



**International
Standard**

ISO/IEC 19988

**Information technology — GS1 Core
Business Vocabulary (CBV)**

*Technologies de l'information — Vocabulaire normatif relatif aux
activités de base GS1*

**Third edition
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Foreword

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This document was prepared by GS1 [as the Core Business Vocabulary (CBV) Standard, Release 2.0] and drafted in accordance with its editorial rules. It was adopted, under the JTC 1 PAS procedure, by Joint Technical Committee ISO/IEC JTC 1, *Information technology*.

This third edition cancels and replaces the second edition (ISO/IEC 19988:2017), which has been technically revised.

The main changes are as follows:

- support for GS1 Web Vocabulary, URI semantic equivalence by means of owl:sameAs relationships;
- new "How" event dimension;
- overview of EPCIS event "dimensions" with cross-references to relevant sections in EPCIS (ISO/IEC 19987) and CBV (this document);
- new Persistent Disposition indicating non-transient business state of an object;
- use of new prefix 952 in all examples;
- new business step values: `sampling`, `sensor_reporting`;
- clarified definitions of business step values: `commissioning`, `encoding`, `inspecting`, `removing`;

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- addition of new disposition values: available, completeness_verified, completeness_inferred, conformant, container_open, mismatch_instance, mismatch_class, mismatch_quantity, needs_replacement, non_conformant, unavailable;
- clarified definition and example of disposition value in_progress, recommending omission;
- deprecated disposition value: no_pedigree_match;
- new business transaction types cert, testprd, testres, upevt;
- clarified definition of business transaction type poc to make it clear that Purchase Order Confirmation is also used to represent Sales Order;
- sensor measurement types now supported;
- clarification of HTTPS URLs as a recommended approach alongside HTTP URLs;
- introduced support for constrained set of GS1 Digital Link URIs supported alongside generic HTTP URIs for identification of object instance, class, location, business transaction, source/destination, and transformation;
- clarification preference for PGLN to identify owning and possessing parties;
- introduction of Hash URI as business transaction identifier;
- introduction of EPCIS Event Hash ID as an event Identifier;
- introduction of chemical substance identifiers;
- introduction of microorganism identifiers;
- restriction of date types to specific subset of W3C primitive datatypes;
- extended support for QNames to express master data attributes;
- incorporation of additions published previously as CBVCNs 17-339 (Tax ID), 18-108 (Fish Attributes);
- inclusion of certification attributes in Certification List;
- additionalTradeItemId now as additionalTradeItemList;
- deprecation of latitude and longitude from location/party master data;
- addition of geoLocation and geoFence to location/party master data;
- addition of AdditionalPartyIDList;
- example event data moved to machine-readable artefacts;
- introduction of <https://ref.gs1.org/cbv> namespace, to underpin CBV 2.0 support for Linked Data.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html and www.iec.ch/national-committees.

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1 Introduction – Core Business Vocabulary

This GS1 standard defines the Core Business Vocabulary (CBV). The goal of this standard is to specify various vocabulary elements and their values for use in conjunction with the EPCIS standard [EPCIS2.0], which defines mechanisms to exchange information both within and across organisation boundaries. [EPCIS and the CBV are developed, maintained and published by GS1; EPCIS and the CBV are also published within ISO's PAS process as ISO/IEC 19987 and ISO/IEC 19988, respectively.](#) The vocabulary identifiers and definitions in this standard will ensure that all parties who exchange EPCIS data using the CBV will have a common understanding of the semantic meaning of that data.

This standard is intended to provide a basic capability that meets the above goal. In particular, this standard is designed to define vocabularies that are *core* to the EPCIS abstract data model and are applicable to a broad set of business scenarios common to many industries that have a desire or requirement to share data. This standard intends to provide a useful set of values and definitions that can be consistently understood by each party in the supply chain.

Additional end user requirements may be addressed by augmenting the vocabulary elements herein with additional vocabulary elements defined for a particular industry or a set of users or a single user. Additional values for the standard vocabulary types defined in this standard may be included in follow-on versions of this standard.

This standard includes identifier syntax and specific vocabulary element values with their definitions for these *Standard Vocabularies*:

- Business step identifiers
- Disposition identifiers
- Business transaction types
- Source/Destination types
- Error reason identifiers
- Sensor measurement types
- Sensor alert types

This standard provides identifier syntax options for these *User Vocabularies*:

- Objects
- Locations
- Business transactions
- Source/Destination identifiers
- Transformation identifiers
- Event identifiers
- Chemical substance identifiers
- Microorganism identifiers

This standard provides *Master Data Attributes and Values* for describing Physical Locations including:

- Site Location
- Sub-Site Type
- Sub-Site Attributes
- Sub-Site Detail

Additional detailed master data regarding locations (addresses, etc.) are not defined in this standard.

2 Relationship to the GS1 System Architecture

The CBV is a companion standard to the EPCIS standard. EPCIS is the standard that defines the technical interfaces for capturing and sharing event data. EPCIS defines a framework data model for event data. The CBV is a GS1 *data standard* that supplements that framework by defining specific data values that may populate the EPCIS data model. As such, the CBV exists in the "Share" group of GS1 standards.

3 Relationship to EPCIS

This section specifies how the CBV standard relates to the EPCIS standard.

3.1 EPCIS event structure

The EPCIS 2.0 standard [EPCIS2.0] specifies the data elements in an EPCIS event. The following lists these data elements, and indicates where the CBV provides identifiers that may be used as values for those data elements.

- **The "what" dimension** contains (for most event types) one or more unique identifiers for physical or digital objects or classes of physical or digital objects. Identifiers for physical or digital objects are specified in section 8.2 and 8.3. In the case of an EPCIS `TransformationEvent`, an optional `TransformationID` may be used to link together multiple events that describe the same transformation. `TransformationIDs` are included in section 8.8.
- **The "when" dimension** reflects the moment in time at which an EPCIS event occurred. Event time is fully specified in the EPCIS standard.
- **The "where" dimension** consists of two identifiers that describe different aspects of where an event occurred:
 - **Read Point** (`readPoint`): The location where the EPCIS event took place. In the case of an EPCIS event arising from reading a barcode or RFID tag, the Read Point is often the location where the barcode or RFID tag was read. Identifiers for read points are specified in section 8.3.
 Example: A reader is placed at dock door #3 at the London Distribution Centre (DC). Product passed through the dock door. Read point = <The identifier that stands for London,DC Dock Door #3>
 - **Business Location** (`bizLocation`): The location where the subject of the event is assumed to be following an EPCIS event, until a new event takes place that indicates otherwise. Identifiers for business locations are specified in section 8.3.
 Example: A product is read through the sales floor transition door at store #123. The product is now sitting on the sales floor. Business location = <The identifier that stands for store #123 Sales Floor>
- **The "why" dimension** provides business process information associated with the event, including the business process step that "triggered" the event's capture:
 - **Business Step** (`bizStep`): Denotes a specific activity within a business process. The business step field of an event specifies what business process step was taking place that caused the event to be captured. Identifiers for business steps are specified in section 7.1.
 Example: an EPCIS event is generated as a product departs the location identified by the Read Point. Business Step = <The identifier that denotes "shipping">
 - **Disposition** (`disposition`): Denotes the business state of an object. The disposition field of an event specifies the business condition of the subject of the event (the things specified in the "what" dimension), subsequent to the event. The disposition is assumed to hold true until another event indicates a change of disposition. Identifiers for dispositions and persistent dispositions (see below) are specified in section 7.2.

