



General Specifications Change Notification (GSCN)

WR #	GSCN Name	Ratification Date
WR 21-307	Application Identifier for ISO / IEC 20248 data structure	Jun 2023

1 Associated Work Request (WR) Number:

WR 23-126: errata

2 Background:

Within the GS1 Digital Signatures MSWG we have determined the need for a GS1 Application Identifier that can be used to accommodate the data structure detailed in ISO/IEC 20248 - Information technology — Automatic identification and data capture techniques — Data structures — Digital signature meta structure. ISO/IEC 20248 specifies a method to add a digital signature, and other verifiable data, to a barcode or RFID data construct by which the verification of the following can be achieved without the need to connect to an external data source:

- The data has not been changed.
- The provenance of the data, i.e., who digitally signed the data.
- The link with the physical object by using physical features and security marks.
- The authenticity of the RFID tag by using the unique and secured tag ID.

An ISO/IEC 20248 data construct is commonly known as a DigSig. This specification uses the term "Digital Signature" to avoid confusion. "digital signature" in lower case refers to digital signatures in general. When using capitals, it becomes a named thing with a specific meaning. The specification uses "Digital Signature" meaning "DigSig (ISO/IEC 20248 data construct)".

3 Disclaimer:

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**Symbol X-dimensions, minimum symbol height and minimum symbol quality**

See section [5.12.3.5](#), *GS1 symbol specification table 5*.

Symbol placement

All the symbol placement guidelines defined in section [6](#).

Unique application processing requirements

For a description of processing requirements, see section [7](#).

2.3 Assets

The GS1 system provides a method for the identification of assets. The object of asset identification is to identify a physical entity as an inventory item.

Each company holding a GS1 Company Prefix may assign a Global Returnable Asset Identifier (GRAI) or Global Individual Asset Identifier (GIAI). If the asset is manufactured on behalf of a company best practice may dictate that the manufacturing company applies the GRAI or GIAI during the manufacturing process on behalf of this customer.

- ✓ **Note:** Where assets of the same type need to be ordered a GTIN is required for the ordering process. There is no conflict when a GTIN and a GRAI (GS1 Company Prefix, asset type and check digit) have the same digits, because the data carrier (EDI qualifier, GS1 barcode with GS1 Application Identifier, or EPC/RFID) will distinguish between the two GS1 identification keys.

The GS1 asset identifiers act as keys to access the characteristics of an asset stored in a computer file and/or to record movements of assets.

- ✓ **Note:** The attributes of the asset should be recorded and shared digitally using the GS1 asset identifier as the key to the information. Examples of the type of information held include the party who owns the asset, the value of the asset, the location of the asset and the life cycle history of the asset.

Asset identifiers may be used for basic applications, such as the location and usership of a given asset (e.g., a personal computer or returnable transport item) or for complex applications, such as recording the characteristics of a returnable asset (e.g., a reusable beer keg), its movements, its life cycle history and any relevant data for accounting purposes.

2.3.1 Global Returnable Asset Identifier (GRAI): AI (8003)

Application description

A returnable asset is a reusable package or transport equipment of a certain value, such as a beer keg, a gas cylinder, a plastic pallet, or a crate. The GS1 system identification of a returnable asset, the Global Returnable Asset Identifier (GRAI), enables tracking as well as recording of all relevant data.

The GRAI is composed of the GS1 Company Prefix (of the company assigning the asset identifier) and the asset type. The latter is assigned to uniquely identify, together with the GS1 Company Prefix, a particular kind of asset. The GRAI remains the same for all identical returnable assets. Although consecutive numbering is recommended, the structure is left to the discretion of the assigning company. An optional serial component may be used to distinguish individual assets within a given asset type.

A typical application using this element string is in tracking returnable beer kegs. The owner of the beer keg applies a barcode carrying a GRAI to the keg using a permanent marking technique. This barcode is scanned whenever the keg is supplied full to a customer and scanned again when it is



returned. This scanning operation allows the beer keg owner to automatically capture the life cycle history of a given keg and to operate a deposit system, if desired.

- ✔ **Note:** This element string identifies a physical entity as a returnable asset. When such a physical entity is used to transport or to contain a trade item, the element string AI (8003) must never be used to identify the transported or contained trade item.
- ✔ **Note:** GS1 refers to the GRAI in section [2.1.8](#), which deals the Automatic Identification and Data Capture (AIDC) of medical devices within the micro-logistics cycle of use, cleaning and sterilisation. See section [2.1.8](#) for more details.

GS1 key

Required

GRAI

The GS1 Application Identifier to indicate the Global Returnable Asset Identifier (GRAI) is AI (8003), see section [3.2](#).

Rules

See section [4.4](#).

Attributes

Required

Not applicable

Optional

[For all the GS1 Application Identifiers that may be used with a GRAI, see section 3.2.](#)

Data carrier specification

Carrier choices

The GS1 data carriers that can be used to represent the GRAI are:

- GS1-128
- GS1 DataMatrix
- GS1 QR Code
- EPC/RFID

When encoding an asset identifier for medical devices see section [2.1.8](#).

When applying permanent marking, also see the information in section [2.6.14](#).

Symbol X-dimension, minimum symbol height and minimum symbol quality

For GS1-128, GS1 DataMatrix and GS1 QR Code, see section [5.12.3.9](#) *GS1 symbol specification table 9* and section [5.12.3.7](#) *GS1 symbol specification table 7* (direct part marking) or section [5.12.3.13](#) *GS1 symbol specification table 13* (long distance scanning).

Symbol placement

Not applicable.

Unique application processing requirements

For a description of processing requirements, see section 7.

2.3.2 Global Individual Asset Identifier (GIAI): AI (8004)

Application description

In the GS1 system, an individual asset is considered a physical entity made up of any characteristics.

This element string identifies a particular physical entity as an asset. It must not be used for other purposes and must be unique for a period well beyond the lifetime of the relevant asset records. Whether or not the assigned Global Individual Asset Identifier (GIAI) may remain with the asset when changing hands depends on the particular business application. If it remains with the asset it SHALL never be reused.

The GIAI comprises the GS1 Company Prefix of the company assigning the asset identifier and an individual asset reference (see section 3). The individual asset reference is alphanumeric. Its structure is left to the discretion of the asset owner or manager.

This element string might, for example, be used to record the life cycle history of aircraft parts. By symbol marking the GIAI, AI (8004), on a given part, aircraft operators are able to automatically update their inventory database and track assets from acquisition until retirement.

GS1 refers to GIAI in the section 2.1.8, which deals with Automatic Identification and Data Capture (AIDC) for medical devices within the micro-logistics cycle of use, cleaning and sterilisation. See section 2.1.8 for more details.

GS1 key

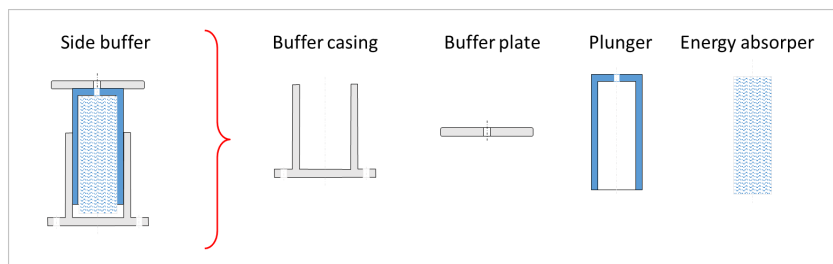
Required

GIAI

The GS1 Application Identifier to indicate the Global Individual Asset Identifier (GIAI) is AI (8004), see section 3.2.

- ✓ **Note:** The GIAI of assemblies (composite components) may need to be marked on a component of the assembly (the so called leading part) when there is no dedicated space to mark the GIAI on the assembly itself. For example, the GIAI of a *side buffer* of a rail vehicle may be included in a separate marking on the *buffer casing*, in addition to the marking of the *buffer casing* itself. To be able to recognise the marking of the assembly AI (7023) SHALL be used to indicate the GIAI of the assembly.

