support four different syntax. 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. Plain syntax has no real structure and is just numeric text. There is also GS1 element string syntax used to encode GS1 Application Identifiers (AIs) and their associated field, EPC URI syntax is used to encode supported AIs within EPC headers, and GS1 Digital Link URI syntax that facilitates interoperability with the web.



8-18.2 ASP 1: Fixed measure trade items scanned at retail POS

ASP 1 applies to product packages that are intended for scanning at retail point-of-sale, are fixed measure (not sold on the basis of variable weight or variable measure) and are not intended for "general distribution scanning". Examples include trade items sold at the retail check-out like milk, soup cans, a hat, a lamp, a tennis racket, a battery pack, or toy. The normative AIDC application standard for ASP 1 is Section 2.1.1.1, 2.1.1.2 or 2.1.1.3 (depending on identifier and symbol choice) for general retail products and 2.1.1.6 for fresh food products.

 **Note:** ASP 1 does not apply to products distributed under control via a pharmacy or apothecary based on a physician's prescription nor does it apply to books and serial publications where additional identification, data carrier, specifications and/or rules apply.

 **Note:** Some trade items like beverage cans bundled by plastic rings may not obscure the barcode on the individual can level as the product may be sold in quantities of one or one grouping (e.g., six-pack). In this case, the barcode on each beverage can require ASP 1 conformance but six-pack transactions, where the individual beverage cans barcode is scanned, may require a check-out quantity confirmation.

confirmation.

Figure 8.2.1 ASP 1 conformance requirements

Conformance requirements	General retail products	Fresh Food
Basis of conformance requirements	GS1 General Specifications Section 2.1.3.1 GS1 General Specifications Section 2.1.3.2 GS1 General Specifications Section 2.1.3.3	GS1 General Specifications Section 2.1.3.6
Identifier choices	GTIN-8, GTIN-12, GTIN-13	GTIN-8, GTIN-13, GTIN-12
Mandatory attribute(s)	N/A	N/A
Optional attribute(s)	See Section 3.2 for the list of GS1 Application Identifiers that may be used with the identifier	See Section 3.2 for the list of GS1 Application Identifiers that may be used with the identifier
Data carrier choices	EAN-8, EAN-13, UPC-A, UPC-E GS1 DataBar Omni-directional GS1 DataBar Stacked Omni-directional GS1 DataBar Expanded GS1 DataBar Expanded stacked	EAN-8, EAN-13, UPC-A, UPC-E GS1 DataBar Omni-directional GS1 DataBar Stacked Omni-directional GS1 DataBar Expanded GS1 DataBar Expanded stacked
Carrier specifications	Symbol Specification Table 1	Symbol Specification Table 1
Data format/syntax (identifier syntax)	Plain, GS1 Element String	Plain, GS1 Element String

**Figure 8.2.2** ASP 1 cross application rules

Cross-application rules	Description	GS1 General Specifications Section
GTIN rules	Management of uniqueness, Allocating the numbers, GTIN Management definitions	4.3, 4.3.7
Licensing rules that may impact GTIN allocation	Additional requirements in the following sections apply when a company changes legal status as a result of an acquisition, merger, partial purchase, split, or “spin-off.”	1.6
Data relationships	Rules for allowed combinations of element strings on the same physical entity, irrespective of the data carrier(s) applied to the entity.	4.14
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.	4.15
Multiple barcode	When additional barcodes are introduced into an existing scanning environment or business application existing barcodes must remain acceptable. This section provides a set of management practices intended to permit the use of multiple barcodes on the same package.	4.16
Symbol placement used in POS	This section provides guidelines for barcode placement on trade items that will be scanned at Point-of-sale	6.3

Figure 8.2.3 ASP 1 related technical specifications

Related technical specifications	Description	GS1 General Specifications 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
Linear barcodes - EAN/UPC	EAN/UPC were the first type of barcodes used on a global scale to support the retail check out process.	5.2
Linear barcodes - GS1 DataBar	GS1 DataBar is a family of linear symbologies used within the GS1 system..	5.5
Barcode production and quality assessment	This section has quality specifications and will evolve to meet the changes to data carriers and their use within the GS1 system.	5.12
Check digit calculations	This section describes 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
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8-28.3 ASP 2: Fixed measure trade items scanned at retail POS and in general distribution

ASP 2 applies to product packages that are intended for scanning at retail point-of-sale, are fixed measure (not sold on the basis of weight or measure) but unlike ASP1 they are also intended for "general distribution scanning". Examples of these products might be a microwave oven or large bag of animal feed. The normative AIDC application standard for ASP 2 is Section 2.1.1.4.