Example: an EPCIS event is generated and afterward the products can be sold as-is and customers can access product for purchase. `Disposition = <The identifier that denotes "sellable and accessible">`

- **Persistent Disposition** (`persistentDisposition`): Denotes the *persistent* business state of an object. The `persistentDisposition` field of an event is used to `set` or `unset` the business condition of the subject of the event (the things specified in the "what" dimension), subsequent to the event. Unlike the disposition, the `persistentDisposition` is not overridden by subsequently set dispositions or persistent dispositions, and can only be negated or rescinded by being explicitly `unset`. Identifiers for dispositions and persistent dispositions are specified in section [7.2](#).

Example: an EPCIS event is generated to infer the presence of children still aggregated to their parent (i.e., not yet unpacked nor physically scanned) `persistentDisposition = <The identifier that denotes "completeness inferred">`

- **Business Transaction References:** An EPCIS event may refer to one or more business transaction documents. Each such reference consists of two identifiers:
 - **Business Transaction Type:** Denotes a particular kind of business transaction. *Example: the identifier that denotes "purchase order".* Identifiers for business transaction types are specified in section [7.4](#).
 - **Business Transaction Identifier:** Denotes a specific business transaction document of the type indicated by the Business Transaction Type. *Example: <The identifier that denotes Example Corp purchase order #123456>* Identifiers for business transactions are specified in section [8.5](#).
- **Source and Destination References:** An EPCIS event may refer to one or more sources and/or destinations that describe the endpoints of a business transfer of which the event is a part. Each source or destination reference consists of two identifiers:
 - **Source or Destination Type:** Denotes a particular kind of source or destination. *Example: the identifier that denotes "owning party".* Identifiers for source and destination types are specified in section [7.4](#).
 - **Source or Destination Identifier:** Denotes a source or destination of the type indicated by the Business Transaction Type. *Example: <The identifier that denotes Example Corp as an owning party>* Identifiers for sources and destinations are specified in section [8.6](#).
- **The "how" dimension** contains the `SensorElementList` of one or more `SensorElements`, which is used to express conditional information about an object or physical location, as captured by associated sensors. Each `SensorElement` contains:
 - one or more `sensorReport` elements, including one or more attributes that pertain to a specific sensor observation;
 - an optional `sensorMetadata` element, including one or more meta data attributes that apply to all `sensorReport` elements within the same `SensorElement`.

The `SensorElement` provides a rich and flexible framework to convey all kind of sensor-based data, from simple physical observations via multi-dimensional observations to outputs of smart sensor devices. This can include, but is not limited to, information on the concentration of chemical substances and microorganisms.

3.2 Overview of EPCIS event "dimensions" (non-normative)

Dimension in EPCIS/CBV 1.x	Categorisation in EPCIS/CBV 2.0	Field	EPCIS section in which the field is defined	CBV section in which its value range is specified			
WHAT	Objects in Focus (WHAT) 	EPCIS Plans	epcList	7.4.2 ObjectEvent 7.4.4 TransactionEvent	EPC Tag Data Standard (TDS) section 6, "EPC URI"		
			parentID	7.4.3 AggregationEvent 7.4.4 TransactionEvent 7.4.6 AssociationEvent		8.2 Physical or Digital Objects (Instance)	
			childEPCs	7.4.3 AggregationEvent 7.4.6 AssociationEvent			
			inputEPCList	7.4.5 Transformation Event			
			outputEPCList				
			EPCIS Classes	quantityList	7.4.2 ObjectEvent 7.4.5 TransactionEvent		EPC Tag Data Standard (TDS) section 8, "URIs for EPC Pure Identity Patterns"
				childQuantityList	7.4.3 AggregationEvent 7.4.6 AssociationEvent	8.3 Physical or Digital Objects (Class)	
				inputQuantityList	7.4.5 Transformation Event		
				outputQuantityList			

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Dimension in EPCIS/CBV 1.x	Categorisation in EPCIS/CBV 2.0	Field	EPCIS section in which the field is defined	CBV section in which its value range is specified
WHEN	Chronology (WHEN) 	eventTime	7.4.1 EPCISEvent	
		eventTimeZoneOffset		
		recordTime	7.4.1 EPCISEvent	
WHERE	Whereabouts (WHERE) 	readPoint	7.4.2 ObjectEvent	8.4 Locations
		bizLocation	7.4.3 AggregationEvent 7.4.4 TransactionEvent 7.4.5 TransformationEvent 7.4.6 AssociationEvent	
n/a	Condition (HOW) 	sensorElementList	7.4.2 ObjectEvent 7.4.3 AggregationEvent 7.4.4 TransactionEvent 7.4.5 TransformationEvent 7.4.6 AssociationEvent	7.6 Sensor Measurement Types 8.9 Chemical substance identifiers 8.10 Microorganism identifiers
WHY	Business Context (WHY)	bizStep	7.4.2 ObjectEvent	7.1 Business Steps
		bizTransactionList	7.4.3 AggregationEvent	8.5 Business Transactions

Dimension in EPCIS/CBV 1.x	Categorisation in EPCIS/CBV 2.0	Field	EPCIS section in which the field is defined	CBV section in which its value range is specified
		disposition	7.4.4 TransactionEvent	7.1 Dispositions
		persistentDisposition	7.4.5 TransformationEvent	7.1 Dispositions
		sourceList	7.4.6 AssociationEvent	8.6 Source/Destination Identifiers
		destinationList		
	Other fields	ilmd	7.3.7 Instance/lot master data (ILMD)	9 Trade Item Master Data
(core field)		action	7.3.2 Action type	
(transformationID)		transformationID	7.4.5 TransformationEvent	8.7 Transformation Identifiers
(core field)		eventID	7.4.1 EPCISEvent	8.8 Event Identifiers
(core field)		errorDeclaration	7.4.1 EPCISEvent	7.5 Error Reason Identifiers 8.8 Event Identifiers

3.3 Vocabulary kinds

(The material in this section is adapted directly from [EPCIS], section 6.2.)

Vocabularies are used extensively within EPCIS to model conceptual, physical, and digital entities that exist in the real world.