Figure 2.3.2-1. Example: Side buffer (assembly) with buffer casing (leading part)



**Rules**

See section [4.4](#)

Attributes**Required**

Not applicable

Optional

For all the GS1 Application Identifiers that may be used with a GIAI, see section [3.2](#).

Data carrier specification**Carrier choices**

The GS1 data carriers that can be used to represent the GIAI are:

- GS1-128
- GS1 DataMatrix
- GS1 QR Code
- EPC/RFID

When encoding an asset identifier for medical devices see section [2.1.8](#).

When applying permanent marking, also see the information in section [2.6.14](#).

Symbol X-dimension, minimum symbol height and minimum symbol quality

For GS1-128, GS1 DataMatrix and GS1 QR Code, see section [5.12.3.9](#) GS1 symbol specification table 9 and section [5.12.3.7](#) GS1 symbol specification table 7 (direct part marking), or section [5.12.3.13](#) GS1 symbol specification table 13 (long distance scanning).

Symbol placement

Not applicable

Unique application processing requirements

For a description of processing requirements, see section [7](#).

2.4 Parties and locations

The GLN is a globally unique and unambiguous GS1 identification key that can identify of any type of party or location used in business processes. The use of Global Location Numbers (GLNs) is driven by the exact role of each party and/or location within a given business process.

A GLN identifying a party answers the question of “who” is involved within the use case. This may be a legal entity or function that defines who is transacting in a business scenario.

- **Legal entity** – Any business, government body, department, charity, individual or institution that has standing in the eyes of the law and has the capacity to enter into agreements or contracts.
- **Function** – An organisational subdivision or department based on the specific tasks being performed, as defined by the organisation.

A GLN identifying a location is used to answer the question of “where” something has been, is, or will be. A location can be either physical or digital in nature.

- **Physical location** – A site (an area, a structure or group of structures) or an area within the site where something was, is, or will be located.

**Data carrier specification**

If the GLN is carried in a barcode on a GS1 Logistic Label, the rules for logistic unit applications apply, see section [2.2](#).

If the GLN is carried in a barcode on a payment slip the rules for the payment slips application apply, see section [2.6.6](#).

Unique application processing requirements

For a description of processing requirements, see section [7](#).

2.5 Service relationships

Application description

The Global Service Relation Number (GSRN) is a non-significant number used to identify the relationship between an organisation offering services and the individual entities providing or benefitting from the services. The GSRN provides unique and unambiguous identification. It is the key to accessing information, stored on computer systems, relevant to service(s) provided and received and in some cases, these services could be recurring. The GSRN may also be used for referencing information transferred via Electronic Data Interchange (EDI).

When using the GSRN, often two types of relationships may need to be captured in one transaction:

1. The relationship between the organisation offering the service and the actual recipient of the service.
2. The relationship between the organisation offering the service and the actual provider of the service.

It should be noted that the GSRN is not meant to identify a single service as a trade item, neither is it used to identify a physical unit as a trade item. It may identify a physical unit for service purposes (e.g., a computer with a service agreement).

2.5.1 Global Service Relation Number – Provider: AI (8017)

An element string with GS1 Application Identifier AI (8017) represents the Global Service Relation Number of a relationship between the organisation offering the service and the provider of the service. Some examples of how the GSRN can be used to identify the service relationships are:

- A medical procedure, where it could be used to identify an individual medical provider by role. For identification of the individual provider of care, the hospital or the appropriate authority generates a GSRN with AI (8017) for each of its caregivers and encodes it in an appropriate GS1 Data carrier (barcode) symbol on the caregiver's ID card, work station, work order, etc. In this case, the GSRN would ensure non-significant identification management, securing identification uniqueness and also allowing linkage to local rule management systems.
- A service agreement, where it could be used to manage agreed upon services, such as maintenance services for a television or computer.
- A loyalty program required to identify the service relationship between the loyalty program and the service provider (i.e. company providing merchandise due to use of loyalty points).
- A hospital administration can identify the service relationship between hospital and the doctor, nurses, etc.

GS1 key**Required**

GSRN

The GS1 Application Identifiers to indicate, *Global Service Relation Number(GSRN)* are *AI (8017)* and *AI (8018)* , see section [3.2](#)

**Rules**

All GSRN rules described in section [4.6](#).

Attributes**Required**

Not applicable

Optional

AI (8019) *Service Relation Instance Number*, section [3.2](#)

[AI \(7241\) AIDC media type](#), section [3.2](#)

[AI \(7242\) Version Control Number \(VCN\)](#), section [3.2](#)

[AI \(8030\) Digital Signature \(DigSig\)](#), section [3.2](#)

Commented [DM1]: GSCN 22-345

Rules

Not applicable

Data carrier specification**Carrier choices**

The data carrier choices for this application are:

- GS1 DataBar Expanded
- GS1 DataBar Expanded Stacked
- GS1-128
- GS1 DataMatrix
- GS1 QR Code

Symbol X-dimension, minimum symbol height and minimum symbol quality

See section [5.12.3.11](#), *GS1 symbol specification table 11*

Symbol placement

No standard placement is required.

Unique application processing requirements

For a description of processing requirements, see section [7](#).

2.5.2 Global Service Relation Number – Recipient: AI (8018)

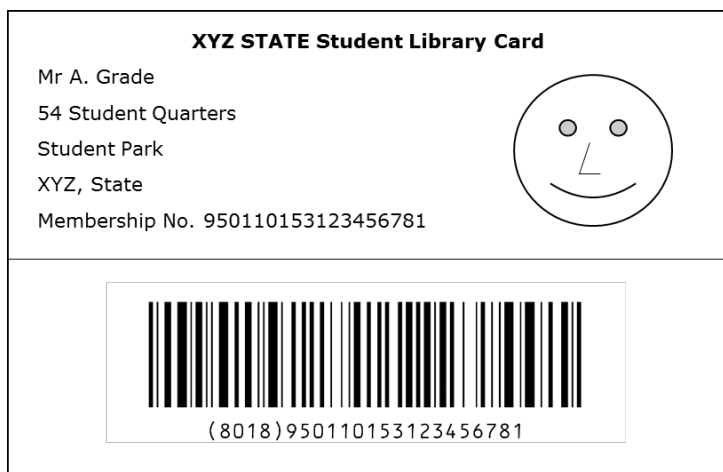
An element string with GS1 Application Identifier AI (8018) represents the Global Service Relation Number of a relationship between the organisation offering the service and the recipient of the service. Some examples of how the GSRN can be used to identify the service relationships are:

- A hospital admission, where it could be used to identify a subject of care globally and uniquely for AIDC purposes and establish an identification uniqueness that does not harm privacy. For identification of the subject of care (patient) the hospital generates a GSRN with AI (8018) for each of its patients and encodes it in an appropriate GS1 Data carrier (barcode) on the patient's wristband as well as his or her corresponding medical record, pathology samples, etc. The GSRN may then be used as the key to link multiple or specific instances of treatment, room charges, medical tests and patient charges.
- A membership in a frequent flyer programme, where it could be used to record awards, claims and preferences.



- A membership in a loyalty scheme, where it could be used to record visits, purchase value and awards.
- A membership in a club, where it could be used for recording entitlements, use of facilities and subscriptions.
- A loyalty program required to identify the service relationship between the loyalty program and the recipient of the loyalty program (the end user or customer who earns loyalty points).
- Patient admission to a hospital can identify the service relationship between the hospital and the patient.
- Utility networks, such as those providing electricity, gas or water, where it could be used to identify the relationship between network service providers and suppliers of utility products.
- A GSRN could be used to give students access to other libraries that have formed a cooperative lending agreement. A typical application is the identification of membership in a student library. The library would issue all members a card that includes a unique GSRN identifying the relationship between the library and a student. The library would then scan the GSRN whenever a book was lent or returned. The Electronic Message from the scanner would then be used to automatically update the library's stock management database. See the figure below for an example of how the service relationship identifier would appear on this membership card.

Figure 2.5.2-1. Example of GSRN on a membership card



GS1 key

Required

GSRN

See section [3.2](#), *Global Service Relation Number AI (8017) and AI (8018)* for the definition of the GS1 Application Identifier.

Rules

See section [4.6](#), *GSRN rules*.