Figure 8.3.1 ASP 2 conformance requirements

Conformance requirements	Fixed Measure POS and General Distribution
Basis of conformance requirements	GS1 General Specifications Section 2.1.4
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
Data carrier choices	EAN-8, EAN-13, UPC-A, or UPC-E GS1 DataBar Omni-directional GS1 DataBar Stacked Omni-directional GS1 DataBar Expanded GS1 DataBar Expanded stacked
Carrier specifications	Symbol Specification Table 3
Data format/syntax (identifier syntax)	Plain, GS1 Element String

Figure 8.3.2 ASP 2 cross application rules

Cross-application rules	description	GS1 General Specifications Section
GTIN rules	Management of uniqueness, Allocating the numbers, GTIN Management definitions	4.3, 4.3.7
Licensing Rules that may impact GTIN allocation	Additional requirements in the following sections apply when a company changes legal status as a result of an acquisition, merger, partial purchase, split, or "spin-off."	1.6
Data relationships	Rules for allowed combinations of element strings on the same physical entity, irrespective of the data carrier(s) applied to the entity.	4.14
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.	4.15



Cross-application rules	description	GS1 General Specifications Section
Multiple barcode	When additional barcodes are introduced into an existing scanning environment or business application existing barcodes must remain acceptable. This section provides a set of management practices intended to permit the use of multiple barcodes on the same package.	4.16
Symbol placement used in POS	This section provides guidelines for barcode placement on trade items that will be scanned at Point-of-sale and general distribution. General distribution scanning items include any item handled as a single unit in the transport and distribution process.	6.3, 6.7

Figure 8.3.3 ASP 2 related technical specifications

Related technical specifications	Description	GS1 General Specifications 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
Linear barcodes - EAN/UPC	EAN/UPC Barcodes were the first type of barcodes used on a global scale to support the retail check out process.	5.2
Linear barcodes - GS1 DataBar	GS1 DataBar is a family of linear symbologies used within the GS1 system.	5.5
Barcode production and quality assessment	This section has quality specifications and will evolve to meet the changes to data carriers and their use within the GS1 system.	5.12
Check digit calculations	This section describes 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



8-38.4 ASP 3: Variable measure trade items scanned at retail POS

ASP 3 applies to product packages that are intended for scanning at retail point-of-sale and identified with a GTIN, are variable measure (sold on the basis of weight or 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. The normative AIDC application standard for ASP 3 is GS1 General Specifications Section 2.1.12.1.

Figure 8.4.1 ASP 3 conformance requirements

Conformance requirements	Variable measure fresh food using GTIN + count/weight	Variable measure fresh food using RCN
Basis of conformance requirements	GS1 General Specifications Section 2.1.12.1	GS1 General Specifications Section 2.1.12.2
Identifier choices	GTIN-13, GTIN-12	RCN-12, RCN-13
Mandatory attribute(s)	Must have at least one of the following: 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
Data carrier choices	GS1 DataBar Expanded GS1 DataBar Expanded stacked	EAN-13, UPC-A
Carrier specifications	Symbol Specification Table 1	Symbol Specification Table 1
Data format/syntax (identifier syntax)	Plain, GS1 Element String	Plain

Figure 8.4.2 ASP 3 cross application rules

Cross-application rules	Description	GS1 General Specifications Section
GTIN rules	Management of uniqueness, Allocating the numbers, GTIN Management definitions	4.3
Licensing rules that may impact GTIN allocation	Additional requirements in the following sections apply when a company changes legal status as a result of an acquisition, merger, partial purchase, split, or “spin-off.”	1.6
Data relationships	Rules for allowed combinations of element strings on the same physical entity, irrespective of the data carrier(s) applied to the entity.	4.14
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.	4.15



Cross-application rules	Description	GS1 General Specifications Section
Multiple barcode	When additional barcodes are introduced into an existing scanning environment or business application existing barcodes must remain acceptable. This section provides a set of management practices intended to permit the use of multiple barcodes on the same package.	4.16
Symbol placement used in POS	This section provides guidelines for barcode placement on trade items that will be scanned at point-of-sale.	6.3