Examples of vocabularies defined in the EPCIS standard are business steps, dispositions, location identifiers, physical or digital object identifiers, business transaction type names, and business transaction identifiers. In each case, a vocabulary represents a finite (though open-ended) set of alternatives that may appear in specific fields of events.

It is useful to distinguish two kinds of vocabularies, which follow different patterns in the way they are defined and extended over time:

- **Standard Vocabulary:** A Standard Vocabulary is a set of Vocabulary Elements whose definition and meaning must be agreed to in advance by trading partners who will exchange events using the vocabulary.
- **User Vocabulary:** A User Vocabulary is a set of Vocabulary Elements whose definition and meaning are under the control of a single organisation.

These concepts are explained in more detail below.

3.3.1 Standard Vocabulary

A Standard Vocabulary is a set of Vocabulary Elements whose definition and meaning must be agreed to in advance by trading partners who will exchange events using the vocabulary. For example, the EPCIS standard defines a vocabulary called "business step," whose elements are identifiers denoting such things as "shipping," "receiving," and so on. One trading partner may generate an event having a business step of "shipping," and another partner receiving that event through a query can interpret it because of a prior agreement as to what "shipping" means.

Standard Vocabulary elements tend to be defined by organisations of multiple end users, such as GS1, industry consortia outside GS1, private trading partner groups, and so on. The master data associated with Standard Vocabulary elements, if any master data is defined at all, are defined by those same organisations, and tend to be distributed to users as part of a standard or by some similar means. New vocabulary elements within a given Standard Vocabulary tend to be introduced through a very deliberate and occasional process, such as the ratification of a new version of a standard or through a vote of an industry group.

The Standard Vocabularies specified in the CBV are: sections [7.1 \(Business steps\)](#), [7.2 \(Dispositions\)](#), [7.3 \(Business Transaction Types\)](#), [7.4 \(Source/Destination types\)](#), [7.5 \(Error reason identifiers\)](#), [7.6 \(Sensor measurement types\)](#), [7.7 \(Sensor alert types\)](#) and [7.8 \(Sensor report component type\)](#). The elements and definitions are agreed to by parties prior to exchanging data, and there is general agreement on their meaning.

Example: the following are two different ways of expressing a business step identifier, as defined in section [7.1](#) :

urn:epcglobal:cbv:bizstep:receiving

<https://ref.gs1.org/cbv/Bizstep-receiving>

This identifier is defined by the GS1 CBV standard, and its meaning is known and accepted by those who implement the standard. For each of the identifiers defined, equivalent terms and values are also included in the [GS1 Web Vocabulary](#) published at <https://www.gs1.org/voc/>. [Both URI structures are considered to be semantically equivalent via an owl:sameAs relationship.](#)

While an individual end user organisation acting alone may introduce a new Standard Vocabulary element, such an element would have limited use in a data exchange setting, and would probably only be used within an organisation's four walls. On the other hand, an industry consortium or other group of trading partners may define and agree on standard vocabulary elements beyond those defined by the CBV, and these may be usefully used within that trading group.

3.3.2 User Vocabulary

A User Vocabulary is a set of Vocabulary Elements whose definition and meaning are under the control of a single organisation. For example, the EPCIS standard defines a vocabulary called "business location," whose elements are identifiers denoting such things as "Acme Corp. Distribution Centre #3." The location identifier and any associated master data is assigned by the user. Acme Corp may generate an event whose business location field contains the identifier that denotes "Acme Corp. Distribution Centre #3," and another partner receiving that event through a query can interpret it either because the partner recognises the identifier as being identical to the identifier received in other events that took place in the same location, or because the partner consults master data attributes associated with the location identifier, or both.

Example:

urn:epc:id:sgln:9521414.12345.400

This identifier is assigned by the End User who has been assigned the GS1 Company Prefix 9521414, and the meaning of the identifier (that is, what location it denotes) is determined exclusively by that end user. Another End User can understand the meaning of this identifier by consulting associated master data.

User Vocabulary elements are primarily defined by individual end user organisations acting independently. The master data associated with User Vocabulary elements are typically defined by those same organisations, and are usually distributed to trading partners through the EPCIS Query Interface or other data exchange / data synchronisation mechanisms. New vocabulary elements within a given User Vocabulary are introduced at the sole discretion of an end user, and trading partners must be prepared to respond accordingly.

While the CBV does not (and as the discussion above makes clear, cannot) specify particular user vocabulary elements, the CBV does provide syntax templates that are recommended for use by End Users in constructing their own user vocabulary elements. See section [8.1](#). The user vocabularies for which templates are specified in this standard are: [8.2 \(Physical or digital objects \(Instance-Level Identification\)\)](#) and [8.4 \(Locations\)](#) which include both read points and business locations [8.5 \(Business transactions\)](#), [8.7 \(Source/Destination identifiers\)](#), [8.8 \(Transformation identifiers\)](#), [8.9 \(Event identifiers\)](#), [8.10 \(Chemical substance identifiers\)](#) and [8.11 \(Microorganism identifiers\)](#).

4 Terminology and typographical conventions

Within this standard, the terms SHALL, SHALL NOT, SHOULD, SHOULD NOT, MAY, NEED NOT, CAN, and CANNOT are to be interpreted as specified in section 7 ("*Verbal forms for expressions of provisions*") of the ISO/IEC Directives, Part 2, 2018, 8th edition [ISODir2]. When used in this way, these terms will always be shown in ALL CAPS; when these words appear in ordinary typeface they are intended to have their ordinary English meaning.

All sections of this document, with the exception of sections [2](#), [3](#) and [3](#) are normative, except where explicitly noted as non-normative.

The following typographical conventions are used throughout the document:

- ALL CAPS type is used for the special terms from [ISODir2] enumerated above.
- Monospace type is used to denote programming language, UML, XML and JSON/JSON-LD identifiers, as well as for the text of XML and JSON/JSON-LD documents.

5 Compliance and compatibility

The CBV is designed to facilitate interoperability in EPCIS data exchange by providing standard values for vocabulary elements to be included in EPCIS data. The standard recognises that the greatest interoperability is achieved when all data conforms to the standard, and also recognises that individual End Users or groups of trading partners may need to extend the standard in certain situations.

To that end, this standard defines two levels of conformance for EPCIS documents:

- **CBV-Compliant:** An EPCIS document that only uses vocabulary identifiers specified in the CBV in the standard fields of EPCIS events.
- **CBV-Compatible:** An EPCIS document that uses a combination of vocabulary identifiers specified in the CBV and other identifiers that are outside the standard.

An EPCIS document is neither CBV-Compliant nor CBV-Compatible if it wrongly uses identifiers defined in the CBV or if it violates any other rules specified herein.

The formal definition of these terms is specified below.

5.1 CBV-Compliant

A "CBV-Compliant Document" is a document that conforms to the schema and other constraints specified in [EPCIS2.0], and which furthermore conforms to all the normative language in this standard that pertains to a "CBV-Compliant Document."