**Attributes****Required**

Not applicable

Optional

AI (8019) Service Relation Instance Number, see section 3.2.

AI (7241) AIDC media type, section 3.2

AI (7242) Version Control Number, section 3.2

AI (8030) Digital Signature (DigSig), section 3.2

Commented [DM2]: GSCN22-345

Rules

Not applicable

Data carrier specification**Carrier choices**

The data carrier choices for this application are:

- GS1 DataBar Expanded
- GS1 DataBar Expanded Stacked
- GS1-128
- GS1 DataMatrix
- GS1 QR Code

Symbol X-dimension, minimum symbol height and minimum symbol quality

See section 5.12.3.11, GS1 symbol specification table 11

Symbol placement

No standard placement is required.

Unique application processing requirements

For a description of processing requirements, see section 7.

2.5.3 Service Relation Instance Number: AI (8019)

A service provider or a service recipient can be identified with a Global Service Relation Number (GSRN), using AI (8017) and (8018) respectively. When a product or service is administered (e.g., a particular treatment is given) it can easily be associated with the patient by scanning the Global Trade Item Number (GTIN) of the product or service as well as the caregiver's GSRN (barcoded with AI (8017)) and the patient's GSRN (barcoded with AI (8018)). If the subject of care service provider or recipient identification needs to, optionally, be made more granular with a sequence indicator corresponding to each encounter during the episode of care service relationship, attribute data in the form of a Service Relation Instance Number (SRIN GS1 Application Identifier AI (8019)), see section 3.2, may be added. This would, for example, allow differentiation of subject of care identification captured from an identification band, both before and after its replacement (i.e. radiology examination). If the treatment plan requires different instances of care, such as chemotherapies, and when a record should be captured for each instance, the SRIN linked to the GSRN may be used.

Commented [PD3]: GSCN22-345

For example, when a GSRN is encoded to a data carrier and applied to a patient wristband to identify the patient as a recipient of care, each SRIN linked to the patient's GSRN can correspond to a specific instance or encounter within an episode of care for that patient. For treatments which may require multiple instances of care and a record to be captured for each instance, such as for chemotherapies, the SRIN linked to the GSRN may be used. Furthermore, when a product or service



2.6.2 Coupons identified using the Global Coupon Number

2.6.2.1 Paper coupons

Application description

A paper coupon is a physical representation that is distributed and presented in hard-copy form, and can be exchanged for a financial discount or for loyalty points when making a purchase.

Paper coupons may be identified by a Global Coupon Number (GCN) assigned by the coupon issuer. The GCN comprises a GS1 Company Prefix followed by a coupon reference. It may be supplemented by an optional serial number.

Before implementing the Global Coupon Number to identify paper coupons, it is advised that the issuer of the coupons confirm the acceptance of the Global Coupon Number with their trading partners. Several options exist for coupons with restricted geographic distribution that may be preferred method of identifying coupons, see section [2.6.3](#).

GS1 key

Required

GCN

The GS1 Application Identifier to indicate the Global Coupon Number (GCN) is AI (255) (see section [3.2](#)).

Rules

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

Attributes

Required

Not applicable

Optional

To provide additional information to the Global Coupon Number, the following AIs can be used: AI (17) Expiration date, AI (390N) Coupon value – Single monetary area or AI (394n) Percentage discount of a coupon or AI (8111) Loyalty points of a coupon (see section [3](#)).

[For all the GS1 Application Identifiers that may be used with an GCN, see section 3.2](#)

Data carrier specification

Carrier choices

GS1 DataBar

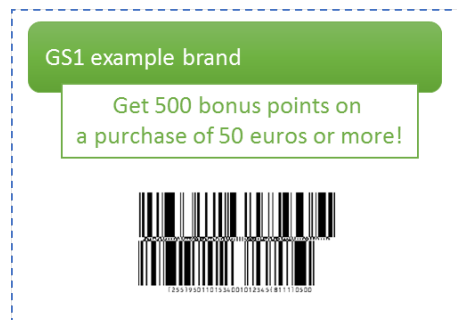
Symbol placement

Not applicable



Coupon barcode contains AI (255) GCN, AI (17) EXPIRY and AI (3902) AMOUNT (two decimals)

Example 4 Coupon with GCN and loyalty points



Coupon barcode contains AI (255) GCN (serialised) and AI (8111) POINTS

Example 5 Coupon with GCN and percentage discount



Coupon barcode contains AI (255) GCN and AI (3941) PRCNT OFF (one decimal)

2.6.2.2 Digital coupons

Application description

A digital coupon is an electronic presentation that is distributed and presented without manifesting as "paper" or in other hard-copy form and can be exchanged for a financial discount or for loyalty points when making a purchase. GS1 global standards enable efficient digital coupon processes for the benefit of:

Brands who can execute offers in the same way in multiple countries and with multiple retailers. Brands can have more relevant/targeted marketing and campaign opportunities tied to specific factors (ex. Location, consumer, products, interest and interaction with media).

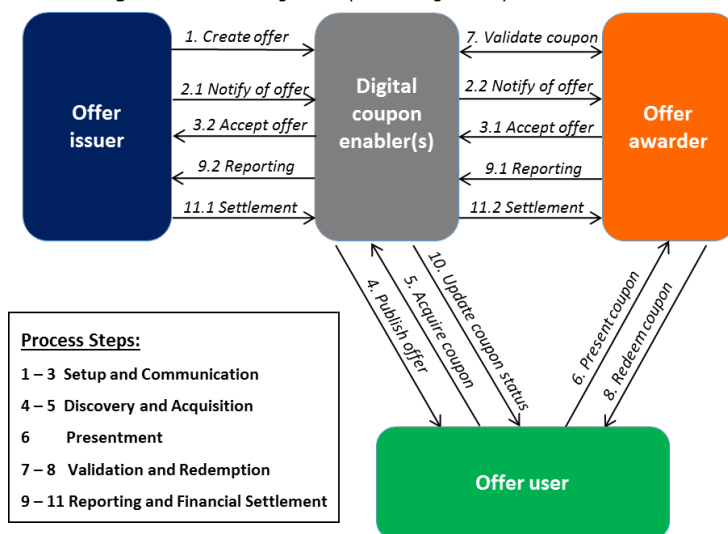
Mobile industry and solution providers who will have a baseline and one standard to implement rather than multiple.

Retailers who can accept offers from coupon issuers in one rather than multiple ways and can understand how to configure (and possibly upgrade) the POS system. Retailers can also accept digital coupons acquired from multiple distributions channels, process them in a uniform and standard way, and integrate where appropriate with their loyalty system.

Consumers who will have a consistent and a satisfying experience when they manage their coupon offers (digital coupons are searchable, sort-able, allowing customers to browse by merchant, category, offer date and other criteria).

The following diagram illustrates the digital coupon management process. The process is specified in detail in the *Digital Coupon Management Standard Specification Document*.

Figure 2.6.2.2-1. Digital coupon management process



2.6.2.2.1 Relation with existing coupon specifications

The digital coupons specification will co-exist in the foreseeable future with coupon specifications described in section 2.6.3 that are restricted to national or common currency regional applications specified by the respective GS1 Member Organisations.

2.6.2.2.2 Identification requirements for digital coupons

The digital coupon management process specifies the following identification requirements:

- Parties, e.g., offer issuer, digital coupon enabler, retailer, SHALL be identified with a GLN.
- Digital coupons are always related to offers and promotions on products or services. Products as well as services SHALL be identified with a GTIN.
- Digital coupons may be managed in conjunction with loyalty cards. If appropriate, consumer loyalty cards accounts may be identified with a GSRN.

Digital coupons SHALL be identified by a Global Coupon Number assigned by the coupon issuer. The GCN comprises a GS1 Company Prefix followed by a coupon reference. It may be supplemented by an optional serial number.

GS1 key

Required

GCN



The GS1 Application Identifier to indicate the Global Coupon Number (GCN) is AI (255) (see section [3.2](#) for a list of all GS1 Application Identifiers).

Rules

All the GCN Application Rules described in section [4](#).