**Figure 8.4.3** ASP 3 related technical specifications

Related technical specifications	Description	GS1 General Specifications 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
Linear barcodes - EAN/UPC	EAN/UPC Barcodes were the first type of barcodes used on a global scale to support the retail check out process.	5.2
Linear barcodes - GS1 DataBar	GS1 DataBar is a family of linear symbologies used within the GS1 system.	5.5
Barcode production and quality assessment	This section has quality specifications and will evolve to meet the changes to data carriers and their use within the GS1 system.	5.12
Check digit calculations	This section describes 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



8-48.5 ASP 4: Retail consumer trade item with extended packaging

Information on a product package can be extended in many ways when the consumer scans a 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 QR Code or Data Matrix is used. For this reason, the ASP focuses solely on the forward-looking approach. Prior to the GS1 Digital Link URI standard, GS1 approved two approaches 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. The normative AIDC application standard for ASP 4 is GS1 General Specifications Section 2.1.13.

**Figure 8.5.1** ASP 4 conformance requirements

Conformance requirements	General retail products GS1 Digital Link URI
Basis of conformance requirements	GS1 General Specifications Section 2.1.13.1 for GS1 Digital Link URI
Identifier choices	GTIN-13, GTIN-12, or GTIN-8
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
Data carrier choices	QR Code (GS1 Digital Link URI only) Data Matrix (GS1 Digital Link URI only)
Carrier specifications	Symbol Specification Table 1 addendum 2 for GS1 Digital Link URI
Data format/syntax (identifier syntax)	GS1 Digital Link URI (GS1 Digital Link URI standard - https://www.gs1.org/standards/gs1-digital-link)

Figure 8.5.2 ASP 4 cross application rules

Cross-application rules	Description	GS1 General Specifications Section
GTIN rules	Management of uniqueness, Allocating the numbers, GTIN Management definitions	4.3
Licensing rules that may impact GTIN allocation	Additional requirements in the following sections apply when a company changes legal status as a result of an acquisition, merger, partial purchase, split, or “spin-off.”	1.6
Data relationships	Rules for allowed combinations of element strings on the same physical entity, irrespective of the data carrier(s) applied to the entity.	4.14
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.	4.15
Multiple barcode	When additional barcodes are introduced into an existing scanning environment or business application existing barcodes must remain acceptable. This section provides a set of management practices intended to permit the use of multiple barcodes on the same package.	4.16

**Figure 8.5.3** ASP 4 related technical specifications

Related technical specifications	Description	GS1 General Specifications 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
Two-dimensional barcodes – Data Matrix, QR Code	The GS1 General Specifications normatively references ISO/IEC standards for Data Matrix (ISO/IEC 16022) and QR Code (ISO/IEC 18004) for the technical aspects of the two-dimensional barcode symbologies. Both symbol types are standalone, two-dimensional matrix symbologies that are made up of square modules arranged within a finder pattern.	5.9, 5.10
Barcode production and quality assessment	This section has quality specifications and will evolve to meet the changes to data carriers and their use within the GS1 system.	5.12
Check digit calculations	This section describes 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
The GS1 regular expression test	The regular expression test is used to identify 2D barcodes encoded with GS1 Digital Link URI syntax. This plausibility test is required as we don't have the "FNC1" that identifies GS1 Element String syntax	GS1 Digital Link URI, Chapter 6
The GS1 Link type rules for GS1 Digital Link	Link types (short for link relation types) are both human and machine-readable. Link types make it possible to use one data carrier for multiple purposes.	GS1 Web vocabulary for GS1 Digital Link "Link type" rules



10.19.1 GS1 glossary of terms and definitions

The glossary lists the terms and definitions that are applied in this document. Please refer to the www.gs1.org/glossary for the online version.