A "CBV-Compliant Application" is any application for which both of the following are true:

- If it operates in a mode where it claims to accept a CBV-Compliant Document as an input, the application SHALL accept any document that is a CBV-Compliant Document according to this standard, and furthermore in processing that input SHALL interpret each CBV identifier according to the meaning specified herein.
- If it operates in a mode where it claims to produce a CBV-Compliant Document as an output, the application SHALL only produce a document that is a CBV-Compliant Document according to this standard, and furthermore in generating that output SHALL only use CBV identifiers to denote their meaning as specified herein.

The following list summarises the requirements for an EPCIS document to be a "CBV-Compliant Document," as specified elsewhere in this standard:

- A CBV-Compliant Document SHALL conform to the schema and other constraints specified in [EPCIS 2.0].
- A CBV-Compliant Document SHALL NOT use any URI beginning with `urn:epcglobal:cbv:` except as specified in this standard.
- Each EPCIS event in a CBV-Compliant Document SHALL include a `bizStep` field. The value of the `bizStep` field SHALL be a URI consisting of one of the following two prefixes:
 - `urn:epcglobal:cbv:bizstep:`
 - `https://ref.gs1.org/cbv/BizStep-`

followed by the string specified in the first column of some row of the table in section 7.1.3. These two URI structures are considered to be semantically equivalent via an `owl:sameAs` relationship.

- A CBV-Compliant Document MAY include a `disposition` field. If the `disposition` field is present, the value of the `disposition` field SHALL be a URI consisting of one of the following two prefixes:
 - `urn:epcglobal:cbv:disp:`
 - `https://ref.gs1.org/cbv/Disp-`

followed by the string specified in the first column of some row of the table in section 7.2.3. These two URI structures are considered to be semantically equivalent via an `owl:sameAs` relationship.

- A CBV-Compliant Document MAY include a `persistentDisposition` field. If the `persistentDisposition` field is present, the value of the `disposition` field SHALL be a URI consisting of one of the following two prefixes:
 - `urn:epcglobal:cbv:disp:`
 - `https://ref.gs1.org/cbv/Disp-`

followed by the string specified in the first column of some row of the table in section 7.2.3. These two URI structures are considered to be semantically equivalent via an `owl:sameAs` relationship.

- Each EPCIS event in a CBV-Compliant Document MAY include one or more `bizTransaction` elements. If `bizTransaction` elements are present, each such element MAY include a `type` attribute. If a given `bizTransaction` element includes a `type` attribute, the value of the `type` attribute SHALL be a URI consisting of one of the following two prefixes:
 - `urn:epcglobal:cbv:btt:`
 - `https://ref.gs1.org/cbv/BTT-`

followed by the string specified in the first column of some row of the table in section [7.3.3](#). These two URI structures are considered to be semantically equivalent via an owl:sameAs relationship.

- Each EPCIS event in a CBV-Compliant Document MAY include one or more `source` or `destination` elements. The value of the `type` attribute of each such element SHALL be a URI consisting of one of the following two prefixes:

- `urn:epcglobal:cbv:sdt:`
- `https://ref.gs1.org/cbv/SDT-`

followed by the string specified in the first column of some row of the table in section [7.4.3](#). These two URI structures are considered to be semantically equivalent via an owl:sameAs relationship.

- Each EPCIS event in a CBV-Compliant Document MAY include an `ErrorDeclaration` element, and when present, the `ErrorDeclaration` element MAY include a `reason` field. When present in a CBV-Compliant Document, the value of the `reason` field of the `ErrorDeclaration` element SHALL be a URI consisting of one of the following two prefixes:

- `urn:epcglobal:cbv:er:`
- `https://ref.gs1.org/cbv/ER-`

followed by the string specified in the first column of some row of the table in section [7.5.3](#). These two URI structures are considered to be semantically equivalent via an owl:sameAs relationship.

- URIs defined in the EPC Tag Data standard SHALL only be used in a CBV-Compliant Document as specified in section [5.1](#).
- A CBV-Compliant document SHALL use one of the URI forms specified in section [8.2](#) to populate instance-level identifiers in the “what” dimension of EPCIS events (that is, the `epcList`, `parentID`, `childEPCs`, `inputEPCList`, and `outputEPCList` fields in `EPCIS ObjectEvents`, `AggregationEvents`, `TransactionEvents`, `TransformationEvents` and `AssociationEvents`), for every such field that is not null. A CBV-Compliant document SHOULD use the either the EPC URI form as specified in section [8.2.1](#) or the GS1 Digital Link URI form specified in section [8.2.2](#) unless there is a strong reason to do otherwise.
- A CBV-Compliant document SHALL NOT use an SGLN EPC (`urn:epc:id:sgln:...`) or PGLN (`urn:epc:id:pgl:...`) as an object identifier.
- A CBV-Compliant document SHALL use one of the URI forms specified in section [8.3](#) to populate class-level identifiers in the “what” dimension of EPCIS events (that is, the `epcClass` fields in all EPCIS event types), for every such field that is not null. A CBV-Compliant document SHOULD use the EPC URI form as specified in section [8.3.1](#) or the GS1 Digital Link URI form specified in section [8.7.2](#) unless there is a strong reason to do otherwise.
- A CBV-Compliant document SHALL use one of the URI forms specified in section [8.4](#) to populate the “where” dimension of EPCIS events (that is, the `readPoint` and `bizLocation` fields in all EPCIS event types), for every such field that is not null. A CBV-Compliant document SHOULD use the EPC URI form as specified in section [8.4.1](#) or the GS1 Digital Link URI form specified in section [8.4.2](#) unless there is a strong reason to do otherwise.
- When using an EPC URI as a location identifier (section [8.4.1](#)), a CBV-Compliant document SHOULD NOT use EPC schemes other than SGLN (`urn:epc:id:sgln:...`), unless there is a strong reason to do so.
- A CBV-Compliant document SHALL use one of the URI forms specified in section [8.7](#) to populate the business transaction identifier field (that is, the text content of the `bizTransaction` element) of EPCIS events, for every such field that is not null.
- When using an EPC URI as a business transaction identifier, a CBV-Compliant Documents SHOULD NOT use EPC schemes other than GDTI EPCs

(urn:epc:id:gdti:...) or GSRN EPCs (urn:epc:id:gsrcn:...), unless there is a strong reason to do so. GDTI EPCs SHOULD only be used as business transaction identifiers when they have been assigned to denote a business transaction, rather than a physical document not connected with any business transaction.