Attributes

Required

Not applicable

Optional

[For all the GS1 Application Identifiers that may be used with an GCN, see section 3.2.](#)

Data carrier specification

Carrier choices

Data carrier specifications for the GCN were out of scope and therefore not addressed when this standard was developed. Local implementations may choose to use the GS1 DataBar to carry the coupon identifier, as it is the only carrier that is capable of holding the identifier structure that is approved for POS use within the GS1 system.

Symbol placement

Not applicable



2.6.9 Global Document Type Identifier for document control

Introduction

The Global Document Type Identifier is the GS1 identification key used to identify documents, electronic messages and digital files for the purposes of document control. Any aspect of referenced modification, version control, specific instance recording would fall into the process of document control, either internal or externally with trade partners, where unique identification is required

The term “document” is applied broadly to cover any paper(s) or digital file(s). The Global Document Type Identifier (GDTI) can be used to identify any type of document including but not limited to:

- Commercial documents (e.g., invoice, purchase order)
- Documents that infer a right (e.g., proof of ownership)
- Documents that infer an obligation (e.g., notification or call for military service)
- Identification documents (e.g., driver’s licence, passport)
- Digital files
- Electronic messages

Application description

Physical documents and electronic messages used in communications with other parties often include a unique number that can be used as a reference. Also, digital files shared with other parties may require a unique identifier to ensure the use of the right type and version. The issuer of the document is normally responsible for the identification of the document.

The GDTI enables issuers to assign globally unique identifiers to documents and, where applicable, to physically mark these on the physical version(s) in barcode or EPC/RFID format.

Examples of documents that can be identified with the GDTI include, but are not limited to:

- Land registration papers
- Tax demands
- Proof of shipment/receipt forms
- Custom’s clearance forms
- Insurance policies
- Internal invoices
- National press documents
- Educational papers
- Transporting company documents
- Mail company documents
- Images

GS1 key

Required

GDTI

The GS1 Application Identifier to indicate the Global Document Type Identifier (GDTI) is AI (253), see section [3.2](#).

Rules

See section [4.7](#), *GDTI rules*.



Attributes

Required

Not applicable

Optional

[For all the GS1 Application Identifiers that may be used with an GDTI, see section 3.2](#)

Data carrier specification

Carrier choices

- GS1-128
- GS1 DataMatrix
- GS1 QR Code

Symbol X-dimension, minimum symbol height and minimum symbol quality

See section [5.12.3.9](#), *GS1 symbol specification table 9*.

Symbol placement

No standard placement. The following are examples of numbering and symbol marking for document control:

Unique application processing requirements

For description of processing requirements, see section [7](#).



2.6.12 Component/part identification

2.6.12.1 Application description

This application is subject to the following restrictions:

- The Component & Part Identifier is available for business processes where products are identified by the buyer. The buyer instructs his suppliers on how to identify and mark the products delivered to him.
- The identifier SHALL NOT be used in open supply chains. It is restricted to use by mutual agreement. The GTIN is the only GS1 standard identifier for trade items in open supply chains.


A Component/Part (C/P) is defined as an item that is intended to undergo at least one further transformation process to create finished goods for the purpose of downstream consumption. C/P examples may include:

- Drive motor for washing machine
- Fan assembly for a jet engine
- Pipe/tube
- Printed circuit board for television
- Starter motor for vehicle
- Magnetic coil for a Magnetic Resonance Imaging (MRI) machine
- Wheel axle

Several industry sectors use established systems for the identification of C/P in the supply chain. Very often, companies use alphanumeric identifiers for their C/P, which may be serialised. Many IT systems rely on the identifiers structure that includes limited meaningful information. Time-critical processes (material resource planning, delivery schedules, etc.) do not allow for a mapping of the identification schemes to other identifiers. In addition, there is often no ubiquitous network access available. Network failures can happen in reality and could lead to production interruptions which in turn lead to tremendous economic losses. For that reason, technical industries have implemented autonomous assembly lines, which are controlled by dedicated control terminals that need no permanent network access.

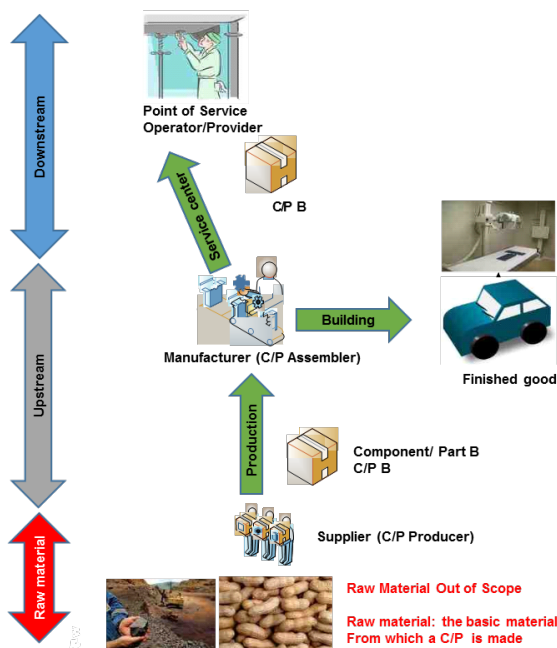
This application specifies a C/P Identifier that is available for the following processes:

- The C/P Identifier may be used by an OEM for their C/P procurement. The typical scenario is that an Original Equipment Manufacturer (OEM) assigns identifiers to Components/Parts necessary to build finished goods, such as automobiles. The C/P production is contracted to suppliers who use the C/P Identifier assigned by their customer, the OEM.
- The OEM and/or agents make use of the C/P Identifier in their production process.
- C/P Identifiers are also available to points of service for after sales services and maintenance activities, including procurement.

 **Note:** GTIN remains the mandatory solution for items crossing aftermarket retail points of sale.

The following diagram illustrates the three main business processes where C/P Identifiers may be appropriate:

Figure 2.6.12.1-1. Business processes where C/P Identifiers may be appropriate



2.6.12.2 Identification requirements

Components/Parts that meet the requirements described above can be identified by a C/P Identifier that has the following characteristics:

- The C/P Identifier comprises a GS1 Company Prefix and C/P reference assigned by the GS1 Company Prefix holder.
- The C/P reference format is variable length. The Component/Part reference SHALL only consist of numeric, alphabetic upper-case or special characters "#", "-", or "/"
- The total length of the identifier SHALL NOT exceed 30 characters.
- The C/P Identifier would be classified as a "GS1 key" according to the current GS1 definitions. However it is not to be used in open supply chains but can be used as primary identifier in barcoding applications, EPC/RFID and EPCIS.

GS1 key

Required

CPID

The GS1 Application Identifier to indicate the Component/Part Identifier (CPID) is AI (8010), see section [3.2](#).

**Rules**

The C/P Identifier would be classified as a "GS1 key" according to the current GS1 definitions. However it is not to be used in open supply chains.

Attributes**Required**

Not applicable

Optional

The C/P Identifier may be supplemented by an optional serial number. The format of the serial number is numeric only, maximum 12 digits. See GS1 Application Identifier (8011) Component/Part Identifier in section [3.9.11](#) and also for all the GS1 Application Identifiers that may be used with a CPID, see section [3.2](#).

Data carrier specification**Carrier choices**

- GS1-128
- GS1 DataMatrix
- GS1 QR Code
- EPC/RFID

Data carrier specifications are to be provided by the OEM to its partners.

Symbol placement

Not applicable

Unique application processing requirements

Not applicable



Data carrier specification

Carrier choices

- GS1-128
- GS1 DataMatrix
- GS1 QR Code
- EPC/RFID

The mandatory data carrier used to represent the SSCC on individual logistic units is the GS1-128 barcode symbology.

As indicated by figure 2.6.15, 2D symbols MAY be included in addition to the GS1-128 symbol. When used, the GS1 2D symbol SHALL include all element strings included in the GS1-128 symbol(s) and MAY include additional element strings.

If a logistic unit does not have at least one surface area greater than an A6 or 4" x 6" logistic label (see section 6.6.4.5), a GS1 DataMatrix or GS1 QR Code MAY be used by itself on a logistic label, though a GS1-128 containing a SSCC is still recommended. If a logistic label is used with only a GS1 DataMatrix or GS1 QR Code, care must be taken to ensure trading partners are able to scan this barcode.