Term	Definition
acceptance criteria	An allowance for a small measurement variation between commercial verifiers or operators during barcode verification testing.
add-on symbol	A barcode used to encode information supplementary to that in the main EAN/UPC barcode.
aggregated packaging (per EU 2018/574)	Any packaging containing more than one unit packet of tobacco products. For GS1, this may be either a trade item grouping or logistics unit.
AIM DotCode	A two-dimensional barcode symbology rendered by printing dots per the AIM DotCode Specification.
allocation	The association of an issued GS1 Prefix, GS1 Company Prefix, or GS1 identification key to its corresponding entity or object in accordance with the GS1 rules and policies.
alphanumeric	A character set that contains alphabetic characters (letters), numeric digits (numbers), and other characters, such as punctuation marks.
aperture	A physical opening that is part of the optical path in a device such as a scanner, photometer, or camera. Most apertures are circular, but they may be rectangular or elliptical.
Application Standard Profile	A template that records conformance requirements of existing and any future AIDC application standards, the normative decisions (MSWG, ISO, Regulation, ...), maintains centralisation of cross-application rules and related technical specifications.
asset type	A component of the Global Returnable Asset Identifier (GRAI), assigned by the asset owner or manager, in order to create a unique GRAI.
attribute	Additional information about an entity identified with a GS1 identification key.
autodiscrimination	The capability of a reader to automatically recognise and decode multiple barcode symbologies.
automatic identification and data capture (AIDC)	A technology used to automatically capture data. AIDC technologies include barcodes, smart cards, biometrics and RFID.
auxiliary patterns	Components of the EAN/UPC symbology. The centre guard bar pattern, the left guard bar pattern, and the right guard bar pattern are examples of these.
bar gain/loss	The increase/decrease in bar width due to effects of the reproduction and printing processes.
barcode	A symbol that encodes data into a machine readable pattern of adjacent, varying width, parallel, rectangular or square dark and light spaces.
barcode verification	The assessment of the printed quality of a barcode based on ISO/IEC standards using ISO/IEC compliant barcode verifiers.
base unit	In a hierarchy of trade item groupings, the consumer trade item level or unit of use.
Basic Unique Device Identifier – Device Identifier (UDI-DI)	The Basic UDI - DI is a unique identifier specific to a medical device product family. It is represented by GS1's Global Model Number (GMN).
batch/lot	Associates an item with information the manufacturer considers relevant for traceability of the trade item.
bearer bars	Bar abutting the tops and bottoms of the bars in a barcode or a frame surrounding the entire symbol, intended to equalise the pressure exerted by the printing plate over the entire surface of the symbol and/or to prevent a partial scan by the barcode reader.
brand owner	The organisation that owns the specifications of a trade item, regardless of where and by whom it is manufactured. The brand owner is normally responsible for the management of the Global Trade Item Number (GTIN).
Character Set 39	A subset of characters found in ISO 646: Unique Graphic Character Allocations which includes numeric, alphabetic upper-case, plus the characters "#", "-", and "/".
Character Set 82	A subset of characters found in ISO 646: Unique Graphic Character Allocations which includes numeric, alphabetic upper-case and lower-case, plus twenty special characters but excluding "space".
check character pair	A final character pair calculated from the other characters of the Global Model Number. These characters are used to check that the data has been correctly composed and transmitted.
check digit	Numeric character calculated from data and appended as part of the data string to ensure that the data is correctly composed and transmitted.