- A CBV-Compliant document SHALL use one of the URI forms specified in section 8.7 to populate a source or destination identifier field (that is, the text content of a source or destination element), for every such field that is not null. A CBV-Compliant document SHOULD use the EPC URI form as specified in section 8.7.1 or the GS1 Digital Link URI form specified in section 8.7.2 unless there is a strong reason to do otherwise.
- When using an EPC URI as a source or destination identifier (section 8.7.1), a CBV-Compliant document SHOULD NOT use EPC schemes other than SGLN (urn:epc:id:sgln:...) or PGLN (urn:epc:id:pqln:...), unless there is a strong reason to do so.
- A CBV-Compliant document SHALL use one of the URI forms specified in section 8.8 to populate the transformation identifier field (that is, the text content of the transformationID element) of EPCIS TransformationEvents, for every such field that is not null.
- A CBV-Compliant document SHALL use one of the URI forms specified in section 8.9 to populate the event identifier field (that is, the text content of the eventID element) of an EPCIS event, whenever that field is not null.

5.2 CBV-Compatible

A “CBV-Compatible Document” is a document that conforms to the schema and other constraints specified in [EPCIS2.0], and which furthermore conforms to all the normative language in this standard that pertains to a “CBV-Compatible Document.”

A “CBV-Compatible Application” is any application for which both of the following are true:

- If it operates in a mode where it claims to accept a CBV-Compatible Document as an input, the application SHALL accept any document that is a CBV-Compatible Document according to this standard, and furthermore in processing that input SHALL interpret each CBV identifier according to the meaning specified herein.
- If it operates in a mode where it claims to produce a CBV-Compatible Document as an output, the application SHALL only produce a document that is a CBV-Compatible Document according to this standard, and furthermore in generating that output SHALL only use CBV identifiers to denote their meaning as specified herein.

The following list summarises the requirements for an EPCIS document to be a “CBV-Compatible Document,” as specified elsewhere in this standard.

- A CBV-Compatible Document SHALL conform to the schema and other constraints specified in [EPCIS2.0].
- A CBV-Compatible Document SHALL NOT use any URI beginning with urn:epcglobal:cbv: except as specified in this standard.
- URIs defined in the EPC Tag Data standard SHALL only be used in a CBV-Compatible Document as specified in section 5.2.
- A CBV-Compatible Document SHOULD use the EPC URI form as specified in section 8.2.1 for each instance-level object identifier unless there is a strong reason to do otherwise.
- A CBV-Compatible Document SHOULD use the EPC URI form as specified in section 8.3.1 for each class-level object identifier unless there is a strong reason to do otherwise.
- A CBV-Compatible Document SHALL NOT use an SGLN EPC (urn:epc:id:sgln:...) or a PGLN (urn:epc:id:pqln:...) as an object identifier.
- A CBV-Compatible Document SHOULD use the EPC URI form as specified in section 8.4.1 for each location identifier unless there is a strong reason to do otherwise.

- When using an EPC URI as a location identifier (section 8.4.1), a CBV-Compatible Document SHOULD NOT use EPC schemes other than SGLN (`urn:epc:id:sgln:...`), unless there is a strong reason to do so.
- When using an EPC URI as a business transaction identifier, a CBV-Compatible Document SHOULD NOT use EPC schemes other than GDTI EPCs (`urn:epc:id:gdti:...`) or GSRN EPCs (`urn:epc:id:gsrc:...`), unless there is a strong reason to do so. GDTI EPCs SHOULD only be used as business transaction identifiers when they have been assigned to denote a business transaction, rather than a physical document not connected with any business transaction.
- When using an EPC URI as a source or destination identifier (section 8.7.1), a CBV-Compatible document SHOULD NOT use EPC schemes other than SGLN (`urn:epc:id:sgln:...`), unless there is a strong reason to do so.

In general, every CBV-Compliant Document is also a CBV-Compatible Document, though not every CBV-Compatible Document is a CBV-Compliant Document. A CBV-Compatible Document may include an identifier that is compliant with [EPCIS2.0] but which is not permitted for CBV-Compliant Documents, provided that it meets the requirements above. A CBV-Compatible Document may also include an event in which the `bizStep` field is omitted, whereas that field is always required for CBV-Compliant Documents.

6 Use of Uniform Resource Identifiers (URIs)

This section specifies general rules that apply to all uses of URIs in this standard.

6.1 URI prefix for Standard Vocabularies in the CBV

All URIs for standard vocabulary elements specified in the CBV have one of the following two syntaxes:

- `urn:epcglobal:cbv:qualifier:payload`
- `https://ref.gs1.org/cbv/qualifier-payload`

where the `qualifier` denotes the type of the vocabulary the vocabulary element belongs to and `payload` the vocabulary element unambiguously identifies an element of the vocabulary.

6.2 Limitation on Use of the `epcglobal` URN prefix

The CBV is the only GS1 standard in which URIs beginning with `urn:epcglobal:cbv:` are defined.

A CBV-Compliant or CBV-Compatible document SHALL NOT use any URI beginning with `urn:epcglobal:cbv:` or `urn:epc:` except as specified in this standard.

Both CBV-Compliant and CBV-Compatible documents MAY contain URIs that do not begin with `urn:epcglobal:cbv:`, provided that the requirements specified elsewhere in this standard are met. These SHALL be used to identify vocabulary elements not defined by the CBV standard. URIs beginning with `urn:epcglobal:` SHALL NOT be used except as specified herein or in another GS1 standard.

6.2.1 Example of limitation of use of `epcglobal` URN prefix (non-normative)

- ❗ Suppose a user needs a new disposition value to stand for "quarantined." The user may NOT use the following URI:

```
urn:epcglobal:cbv:disp:quarantined
```

In this case the particular URI above is NOT part of this standard and therefore may not be used. Instead a URI like the following could be used and considered CBV-Compatible. However, it must be noted that this vocabulary would have limited

meaning to supply chain participants receiving this unless a prior understanding had been established.

`https://epcis.example.com/disp/quarantined`

7 Standard Vocabularies

This section specifies standard vocabulary elements for four EPCIS standard vocabularies: business steps, dispositions, business transaction types, and source/destination types.

7.1 Business steps

This section specifies standard identifiers for the EPCIS `BusinessStepID` vocabulary. For each of the identifiers defined, equivalent terms and values are also included in the [GS1 Web Vocabulary](https://www.gs1.org/voc/) published at <https://www.gs1.org/voc/>.

These identifiers populate the `bizStep` field in an EPCIS event, as specified below.

7.1.1 URI structure

All business step values specified in this section have one of the following two forms:

- `urn:epcglobal:cbv:bizstep:payload`
- `https://ref.gs1.org/cbv/Bizstep-payload`

where the `payload` part is a string as specified in the next section. Every payload string defined here contains only lower case letters and the underscore character.