Symbol X-dimension, minimum symbol height and minimum symbol quality

For GS1-128, GS1 DataMatrix and GS1 QR Code, see section 5.12.3.5 GS1 symbol specification table 5.

Symbol Placement

All the symbol placement guidelines in section 6.

Unique application processing requirements

For a description of processing requirements, see section 7. Note that some transport process information may include accented / non-Latin characters and space characters which are not available in the subset of *ISO/IEC 646 International Reference Version* defined in figure 7.11-1 used for all GS1 Application Identifier (AI) element strings. Encoding these characters can be accomplished using percent encoding as defined in RFC 3986 while using existing characters from the subset of *ISO/IEC 646 International Reference Version* defined in figure 7.11-1. Note that space character can be encoded as a plus symbol (+) as an alias of %20.

2.6.16 Digital Signature (DigSig)

Application description

Digital signatures provide the ability to check:

- The data has not been changed (tamper detection)
- The provenance of the data, i.e., who digitally signed the data (non-repudiation)

ISO/IEC 20248: *Information technology — Automatic identification and data capture techniques — Digital signature data structure schema* (<https://www.iso.org/standard/81314.html>) specifies a method to add a digital signature, and other verifiable data, to a barcode or RFID data construct by which the verification of the following can be achieved without the need to connect to an external data source:

- The link with the physical object by using physical features and security marks.
- By using the unique and secured chip ID, it is possible to detect if the data on a specific RFID tag has been cloned from another tag.

An ISO/IEC 20248 data construct is commonly known as a DigSig, a named thing with a specific meaning, while "digital signature" in lower case refers to the general and common digital signature.



Digital signatures can be stored within an AIDC data carrier or retrieved from an online resource. Application Identifier (8030) indicates that its value is an ISO/IEC 20248 DigSig data structure, which is an efficiently compressed data envelope that contains a digital certificate ID, digital signature, timestamp, as well as data. The signature is calculated over some data values that may be present within the DigSig envelope, as well as other data values that need to be sourced from elsewhere, such as entering a PIN number or reading a code from a security marking (e.g., hologram, UV ink mark) on the product, before attempting to verify the signature. In this way, ISO/IEC 20248 supports a strong binding between the digital signature and the physical object to which the data corresponds.

An alternative approach using an online digital signature can support a similarly strong binding to the physical object if the digitally signed data uses properties defined within the GS1 Web vocabulary - see <https://gs1.org/voc/AuthenticityDetails>. In a similar manner to ISO/IEC 20248, it is possible to include a value within the calculation of the digital signature, while omitting it from the data payload, forcing the verifying party to retrieve the missing data value from elsewhere, e.g., from a known PIN number or from a code read from a security marking on the physical object. Formats for online digital signatures include JSON Web Signatures (JWS), XML Signatures or Verifiable Credentials. Resolver infrastructure for GS1 Digital Link can be used (e.g., with `linkType=gs1:jws`) to find sources of digitally signed data for a GS1 Digital Link URI (or for its equivalent element string).



Note: For regulated healthcare trade items, Digital Signature (DigSig) SHALL NOT be used in any labelling, physical marking, or GS1 AIDC data carrier on associated trade items.

The following keys are viable keys for use with a Digital Signature (DigSig).

GS1 Key

Required

The following key formats are allowed in this application:

- GTIN-8
- GTIN-12
- GTIN-13
- GTIN-14
- ITIP
- SSCC
- GRAI
- GIAI
- GSRN (Provider)
- GSRN (Recipient)
- GCN
- GDTI
- CPID

Rules

All application rules for the relevant GS1 key, described in section 4.

Attributes

Required

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**AI (8030) Digital Signature (DigSig)**

Instance level identification is required in addition to AI (8030), see Table 4-1 Entities identified by GS1 identification keys (simple or compound) within the GS1 System Architecture document.

Optional

Not applicable

Rules

Not applicable

Data carrier specification**Carrier choices**

The data carriers required to carry a DigSig are listed below however specifications for data carriers are established with the application standards for the GS1 Identification keys. In some applications, one of the data carriers below are permitted without needing any other data carriers on the entity being identified. In other application standards, one of the data carriers below are permitted in addition to another data carrier that is incapable of encoding DigSig (e.g., EAN/UPC, GS1-128, ITF-14, GS1 DataBar)

- GS1 DataMatrix
- GS1 QR Code
- Data Matrix (GS1 Digital Link URI)
- QR Code (GS1 Digital Link URI)
- EPC/RFID

Symbol X-dimension, minimum symbol height and minimum symbol quality

To determine which Symbol Specification Table is applicable, please refer to the relevant application standard for the required GS1 key, in section 2.

Symbol placement

Not applicable

Unique application processing requirements

For a description of processing requirements, see section 7.

2.7 Summary of applications and operative scanning environments

The figure below provides a cross-reference for all system applications defined in section 2 and the GS1 symbol specification tables (SSTs) in section 5. The application where the barcode will be used needs to be determined prior to locating the correct symbol specification table (SST) entry. Use the "SST(s)" column to find the SST appropriate for the application area. Because most application areas provide a reference to two symbol specification tables based on the operative scanning environment, a decision must be made between the two. See the decision tree in figure 5.12.2.6-2 to determine the correct symbol specification table.



Application	See section	SST(s)	Carrier choices
Internal applications	2.6.10	N/A	GS1-128, GS1 DataBar Expanded, GS1 DataMatrix, GS1 QR Code
Consumer trade item production control	2.6.11	N/A	GS1 DataBar, GS1 DataMatrix, GS1 QR Code, GS1-128, Composite Component
Component/part identification	2.6.12	N/A	GS1-128, GS1 DataMatrix, GS1 QR Code, EPC/RFID
Global Model Number	2.6.13	4	GS1 DataMatrix, GS1 QR Code, EPC/RFID
Permanently marked items	2.6.14	4, 7, 9, 13	GS1 DataMatrix, GS1 QR Code, EPC/RFID
Encoding transport process information	2.6.15	5	GS1-128, GS1 DataMatrix, GS1 QR Code, EPC/RFID
Digital Signature (DigSig) detailed in ISO/IEC 20248	2.6.16	(**)	(***) GS1 DataMatrix, GS1 QR Code, DataMatrix (GS1 Digital Link URI), QR Code (GS1 Digital Link URI), EPC/RFID
<p>(*) See <i>US Coupon Application Guideline Using GS1 DataBar Expanded Symbols</i> for the appropriate SST.</p> <p>(**) Refer to the application standard of the required GS1 key, for the appropriate SST.</p> <p>(***) Refer to the application standard of the required GS1 key, to determine if one of the listed data carriers for Digital Signature (DigSig) is permitted, or if it is only permitted in addition to another data carrier that is incapable of encoding Digital Signature (DigSig) e.g., EAN/UPC, GS1-128, ITF-14, GS1 DataBar.</p>			