Term	Definition
codeword	A symbol character value. An intermediate level of coding between source data and the graphical encodation in the symbol.
component/part	An item that is intended to undergo at least one further transformation process to create finished goods for the purpose of downstream consumption
Component/Part Identifier (CPID)	The unique identifier for a component/part, comprising a GS1 Company Prefix and a component/part reference
Composite Component	The 2D symbol component of a GS1 composite symbol.
concatenation	The representation of several element strings in one barcode.
Conformant	The state in which a system meets a specified standard.
consignment	A grouping of logistic or transport units assembled by a freight forwarder or carrier to be transported under one transport document (e.g., waybill).
consumer product variant (CPV)	An alphanumeric attribute of a GTIN assigned to a retail consumer trade item variant for its lifetime.
country subdivision	Principle administrative divisions, or similar areas, of a country included in <i>ISO 3166-1</i> . Examples are a state in the US, a region in France, a canton in Swiss.
coupon	A voucher that can be redeemed at the point-of-sale for a cash value or free item.
coupon issuer	Party issuing the coupons, bearing the commercial and financial responsibility for the coupons.
customer	The party that receives, buys, or consumes an item or service.
data character	A single numeric digit, alphabetic character or punctuation mark, or control character, which represents meaningful information.
data field	A field that contains a GS1 identification key, an RCN, or attribute information
Data Matrix symbology	A standalone, two-dimensional matrix symbology that is made up of square modules arranged within a perimeter finder pattern. Data Matrix using ECC 200 error correction is the only version that supports GS1 system identification keys, including the Function 1 Symbol Character (FNC1). Data Matrix symbols are read by two-dimensional imaging scanners or vision systems.
data titles	Data titles are the abbreviated descriptions of element strings which are used to support manual interpretation of barcodes.
digital coupon	A digital coupon is an electronic presentation, that is distributed and presented without manifesting as "paper" or in other hard-copy form, and that can be exchanged for a financial saving or for loyalty points when making a purchase.
direct mode	Mobile device information retrieval function when the barcode contains either the address (URL) of the content or service, or the content itself, in-line.
direct part marking (DPM)	Direct part marking refers to the process of marking a symbol on an item using an intrusive or non-intrusive method.
direct print	A process in which the printing apparatus prints the symbol by making physical contact with a substrate (e.g., flexography, ink jet, dot peening).
document type	A component of a Global Document Type Identifier (GDTI) assigned by the document issuer to create a unique GDTI.
dynamic assortment	An assortment that comprises a fixed count of a changing assortment of two or more different retail consumer trade items, each identified with a unique GTIN. All of the retail consumer trade items and their GTINs will have been communicated to the recipient before trading takes place and are declared on the package. The recipient has accepted that the supplier may change the assortment without any prior notice. A trade item that comprises two or more different trade items, with a fixed total count, where the count of each trade item contained may change.
EAN/UPC symbology	A family of barcodes including EAN-8, EAN-13, UPC-A, and UPC-E barcodes as well as the 2- and 5-digit add-ons. See also EAN-8 barcode, EAN-13 barcode, UPC-A barcode, and UPC-E barcode.
EAN-13 barcode	A barcode of the EAN/UPC symbology that encodes GTIN-13 or RCN-13.
EAN-8 barcode	A barcode of the EAN/UPC symbology that encodes GTIN-8 or RCN-8.
economic operator (per EU 2018/574)	An economic operator is a business or other organisation which supplies goods, works or services within the context of market operations. Related to requirement for EOID for each country in which a party operates a facility.

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Term	Definition
Electronic Product Code (EPC)	An identification scheme for universally identifying physical objects (e.g., trade items, assets, and locations) via RFID tags and other means. The standardised EPC data consists of an EPC (or EPC Identifier) that uniquely identifies an individual object, as well as an optional filter value when judged to be necessary to enable effective and efficient reading of the EPC tags.
element	A single bar or space of a linear barcode symbol.
EU 2018/574	A European Union Regulation on the traceability of tobacco products
even parity	A characteristic of the encodation of a symbol character whereby the symbol character contains an even number of dark modules.
extended packaging	An approach to giving consumers access to additional information or services about trade items through their mobile device. It is the ability to retrieve additional information about the trade item through mobile devices or, in general, to link a trade item with trusted virtual information or services.
extension digit	The first digit within the Serial Shipping Container Code (SSCC) which is assigned by the company that constructs the logistic unit.
facility (per EU 2018/574)	Any location, building or vending machine where tobacco products are manufactured, stored or placed on the market.
fixed length	Term used to describe a data field in an element string with an established number of characters.
fixed measure trade item	An item always produced in the same predefined version (e.g., type, size, weight, contents, design) that may be sold at any point in the supply chain.
freight forwarder	The party that arranges the carriage of goods including connected services and/or associated formalities on behalf of the shipper (consignor) or consignee.
fresh foods	Trade items in the following product categories: fruits, vegetables, meats, seafood, bakery and ready to serve food such as cheeses, cold cooked or cured meats, and salad, etc. Fresh foods are defined as food that is not preserved by canning, dehydration, freezing or smoking.
full string	The data transmitted by the barcode reader from reading a data carrier, including the symbology identifier as well as the encoded data.
Function 1 Symbol Character (FNC1)	A symbology character used in some GS1 data carriers for specific purposes.
general distribution scanning	Scanning environments that process barcoded trade items packaged for transport, logistic units, assets, and location tags.
general retail consumer trade item	A trade item intended to be sold at point-of-sale identified with a GTIN-13, GTIN-12 or GTIN-8 utilising omnidirectional linear barcodes.
<u>general retail products</u>	<u>All trade items that cross point-of-sale.</u>
GLN extension component	The GLN extension component is used to identify internal physical locations within a location (such as a selling floor area, a specific area on a shelf, etc.) which is identified with a GLN (such as stores, factories, buildings, etc.).
Global Coupon Number (GCN)	The GS1 identification key used to identify a coupon. The key comprises a GS1 Company Prefix, coupon reference, check digit, and an optional serial number
Global Document Type Identifier (GDTI)	The GS1 identification key used to identify a document type. The key comprises a GS1 Company Prefix, document type, check digit, and optional serial number.
Global Electronic Party Information Registry (GEPIR®)	A web-browser interface and a machine to machine set of protocols for GS1 Member Organisation (MO) membership databases to communicate company information for selected GS1 keys including information about the allocation of the GS1 Company Prefixes used to create GS1 keys and/or individually assigned GS1 keys.
Global Identification Number for Consignment (GINC)	The GS1 identification key used to identify a logical grouping of logistic or transport units that are assembled to be transported under one transport document (e.g., waybill). The key comprises a GS1 Company Prefix and the freight forwarder's or carrier's transport reference.
Global Individual Asset Identifier (GIAI)	The GS1 identification key used to identify an individual asset. The key comprises a GS1 Company Prefix and individual asset reference.
Global Location Number (GLN)	The GS1 identification key used to identify physical locations or parties. The key comprises a GS1 Company Prefix, location reference, and check digit.
Global Model Number (GMN)	The GS1 identification key used to identify a product model or product family. The key comprises a GS1 Company Prefix, model reference and a check character pair.
Global Returnable Asset Identifier (GRAI)	The GS1 identification key used to identify returnable assets. The key comprises a GS1 Company Prefix, asset type, check digit, and optional serial number.