[Both URI structures are considered to be semantically equivalent via an owl:sameAs relationship.](#)

7.1.2 Compliant usage

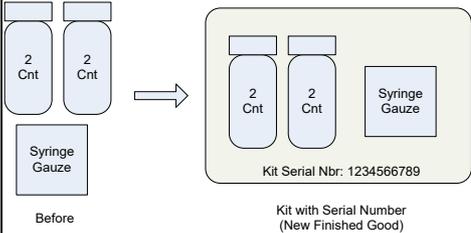
Each EPCIS event in a CBV-Compliant Document SHOULD include a `bizStep` field, and the value of the `bizStep` field SHALL be a URI consisting of one of the following two prefixes:

- `urn:epcglobal:cbv:bizstep:`
- `https://ref.gs1.org/cbv/Bizstep-`

followed by the string specified in the first column of some row of the table in section 7.1.3 below. The portion following the prefix SHALL be written exactly as specified in the table below, in all lowercase letters (possibly including underscores, as indicated).

Each EPCIS event in a CBV-Compatible Document MAY include a `bizStep` field, and the value of the `bizStep` field MAY be a URI as specified above for a CBV-Compliant document, and MAY be any other URI that meets the general requirements specified in [EPCIS2.0], section 6.4, except for those URIs which in this standard are forbidden or designated for a different purpose.

7.1.3 Business step values and definitions

Value	Definition	Examples of use (non-exhaustive)
accepting	Denotes a specific activity within a business process where an object changes possession and/or ownership.	<p>Retailer X unloads a pallet on to the receiving dock. The numbers of cases on the pallet are counted. The pallets are disaggregated from the shipping conveyance. The quantity is verified against the delivery document (Freight Bill or Bill of Lading), notating any over, short or damaged product at the time of delivery. Typically this process releases freight payment and completes the contractual agreement with the carrier of delivering the product/assets to a specified location.</p> <p>A parcel carrier drops off five boxes at Distributor Y's DC. A person on the Receiving Dock signs that they accept the five boxes from the parcel carrier.</p> <p>A wholesaler is assigned a lot of fish at a fish auction, verifies the quantity and acknowledges receipt.</p> <p>A manufacturer's fork lift driver scans the IDs of components which have been removed from a consignment warehouse. In doing so, the components are added to the manufacturer's inventory</p>
arriving	Denotes a specific activity within a business process where an object arrives at a location.	Truckload of a shipment arrives into a yard. Shipment has not yet been received or accepted.
assembling	<p>Denotes an activity within a business process whereby one or more objects are combined to create a new finished product.</p> <p>In contrast to transformation, in the output of assembling the original objects are still recognisable and/or the process is reversible; hence, assembling would be used preferably in an Association Event or, alternatively, an Aggregation Event, but not a Transformation Event.</p>	<p>Computer parts (hard drive, battery, RAM) assembled into a consumer ready computer</p> <p>MRO processes involving components added to an assembly comprised of multiple parts.</p> <p>Healthcare kitting: a surgical kit including drug, syringe, and gauze are combined to create a new 'product': a <i>kit</i></p> 
collecting	Denotes a specific activity within a business process where an object is picked up and collected for future disposal, recycling or re-used.	<p>An organisation picks up disposed consumer electronics in an end of life state from various different organisations. After the goods are picked up, they typically are brought back and received into a Collection Centre</p> <p>Rented or leased pallets are picked up and brought to a collection centre.</p>

Value	Definition	Examples of use (non-exhaustive)
commissioning	<p>Process of associating an instance-level identifier (such as an EPC) with a specific object, or the process of associating a class-level identifier, not previously used, with one or more objects. A tag may have been encoded and applied in this step, or may have been previously encoded.</p> <p><code>commissioning</code> is applied to this association of object and serialised identifier, regardless of industry/sector; it encompasses sector-specific process steps including, but not limited to:</p> <ul style="list-style-type: none"> ▪ catching (of fish) ▪ harvesting (of fruit/vegetable) ▪ picking (of fruit/vegetables) ▪ producing (on an automated line) ▪ slaughtering (of livestock) <p>In the case of a class-level identifier, <code>commissioning</code> differs from <code>creating_class_instance</code> in that <code>commissioning</code> always indicates that this is the first use of the class-level identifier, whereas <code>creating_class_instance</code> does not specify whether the class-level identifier has been used before.</p>	<p>On a packaging line, an encoded EPC is applied to a case and associated to the product.</p> <p>An individual virtual document (e.g. digital coupon, digital voucher, etc.) is assigned an EPC</p> <p>One hundred bottles of a particular batch of pharmaceutical product are produced, those being the first bottles of that batch to be produced.</p> <p>Sides of beef are transformed into individual packaged steaks. This may be a <code>TransformationEvent</code> if the input sides of beef are also tracked.</p>
consigning	<p>Indicates the overall process of <code>staging_outbound</code>, <code>loading</code>, <code>departing</code>, and <code>accepting</code>. It may be used when more granular process step information is unknown or inaccessible.</p> <p>The use of <code>consigning</code> is mutually exclusive from the use of <code>staging_outbound</code>, <code>loading</code>, <code>departing</code>, and <code>accepting</code>.</p> <p>Note: This business step is similar to <code>shipping</code>, but includes a change of possession and/or ownership at the outbound side.</p>	<p>A wholesaler comes aboard a fishing vessel, selects and buys boxes of fish, and brings them to his premises.</p> <p>A manufacturer retrieves components from a consignment warehouse for use in its assembly line. In the logical second of leaving the consignment warehouse, the components pass into the ownership of the manufacturer.</p> <p>A manufacturer stages products for loading, loads them into a container, the container is sealed, and the container departs. Ownership transfers to the receiver sometime during this overall process. If this is done in a single step, then business step <code>consigning</code> is used.</p>
creating_class_instance	<p>Denotes a step in a business process where an instance or increased quantity of a class-level identifier is produced. Unlike <code>commissioning</code>, this business step may be repeated for the same class-level identifier.</p>	<p>Water, sugar, and other ingredients are combined to produce a single batch of soda over a single shift on a single production line. This may be a <code>TransformationEvent</code> if the input ingredients are tracked.</p> <p>Potatoes are sorted by size and quality, washed, and packed into cases of a single lot in a single packaging facility on a single date.</p>
cycle_counting	<p>Process of counting objects within a location in order to obtain an accurate inventory for business needs other than accounting purposes (e.g., replenishment and allocation).</p>	<p>A preselected subset of objects (for instance, all products belonging to a certain brand owner or a specific object class) within a retail store, are counted by a handheld reader.</p> <p>All objects of a specific sub-location (sales floor or a shelf on the sales floor, e.g.) are counted by a handheld reader.</p>