AI	Data Content	Format ⁽¹⁾	FNC1 required ⁽⁴⁾	Data title
<u>7242</u>	<u>Version Control Number (VCN): AI (7242)</u>	<u>NX+X...25</u>	<u>(FNC1)</u>	<u>VCN</u>
8001	Roll products - width, length, core diameter, direction, splices: AI (8001)	N4+N14	(FNC1)	DIMENSIONS
8002	Cellular mobile telephone identifier: AI (8002)	N4+X..20	(FNC1)	CMT No.
8003	Global Returnable Asset Identifier (GRAI): AI (8003)	N4+N14[+X..16]	(FNC1)	GRAI
8004	Global Individual Asset Identifier (GIAI): AI (8004)	N4+X..30	(FNC1)	GIAI
8005	Price per unit of measure: AI (8005)	N4+N6	(FNC1)	PRICE PER UNIT
8006	Identification of an individual trade item (ITIP) piece: AI (8006)	N4+N14+N2+N2	(FNC1)	ITIP
8007	International Bank Account Number (IBAN): AI (8007)	N4+X..34	(FNC1)	IBAN
8008	Date and time of production: AI (8008)	N4+N8[+N..4]	(FNC1)	PROD TIME
8009	Optically readable sensor indicator: AI (8009)	N4+X..50	(FNC1)	OPTSEN
8010	Component/Part Identifier (CPID): AI (8010)	N4+Y..30	(FNC1)	CPID
8011	Component/Part Identifier serial number: AI (8011)	N4+N..12	(FNC1)	CPID SERIAL
8012	Software version: AI (8012)	N4+X..20	(FNC1)	VERSION
8013	Global Model Number (GMN): AI (8013)	N4+X..25	(FNC1)	GMN
8017	Global Service Relation Number (GSRN) to identify the relationship between an organisation offering services and the provider of services: AI (8017)	N4+N18	(FNC1)	GSRN - PROVIDER
8018	Global Service Relation Number (GSRN) to identify the relationship between an organisation offering services and the recipient of services: AI (8018)	N4+N18	(FNC1)	GSRN - RECIPIENT
8019	Service Relation Instance Number (SRIN): AI (8019)	N4+N..10	(FNC1)	SRIN
8020	Payment slip reference number: AI (8020)	N4+X..25	(FNC1)	REF No.
8026	Identification of pieces of a trade item (ITIP) contained in a logistic unit: AI (8026)	N4+N14+N2+N2	(FNC1)	ITIP CONTENT
<u>8030</u>	<u>Digital Signature (DigSig)</u>	<u>N4+Z..90</u>	<u>(FNC1)</u>	<u>DIGSIG</u>
8110	Coupon code identification for use in North America (AI 8110)	N4+X..70	(FNC1)	-
8111	Loyalty points of a coupon: AI (8111)	N4+N4	(FNC1)	POINTS
8112	Positive offer file coupon code identification for use in North America: (AI 8112)	N4+X..70	(FNC1)	-
8200	Extended packaging URL: AI (8200)	N4+X..70	(FNC1)	PRODUCT URL
90	Information mutually agreed between trading partners: AI (90)	N2+X..30	(FNC1)	INTERNAL
91 to 99	Company internal information: AIs (91 - 99)	N2+X..90	(FNC1)	INTERNAL

NOTES:

(1): The first position indicates the length (number of digits) of the GS1 Application Identifier. The following value refers to the format of the data content. The following convention is applied:

- n implied decimal point position
- N numeric digit
- X any character in figure 7.11-1 for GS1 AI encodable character set 82
- Y any character in figure 7.11-2 for GS1 AI encodable character set 39
- Z any character in figure 7.11-3 for GS1 AI encodable character set 64 (file-safe / URI-safe base64)

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- N3 3 numeric digits, fixed length
- X3 3 characters, fixed length
- N..3 up to 3 numeric digits
- X..3 up to 3 characters in figure 7.11-1 for GS1 AI encodable character set 82
- Y..3 up to 3 characters in figure 7.11-2 for GS1 AI encodable character set 39
- Z..3 up to 3 characters in figure 7.11-3 for GS1 AI encodable character set 64 (file-safe / URI-safe base64)
- [] enclosed value is an optional component

(2): If only year and month are available, DD must be filled with two zeroes, except where noted.

(3): The fourth digit of this GS1 Application Identifier indicates the number of decimal places (and in that way the implied decimal point position).

Example:

- 3100 Net weight in kg without a decimal point
- 3102 Net weight in kg with two decimal places

(4): All GS1 element strings that begin with GS1 Application Identifiers not contained in the predefined table shown in figure 7.8.5-2 SHALL be separated by a separator character unless this element string is the last one to be encoded in the symbol. For details on the separator character see section 7.8.4.

(5) An example to illustrate future additional National Healthcare Reimbursement Numbers (NHRNs). If additional NHRN AIs are required, a request for a new NHRN AI SHALL be made through GSMP.

(6) The fourth digit of this GS1 Application Identifier indicates the sequence number, allowing for multiple occurrences of the AI.

3.3 GS1 Application Identifiers starting with digit 0

3.3.1 Identification of a logistic unit (SSCC): AI (00)

The GS1 Application Identifier (00) indicates that the GS1 Application Identifier data field contains an SSCC (Serial Shipping Container Code). The SSCC is used to identify logistic units (see section 2.2).

The extension digit is used to increase the capacity of the serial reference within the SSCC. It is assigned by the company that constructs the SSCC. The extension digit ranges from 0-9.

The GS1 Company Prefix is allocated by GS1 Member Organisations to the company that allocates the SSCC – here the physical builder or the brand owner of the logistic unit (see section 1.4.4). It makes the SSCC unique worldwide but does not identify the origin of the unit.

The structure and content of the serial reference is at the discretion of owner of the GS1 Company Prefix to uniquely identify each logistic unit.

The check digit is explained in section 7.9. Its verification, which must be carried out in the application software, ensures that the number is correctly composed.

Figure 3.3.1-1. Format of the element string

GS1 Application Identifier	SSCC (Serial Shipping Container Code)																	
	Extension digit	GS1 Company Prefix							Serial reference							Check digit		
0 0	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	N ₁₄	N ₁₅	N ₁₆	N ₁₇	N ₁₈

The data transmitted from the barcode reader means that the element string denoting the SSCC of a logistic unit has been captured. When indicating this element string in the non-HRI text section of a barcode label, the following data title SHOULD be used: **SSCC**

3.3.2 Identification of a trade item (GTIN): AI (01)

The GS1 Application Identifier (01) indicates that the GS1 Application Identifier data field contains a GTIN. The GTIN is used to identify trade items (see section 2.1). The GTIN for trade items may be a



When indicating this element string in the non-HRI text section of a barcode label, the following data title SHOULD be used: **GLN EXTENSION COMPONENT**

3.5.13 Global Coupon Number (GCN): AI (255)

The GS1 Application Identifier (255) indicates that the GS1 Application Identifier data field contains the Global Coupon Number (GCN). The GCN provides a globally unique identification for a coupon, with an optional serial number.

The GS1 Company Prefix is allocated by GS1 Member Organisations to the company that allocates the GCN. It makes the number unique worldwide.

The structure and content of the coupon reference is at the discretion of the coupon issuer, in order to uniquely identify each type of coupon.

The check digit is explained in section 7.9. Its verification, which must be carried out in the application software, ensures that the number is correctly composed.

The optional serial component is assigned to an individual instance of a coupon. The combination of GS1 Company Prefix, coupon reference and serial component uniquely identifies an individual coupon. The serial component field is numeric and may contain up to 12 digits. The issuer of the Global Coupon Number determines the serial component.

Figure 3.5.13-1. Format of the element string

GS1 Application Identifier	Global Coupon Number (GCN)													
	GS1 Company Prefix						Coupon reference						Check digit	Serial component (optional)
2 5 5	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	N ₁ –variable → N ₁₂

When indicating this element string in the non-HRI text section of a barcode label, the following data title SHOULD be used: **GCN**

3.5.14 Digital Signature (DigSig): AI (8030)

The GS1 Application Identifier (8030) indicates that the GS1 Application Identifier data field is a Digital Signature (DigSig) that is in conformance with ISO/IEC 20248 Information technology — Automatic identification and data capture techniques — Digital signature data structure schema - <https://www.iso.org/standard/81314.html>. The DigSig data field SHALL only consist of alphanumeric characters from the file-safe/URI-safe base64 character set (a 64-character subset of ISO/IEC 646 Table 1) as defined in section 5 of RFC 4648, see Figure 7.11-3.

Figure 3.5.14-1. Format of the element string

GS1 Application Identifier	Digital Signature (DigSig)
8030	Z ₁ ————— variable length —————> Z ₉₀

The data transmitted from the barcode reader means that the element string denoting a Digital Signature (DigSig) has been captured. As this element string is an attribute of a trade item, asset, coupon, document, component, service relationship or logistic unit, it must be processed together with the identifier of the physical object to which it relates (see section 4.13 Data relationships).