Term	Definition
main symbol	The barcode containing the identification number of the item (e.g., GTIN, SSCC). Used to determine the placement of any additional barcode information.
measure verifier digit	A digit calculated from the measure field in a Restricted Circulation Number (RCN) that is used to check that the data has been correctly composed.
model reference	A component of the Global Model Number (GMN) assigned by the brand owner to create a unique GMN.
module	The narrowest nominal width unit of measure in a barcode. In certain symbologies, element widths may be specified as multiples of one module. The nominal width (& height for 2D barcodes) of a single module is equivalent to the X-dimension
modulo 10	The name of the algorithm – a simple checksum formula in the public domain – used to create a check digit for those GS1 identification keys that require one.
multiple unit blister/package	Immediate package for a medicine with more than one single unit. Package which fully encloses the pill/caplet/capsule. Each dosage form may be individually packaged. The individually blistered dosage forms are attached to each other in one strip.
National Healthcare Reimbursement Number (NHRN)	National and/or regional identification numbers used on pharmaceutical and/or medical devices where required by national or regional regulatory organisations for product registration purposes and/or for the management of healthcare provider reimbursement.
National Trade Item Number (NTIN)	A coding scheme, administered in the healthcare sector by a national organisation for which a GS1 Prefix has been issued to permit its uniqueness within the GTIN pool but without assurance of full compatibility with GTIN functionality. The result is a product identification number assigned by a third party (not the brand owner or manufacturer). Example: the CIP (Club Inter Pharmaceutique) in France administered by the French Health Products Safety Agency (AFSSAPS).
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).
odd parity	A characteristic of the encodation of a symbol character whereby the symbol character contains an odd number of dark modules.
omnidirectional linear barcode	A linear barcode symbology designed to be read in segments by suitably programmed laser point-of-sale (POS) scanners.
packaging component	Objects such as bottles, caps, and labels to package a consumer trade item.
packaging component number	Global Trade Item Number (GTIN) attribute used to establish a relationship between a finished consumer trade item and packaging components.
payment slip	The end customer's notification of a demand for payment for a billable service (e.g., utility bill) comprising an amount payable and payment conditions.
plain syntax	<u>This syntax is just the GS1 identification key with no additional characters or syntactic features.</u>
point-of-care (POC)	Location where dispensing or use of a non-retail, regulated healthcare pharmaceutical or medical device to or for a patient occurs.
point-of-sale (POS)	Refers to the retail checkout where omnidirectional linear barcodes must be used to support high-volume laser-based scanning or low volume checkout where linear barcodes (or for regulated healthcare trade items, GS1 DataMatrix) are used with image-based scanners.
predefined assortments	<u>An assortment that comprises a fixed count of two or more different trade items, each identified with a unique GTIN that is declared on the package. The trade items contained within the assortment may be trade items of one or more manufacturers. When an assortment contains items from multiple manufacturers the GTIN requirement for the assortment is the responsibility of the organisation that creates the assortment. Any change in the configuration of the assortment is considered a new trade item.</u> <u>A trade item that comprises two or more different trade items, with a fixed total count, where the count of each trade item contained does not change.</u>
price verifier digit	A digit calculated from the price element in a Restricted Circulation Number (RCN) that is used to check that the data has been correctly composed.
product model	A base product design or specification from which a trade item is derived.
QR Code symbology	A two-dimensional matrix symbology consisting of square modules arranged in a square pattern. The symbology is characterised by a unique finder pattern located at three corners of the symbol. QR Code symbols are read by two-dimensional imaging scanners or vision systems.