Value	Definition	Examples of use (non-exhaustive)
decommissioning	Process of disassociating an instance-level identifier (such as an EPC) with an object. The object may be re-commissioned at some point in the future – however only with a new instance-level identifier.	An eSeal on a reusable container is broken when the container is opened, so that the container is no longer identified by the instance-level identifier that was in the eSeal. A digital coupon or an empties refund voucher is redeemed at retail point-of-sale
departing	Denotes a specific activity within a business process where an object leaves a location on its way to a destination.	Truckload of a shipment departs a yard, typically through a gate and begins transit to another location
destroying	Process of terminating an object. For an instance-level identifier, the object should not be the subject of subsequent events; subsequent events are likely indicative of error (such as a stray read of a tag inside an incinerator). For a class level identifier, quantities are reduced; however, the class-level identifier may still be used in subsequent events (referring to different instances that were not destroyed).	Distributor or Retailer puts empty case in the incinerator or box crusher.
disassembling	Denotes a specific activity within a business process where an object is broken down into separate, uniquely identified component parts.	Before feeding a consumer electronics end of life item (a computer) into recycling operation line, it is necessary to disassemble the parts for the purpose of being recycled or disposed of in an environmentally sound manner. A surgical kit (e.g. 2- 50 count bottles of medication and 1 syringe gauze) is broken down into its separate component parts
dispensing	Denotes a specific activity within a business process where a product is made available in full or part to a consumer.	A pharmacist dispenses a pharmaceutical to fill a specific prescription written by a physician, to a consumer or patient. A deli manager slices a 5 pound package of turkey for sale.
encoding	Process of writing an instance-level identifier (typically an EPC) to a barcode or RFID tag, where the identifier is not yet associated with an object at this step in the process. Encoding SHOULD only be used in a TransactionEvent.	3rd Party writes tags and returns spool of case tags to Manufacturer
entering exiting	Denotes a specific activity at the Entrance/Exit door of a facility where customers are either leaving with purchased product or entering with product to be returned to the facility.	Customer leaves the facility of Retailer X with their purchased items through a customer entrance/exit door.

Value	Definition	Examples of use (non-exhaustive)
holding	Denotes a specific activity within a business process where an object is segregated for further review.	Retailer X unloads a second pallet on to their receiving dock, and, finding no purchase order for the pallet, moves the pallet to a holding area on the dock Distributor Y obtains a shipment of pharmaceutical product. Distributor Y finds that their supplier cannot provide a complete pedigree. Distributor Y moves the shipment to a quarantine area on their dock. Shipper Z is told by Customs to move a container to a special area until Customs can inspect and clear the container.
inspecting	Process of reviewing objects to address potential physical or documentation defects. In contrast to <i>sampled</i> objects, <i>inspected</i> objects remain viable in the supply chain. <i>Inspecting</i> is non-destructive and typically only checks the plausibility of the product packaging, security devices (e.g. holograms, watermarks, etc.) and integrity of any tamper-evident seals, whereas <i>sampling</i> is always destructive, i.e., makes the sampled product instance no longer viable for sale or onward distribution in the retail/dispensing supply chain).	Manufacturer A pulls 10 bottles from every batch to ensure that the product and pill count in the bottles match expectations Distributor Y checks all returned products to designate them either as saleable or as damaged Regulator R pulls 3 bottles from a shelf to determine if the bottles have a correct pedigree Customs Agent C uses a machine to scan the contents of a shipping container Pallet pool operator Z checks if certain pallets comply with quality standards.
installing	Denotes a specific activity within a business process where an object is put into a composite object (not merely a container). In <i>installing</i> the composite object exists prior to this step, whereas in <i>assembling</i> the composite object is created during the step.	Additional memory chips and a rechargeable battery are installed within a computer A duplexing unit is installed on a laser printer Additional safety equipment is installed within the cabin of an aircraft or vehicle (e.g. fire extinguishers)
killing	Process of terminating an RFID tag previously associated with an object. The object and its instance-level identifier may continue to exist and be the subject of subsequent events (via a barcode, manual data entry, replacement tag, etc.).	Kill Command is issued to the tag to prevent any further reading of the tag or the information on the tag.
loading	Denotes a specific activity within a business process where an object is loaded into shipping conveyance.	Manufacturer A loads pallets into a container. The pallets are aggregated to the container. Distributor Y loads racks full of totes on to a truck
other	A business step not identified by any of the values listed in the CBV.	"Other" may be used for terms that have yet to be added to the CBV from an industry or a user
packing	Denotes a specific activity within a business process that includes putting objects into a larger container – usually for shipping. Aggregation of one unit to another typically occurs at this point.	12 packs of soda are placed into a case Loose potatoes are placed into a tote.
picking	Denotes a specific activity within a business process that includes the selecting of objects to fill an order.	Distributor Y places three units into a tote to meet the requirements of a purchase order Manufacturer A pulls three pallets from its racks to fulfil a purchase order

Value	Definition	Examples of use (non-exhaustive)
receiving	Denotes a specific activity within a business process that indicates that an object is being received at a location and is added to the receiver's inventory. The use of <i>receiving</i> is mutually exclusive from the use of <i>arriving</i> and <i>accepting</i> .	Retailer X confirms that the count of cases on the pallet equals the expected count in a purchase order. Retailer X takes the cases into inventory. Typically, this process matches the product to the purchase order for payment to the supplier. A shipment from a manufacturer factory site to manufacturer distribution centre, is matched against the transaction record then added to local inventory.
removing	Denotes a specific activity within a business process where an object is taken out of a composite object. Opposite of <i>installing</i> .	A defective airplane part is taken out of the engine
repackaging	Denotes a specific activity within a business process where an object's packaging configuration is changed.	Distributor Y receives one box full of batteries and another box full of laptops without batteries. Distributor Y ships out new boxes containing one laptop and one battery.
repairing	Denotes a specific activity within a business process where a malfunctioning product is repaired (typically by a post-sales service), without replacing it by a new one.	A computer is brought to a repair centre to fix a problem An airplane part is in maintenance centre to diagnose an issue
replacing	Denotes a specific activity within a business process where an object is substituted or exchanged for another object.	A defective airplane part is replaced by a new part.
reserving	Process in which a set of instance-level identifiers, not yet commissioned, are provided for use by another party.	Manufacturer provides set of case EPC numbers to a 3rd Party labeller
retail_selling	Denotes a specific activity within a business process at a point-of-sale for the purpose of transferring ownership to a customer in exchange for something of value (currency, credit, etc.).	Retailer X sells a screwdriver to a customer by checking it out through a point-of-sale system.
sampling	Denotes a testing activity within a business process where one or more portions of an object are examined for quality testing, quality inspection, or customs clearance purposes. In contrast to <i>inspected</i> objects, <i>sampled</i> objects are no longer viable in the supply chain. <i>Inspecting</i> is non-destructive and typically only checks the plausibility of the product packaging, security devices (e.g. holograms, watermarks, etc.) and integrity of any tamper-evident seals, whereas <i>sampling</i> is always destructive, i.e., makes the sampled product instance no longer viable for sale or onward distribution in the retail/dispensing supply chain). When a serialised instance undergoes <i>sampling</i> , the subsequent business step SHALL be an end-of-life event (i.e., with action DELETE), to prevent the return of the sampled object (or its identifier) into the supply chain.	Customs authority X removes a pharmaceutical product from a case for quality testing at a customs office. Food laboratory Y pulls a random product sample and checks it for authenticity.