When indicating this element string in the non-HRI text section of a barcode label, the following data title SHOULD be used: **DIGSIG**



If element string		Then mandatory associated element string	Rule
AI	Designation	AI	
8020	Payment slip reference number	415	The payment slip reference number SHALL occur in combination with the GLN of the invoicing party.
8026	ITIP of contained pieces	00 AND 37	The ITIP of contained pieces SHALL occur in combination with an SSCC and the count of the pieces.
8030	Digital Signature (DigSig)	(01 AND 21) XOR (8006 AND 21) XOR (8010 AND 8011) XOR 8003 XOR 8004 XOR 8017 XOR 8018 XOR 00 XOR 253 XOR 255	The Digital Signature (DigSig) SHALL occur in combination with one of the following: <ul style="list-style-type: none">Global Trade Item Number and Serial numberIdentification of an individual trade item piece and Serial numberComponent/Part Identifier and Component/Part Identifier serial numberGlobal Returnable Asset Identifier including Serial componentGlobal Individual Asset IdentifierGlobal Service Relation Number - ProviderGlobal Service Relation Number - RecipientSerial Shipping Container CodeGlobal Document Type Identifier including Serial componentGlobal Coupon Number including Serial component
8111	Loyalty points of a coupons	255	Loyalty points of a coupon SHALL occur in combination with the GCN.
8200	Extended packaging URL	01	The extended packaging URL SHALL occur in combination with the GTIN.
<p>* The AIs for trade measures are set out in section 3.6.2 Trade measures: AIs (31nn, 32nn, 35nn, 36nn). Note: All AIs in section 3.6.2 can be used with this AI 395n.</p> <p>** The AIs for logistics measures are set out in section 3.6.3 Logistic measures: AIs (33nn, 34nn, 35nn, 36nn)</p> <p>*** If used in combination with the identification of trade item pieces (ITIP), the optional AIs on all individual pieces of the trade item SHALL be identical.</p> <p>N Any digit from 0 to 9</p>			

✓ **Note:** Exception for point-of-sale. See figure 2.7-1. Areas of GS1 system application.

4.14 Human readable interpretation (HRI) 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. There are two categories of rules:

- General rules that apply independent of sector, product category, or region.
 - Sector specific rules which must be aligned with the general rules.

For the purposes of interpreting this standard, there are two types of text that appear on a label, package, or item; human readable interpretation (HRI) and non-HRI text.

- Human readable interpretation (HRI) is the information below, beside or above a barcode or tag which is encoded in the barcode or tag and represents the same characters as carried in the barcode or tag (See section 9 for full definition).
- Non-HRI text is all other text on package, label or item (See section 9 for full definition).

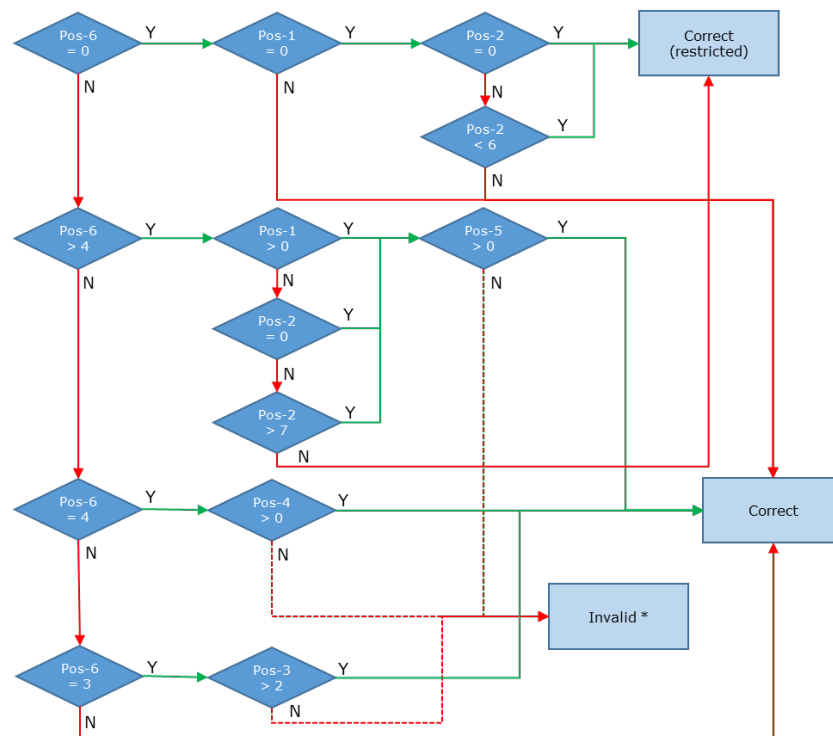
Figure 4.14-1. Example of HRI and non-HRI text

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Figure 7.10-1. Procedure for test 1



* These UPC-E barcodes were valid in previous specifications. Provision for accepting them must be made during decoding only.

Test 2:

Expand the digits encoded in the UPC-E barcode to the first 11 digits of the full length GTIN-12, calculate the check digit and compare it with the check digit decoded from the UPC-E barcode. If they do not match, it signifies an invalid symbol.

7.11 The GS1 subset of International Standard ISO/IEC 646

Figure 7.11-1 lists all characters allowed for use in GS1 Application Identifier (AI) element strings with the exception of the Component and Parts Identifier and Digital Signatures (DigSig). Figure 7.11-1 corresponds to ISO/IEC 646 Table 1. All other ISO 646 characters that are not listed here are not allowed in GS1 Application Identifier (AI) element strings. Figure 7.11-2 lists all the characters allowed for use in the GS1 Application Identifier for Component and Parts Identifier. Figure 7.11-3 lists all the characters allowed for use in the GS1 Application Identifier (AI) for Digital Signatures (DigSig).

Note that some transport process information may include accented / non-Latin characters and space characters which are not available in the subset of ISO/IEC 646 International Reference Version defined in the figure below. Some AIs in the range 4300 – 4320 may use the characters from the figure below in conjunction with percent-encoding as defined in RFC 3986 in order to



support non-Latin characters, with the plus sign (+) being accepted as a way of encoding a literal space character.

Figure 7.11-1. GS1 AI encodable character set 82

Graphic symbol	Name	Coded representation	Graphic symbol	Name	Coded representation
!	Exclamation mark	2/1	M	Capital letter M	4/13
"	Quotation mark	2/2	N	Capital letter N	4/14
%	Percent sign	2/5	O	Capital letter O	4/15
&	Ampersand	2/6	P	Capital letter P	5/0
'	Apostrophe	2/7	Q	Capital letter Q	5/1
(Left parenthesis	2/8	R	Capital letter R	5/2
)	Right parenthesis	2/9	S	Capital letter S	5/3
*	Asterisk	2/10	T	Capital letter T	5/4
+	Plus sign	2/11	U	Capital letter U	5/5
,	Comma	2/12	V	Capital letter V	5/6
-	Hyphen/Minus	2/13	W	Capital letter W	5/7
.	Full stop	2/14	X	Capital letter X	5/8
/	Solidus	2/15	Y	Capital letter Y	5/9
0	Digit zero	3/0	Z	Capital letter Z	5/10
1	Digit one	3/1	—	Low line	5/15
2	Digit two	3/2	a	Small letter a	6/1
3	Digit three	3/3	b	Small letter b	6/2
4	Digit four	3/4	c	Small letter c	6/3
5	Digit five	3/5	d	Small letter d	6/4
6	Digit six	3/6	e	Small letter e	6/5
7	Digit seven	3/7	f	Small letter f	6/6
8	Digit eight	3/8	g	Small letter g	6/7
9	Digit nine	3/9	h	Small letter h	6/8
:	Colon	3/10	i	Small letter i	6/9
;	Semicolon	3/11	j	Small letter j	6/10
<	Less-than sign	3/12	k	Small letter k	6/11
=	Equals sign	3/13	l	Small letter l	6/12
>	Greater-than sign	3/14	m	Small letter m	6/13
?	Question mark	3/15	n	Small letter n	6/14
A	Capital letter A	4/1	o	Small letter o	6/15
B	Capital letter B	4/2	p	Small letter p	7/0
C	Capital letter C	4/3	q	Small letter q	7/1
D	Capital letter D	4/4	r	Small letter r	7/2
E	Capital letter E	4/5	s	Small letter s	7/3
F	Capital letter F	4/6	t	Small letter t	7/4
G	Capital letter G	4/7	u	Small letter u	7/5
H	Capital letter H	4/8	v	Small letter v	7/6
I	Capital letter I	4/9	w	Small letter w	7/7
J	Capital letter J	4/10	x	Small letter x	7/8
K	Capital letter K	4/11	y	Small letter y	7/9
L	Capital letter L	4/12	z	Small letter z	7/10