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Term	Definition
Quiet Zone	A clear space which precedes the start character and follows the stop character of a linear barcode or surrounds a 2D symbol.
Quiet Zone Indicator	A greater than (>) or less than (<) character, printed in the human readable field of the barcode, with the tip aligned with the outer edge of the Quiet Zone.
radio frequency	Any frequency within the electromagnetic spectrum associated with radio wave propagation. When radio frequency power is supplied to an antenna, an electromagnetic field is created that then is able to propagate through space. A radio frequency signal that can be processed by a radio frequency receiver. Many wireless technologies are based on radio frequency field propagation.
radio frequency identification (RFID)	A technology that uses radio frequency electromagnetic fields or waves to automatically identify and track tags attached to objects. An RFID system consists of RFID tags and readers. When triggered by a radio frequency electromagnetic interrogation signal from a nearby RFID reader, the RFID tag transmits digital data, usually a unique identifier like an EPC, back to the reader.
random assortment	An assortment that comprises items that are not uniquely identified on the package and are not marked for individual sale (e.g., a bag of individually wrapped candies or colours of tooth brushes). A trade item that comprises two or more products that are not identified by a GTIN and are not intended for individual sale.
RCN-12	A 12-digit Restricted Circulation Number (see Restricted Circulation Number).
RCN-13	A 13-digit Restricted Circulation Number (see Restricted Circulation Number).
RCN-8	An 8-digit Restricted Circulation Number (see Restricted Circulation Number)
refund receipt	A voucher produced by equipment handling empty containers (i.e., bottles and crates).
regular expression	A sequence of characters that specifies a search pattern. Usually, such patterns are used by string-searching algorithms for "find" or "find and replace" operations on strings, or for input validation
regulated healthcare non-retail consumer trade item	A regulated healthcare trade item not intended for scanning at POS and identified with a GTIN-14, GTIN-13, GTIN-12 or GTIN-8 utilising linear or 2D matrix barcodes that can be scanned by image-based scanners.
regulated healthcare retail consumer trade item	A regulated healthcare trade item to be sold to the end consumer at a regulated healthcare retail point-of-sale (pharmacy). They are identified with a GTIN-13, GTIN-12 or GTIN-8 utilising linear or 2D matrix barcodes that can be scanned by image-based scanners.
regulated healthcare trade item	Pharmaceuticals or medical devices that are sold or dispensed in a controlled environment (e.g., retail pharmacy, hospital pharmacy).
responsible entity	The party responsible for the safety and effectiveness of the medical product at a moment in time in its lifecycle, according to the approved regulatory file (including labelling) and regulatory/legal/professional obligations associated with the medical product. (e.g., brand owner, repackager, hospital pharmacy, etc.)
Restricted Circulation Number (RCN)	Signifies an identification number used for special applications in restricted environments, either defined by local GS1 Member Organisations (for regional applications such as variable measure product identification and, couponing) or by a company (for internal applications).
retail consumer trade item variant	A variation of change to a retail consumer trade item (which may itself be a homogeneous or predefined assortment of other retail consumer trade items) which does not require a new GTIN, but where identification of the variation may be required.
returnable asset	A reusable entity owned by a company that is used for transport and storage of goods. It is identified with a GRAI.
separator character	Special character(s) that are defined as part of GS1 symbolologies and used to separate concatenated element strings, based on their positioning in the GS1 barcodes.
serial number	A code, numeric or alphanumeric, assigned to an individual instance of an entity for its lifetime. Example: a unique individual item may be identified with the combined Global Trade Item Number (GTIN) and serial number.
serial reference	A component of the Serial Shipping Container Code (SSCC) assigned by the physical builder or brand owner of the logistic unit to create a unique SSCC.
Serial Shipping Container Code (SSCC)	The GS1 identification key used to identify logistics units. The key comprises an extension digit, GS1 Company Prefix, serial reference, and check digit.

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