**Figure 7.11-2.** GS1 AI encodable character set 39

Graphic symbol	Name	Coded representation	Graphic symbol	Name	Coded representation
#	Number Sign	2/3	H	Capital letter H	4/8
-	Hyphen/Minus	2/13	I	Capital letter I	4/9
/	Solidus	2/15	J	Capital letter J	4/10
0	Digit zero	3/0	K	Capital letter K	4/11
1	Digit one	3/1	L	Capital letter L	4/12
2	Digit two	3/2	M	Capital letter M	4/13
3	Digit three	3/3	N	Capital letter N	4/14
4	Digit four	3/4	O	Capital letter O	4/15
5	Digit five	3/5	P	Capital letter P	5/0
6	Digit six	3/6	Q	Capital letter Q	5/1
7	Digit seven	3/7	R	Capital letter R	5/2
8	Digit eight	3/8	S	Capital letter S	5/3
9	Digit nine	3/9	T	Capital letter T	5/4
A	Capital letter A	4/1	U	Capital letter U	5/5
B	Capital letter B	4/2	V	Capital letter V	5/6
C	Capital letter C	4/3	W	Capital letter W	5/7
D	Capital letter D	4/4	X	Capital letter X	5/8
E	Capital letter E	4/5	Y	Capital letter Y	5/9
F	Capital letter F	4/6	Z	Capital letter Z	5/10
G	Capital letter G	4/7	Intentionally left blank		

Figure 7.11-3. GS1 AI encodable character set 64 (file-safe / URI-safe base64)

Value	Graphic symbol	Name	Coded representation	Value	Graphic symbol	Name	Coded representation
0	A	Capital letter A	4/1	32	g	Small letter g	6/7
1	B	Capital letter B	4/2	33	h	Small letter h	6/8
2	C	Capital letter C	4/3	34	i	Small letter i	6/9
3	D	Capital letter D	4/4	35	j	Small letter j	6/10
4	E	Capital letter E	4/5	36	k	Small letter k	6/11
5	F	Capital letter F	4/6	37	l	Small letter l	6/12
6	G	Capital letter G	4/7	38	m	Small letter m	6/13
7	H	Capital letter H	4/8	39	n	Small letter n	6/14
8	I	Capital letter I	4/9	40	o	Small letter o	6/15
9	J	Capital letter J	4/10	41	p	Small letter p	7/0
10	K	Capital letter K	4/11	42	q	Small letter q	7/1
11	L	Capital letter L	4/12	43	r	Small letter r	7/2
12	M	Capital letter M	4/13	44	s	Small letter s	7/3
13	N	Capital letter N	4/14	45	t	Small letter t	7/4
14	O	Capital letter O	4/15	46	u	Small letter u	7/5
15	P	Capital letter P	5/0	47	v	Small letter v	7/6
16	Q	Capital letter Q	5/1	48	w	Small letter w	7/7
17	R	Capital letter R	5/2	49	x	Small letter x	7/8
18	S	Capital letter S	5/3	50	y	Small letter y	7/9
19	T	Capital letter T	5/4	51	z	Small letter z	7/10
20	U	Capital letter U	5/5	52	0	Digit zero	3/0



Value	Graphic symbol	Name	Coded representation	Value	Graphic symbol	Name	Coded representation
21	V	Capital letter V	5/6	53	1	Digit one	3/1
22	W	Capital letter W	5/7	54	2	Digit two	3/2
23	X	Capital letter X	5/8	55	3	Digit three	3/3
24	Y	Capital letter Y	5/9	56	4	Digit four	3/4
25	Z	Capital letter Z	5/10	57	5	Digit five	3/5
26	a	Small letter a	6/1	58	6	Digit six	3/6
27	b	Small letter b	6/2	59	7	Digit seven	3/7
28	c	Small letter c	6/3	60	8	Digit eight	3/8
29	d	Small letter d	6/4	61	9	Digit nine	3/9
30	e	Small letter e	6/5	62	-	Hyphen/minus	2/13
31	f	Small letter f	6/6	63	_	Low line / underscore / underline	5/15
Intentionally left blank			N/A		=	Equals (pad character)	3/13

✓ **Note 1:** The permitted characters for use with AI (8030) Digital Signature (DigSig) are the GS1 encodable character set 64 (file-safe / URI-safe base64) ordered alphabet as defined in section 5 of RFC 4648, which consists of the upper-case letters A-Z, lower-case letters a-z, digits 0-9, hyphen (-), low line/underscore/underline (_) and the equals character (=) as a special pad character (Figure 7.11-3).

These 65 characters – a total of 64 characters and the special pad character – are a subset of the GS1 AI encodable character set 82 (Figure 7.11-1). A maximum length of 90 characters corresponds to a maximum capacity of 540 bits. It is recommended to strip the Base64 pad character (=) in accordance with section 5 of RFC 4648, since the binary length of the ISO/IEC 20248 data construct is calculated. Although a Digital Signature (DigSig) AI (8030) value may contain a Base64 pad character (=), it can be removed without causing any loss of information. When expressed within the query string of a GS1 Digital Link URI, the Base64 pad character (=) SHOULD be removed, in accordance with section 5 of RFC 4648, however if it is required, the Base64 pad character SHALL be percent-encoded, as defined in RFC 3986.

Note also that these characters are not freely chosen by the user but are instead a compact representation of a binary value for the calculated ISO/IEC 20248 data construct which contains the digital signature, expressed using one file-safe/URI-safe base64 character per 6 bits.

Commented [PD16]: Changes made as errata on WR-23-126

7.12 Determination of century in dates

Element strings are available for the following types of dates:

- Production date: AI (11).
- Due date: AI (12).
- Packaging date: AI (13).
- Best before date: AI (15).
- Sell by date: AI (16).
- Expiration date: AI (17).
- Expiration date and time: AI (7003).
- First freeze date: AI (7006).



Term	Definition
Character Set 39	A subset of characters found in <i>ISO 646</i> : Unique Graphic Character Allocations which includes numeric, alphabetic upper-case, plus the characters "#", "-", and "/".
Character Set 64 (file-safe / URI-safe base64)	A subset of characters found in ISO 646: Unique Graphic Character Allocations and defined by section 5 of RFC4648 as a URI and filename safe base64 alphabet, which includes numeric, alphabetic upper-case and lower-case, plus the characters "-", "_", and ".". The "=" character is used as a special pad character and has no assigned value. The file-safe URI-safe base64 alphabet is used to represent binary data as compact alphanumeric strings, each character corresponding to a 6-bit value in the range 0-63.
Character Set 82	A subset of characters found in <i>ISO 646</i> : 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.
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 (GS1 Digital Link URI)	Data Matrix encoding data using the uncompressed form of GS1 Digital Link URI syntax.
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.
Digital Signature (DigSig)	ISO/IEC 20248 defines a data construct for encoding a digital signature within a data carrier, providing a method to authenticate barcode and RFID data. It also provides a method to link the barcode and RFID data to the labelled/tagged object. The ISO/IEC 20248 data construct which contains a X.509 digital signature is known as a DigSig. "digital signature" in lower case refers to digital signatures in general, whilst "Digital Signature" with capitals, is a named thing with the specific meaning of "DigSig".



Term	Definition
digital signature	A digital signature is a compact fingerprint of data that supports tamper-detection and non-repudiation by the party who digitally signed the data. A digital signature is constructed by hashing the data then encrypting the hash using the private key. This enables independent verification by anyone, using the public key.
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	A trade item that comprises a variable composition of a fixed total count of two or more different trade items, each identified with a GTIN.
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.
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.
general retail products	All trade items that cross point-of-sale.