Value	Definition	Examples of use (non-exhaustive)
sensor_reporting	<p>Denotes a specific activity within a business process where sensor data, pertaining to the physical properties and condition of an object or location, is returned.</p> <p>If an EPCIS event accommodates sensor data in conjunction with specific business process steps (e.g. sensor observations in the context of a commissioning, packing, or sampling), the business step value describing the process step SHOULD be used. <code>sensor_reporting</code> SHOULD only be used when no other business step is in progress.</p>	<p>Several packages of frozen food are kept in cold storage, with temperature monitoring. An EPCIS event is triggered once a specific, pre-set temperature threshold is reached.</p> <p>A dust-free room is continuously checked for the presence of contaminants. An EPCIS event is captured at regular intervals for documentation purposes.</p> <p>A wine/cheese cellar is continuously checked for humidity and temperature. Each time the door is opened or closed, an EPCIS event is captured, including the range of temperature and humidity values within the period of time since the previously captured <code>sensor_reporting</code> EPCIS event.</p>
shipping	<p>Indicates the overall process of <code>staging_outbound</code>, <code>loading</code> and <code>departing</code>. It may be used when more granular process step information is unknown or inaccessible. It may indicate a final event from a shipping point.</p> <p>The use of <code>shipping</code> is mutually exclusive from the use of <code>staging_outbound</code>, <code>departing</code>, or <code>loading</code>.</p>	<p>Manufacturer A loads and reads product into the shipping container and closes the door. The product has been read out of the shipping facility. The shipment is immediately picked up and a BOL is associated at this point. (The shipment has left the yard)</p> <p>At Distributor Y, the truck containing racks full of totes pulls away from the shipping dock or staging area.</p> <p>Manufacturer A completes loading product into trailer and seals door. The trailer is ready for pickup. The generation of a Despatch Advice / ASN triggers a "shipping" event.</p> <p>A 3PL picks and tags the product. The product is loaded into a trailer and signed over to a transportation carrier. The 3PL notifies the manufacturer who generates a "shipping" event. NOTE: This would be the case if there were NO departing step at a read point at the gate.</p> <p>Typical Process flow: <code>staging_outbound</code> <code>loading</code> <code>departing</code></p> <p>The above steps assume an organisation's ability and desire to share all steps in the process. If those process steps are not captured, the single business step of shipping would be used.</p>
staging_outbound	<p>Denotes a specific activity within a business process in which an object moves from a facility to an area where it will await transport pick-up.</p>	<p>Container is being closed and will be subsequently loaded onto a vehicle in the yard.</p> <p>Container is being closed and seal is applied, and will be subsequently loaded onto a vehicle in the yard</p> <p>Product has been picked and is now in a staging lane waiting for loading into a container</p>
stock_taking	<p>Process of counting objects within a location following established rules and/or standards to serve as a basis for accounting purposes.</p>	<p>All EPCs in a retail store are read by a handheld reader following a procedure accepted by the organisation's accounting firm.</p>

Value	Definition	Examples of use (non-exhaustive)
stocking	Denotes a specific activity within a business process within a location to make an object available to the customer or for order fulfilment within a DC.	Retailer X places cans from a case on to a shelf on the sales floor Distributor X moves goods from a storage area to a picking area
storing	Denotes a specific activity within a business process where an object is moved into and out of storage within a location.	Manufacturer A moves a pallet from the receiving area to a rack Retailer X moves a case from the receiving dock to a shelf in the backroom
transporting	Process of moving an object from one location to another using a vehicle (e.g., a ship, a train, a lorry, an aircraft).	Carrier X conveys 150 sea containers from Hong Kong seaport to Hamburg seaport with a container vessel. A train with 20 goods wagons goes from one train station to another. A lorry moves a swap trailer from a depot to a distribution centre.
unloading	Denotes a specific activity within a business process where an object is unloaded from a shipping conveyance.	Manufacturer A unloads pallets from a shipping conveyance. The pallets are disaggregated from the shipping conveyance. Distributor Y unloads racks full of totes from a truck
unpacking	Denotes a specific activity within a business process that includes removing products (individuals, inners, cases, pallets) from a larger container – usually after receiving or accepting. Disaggregation of one unit from another typically occurs at this point.	12 packs of soda are removed from a case Loose potatoes are taken off from a tote.
void_shipping	Denotes a process of declaring that one or more objects in a prior outbound process (captured in an EPCIS event having business step <i>shipping</i> , <i>departing</i> , or <i>consigning</i>) were not shipped (or departed or consigned) as previously indicated.	A sender cancels a shipment after a prior shipping event. A sender discovers, either by notification from a recipient or on their own, that a shipment they believed occurred and created a shipping event for, did not actually occur. The record is updated to reflect this. A sender discovers that three out of ten items, previously believed as having been shipped, were not included in the shipment. The <i>void_shipping</i> business step indicates that those three items were not shipped.

7.2 Dispositions

This section specifies standard identifier values for the EPCIS *DispositionID* vocabulary. For each of the identifiers defined, equivalent terms and values are also included in the [GS1 Web Vocabulary](https://www.gs1.org/voc/) published at <https://www.gs1.org/voc/>.

These identifiers populate the *disposition* and *persistentDisposition* fields in an EPCIS event, as specified below.

7.2.1 URI structure

All disposition values specified in this section have one of the following two forms:

- `urn:epcglobal:cbv:disp:payload`
- `https://ref.gs1.org/cbv/Disp-payload`

where the *payload* part is a string as specified in the next section. Every payload string defined herein contains only lower case letters and the underscore character.

Both URI structures are considered to be semantically equivalent via an owl:sameAs relationship.

7.2.2 Compliant usage

Each EPCIS event in a CBV-Compliant Document MAY include a disposition field. If the disposition field is present, the value of the disposition field SHALL be a URI consisting of one of the following two prefixes:

- urn:epcglobal:cbv:disp:
- https://ref.gs1.org/cbv/Disp-

followed by the string specified in the first column of some row of the table below. The portion following the prefix SHALL be written exactly as specified in the table below, in all lowercase letters (possibly including underscores, as indicated).

Each EPCIS event in a CBV-Compatible Document MAY include a disposition field, and the value of the disposition field MAY be a URI as specified above for a CBV-Compliant document, and MAY be any other URI that meets the general requirements specified in [EPCIS2.0], section 6.4, except for those URIs which in this standard are forbidden or designated for a different purpose.

7.2.3 Disposition values and definitions

Value	Definition	Examples of use (non-exhaustive)
active	A commissioned object has just been introduced into the supply chain.	Manufacturer A commissions tags for 10 cases of product. A virtual document has been assigned an EPC Business step: commissioning
available	Object has been returned to service or to the supply chain (e.g., following a successfully completed repairing step).	A mechanical component has been serviced and made available for use.
completeness_inferred	Applied as persistentDisposition of an AggregationEvent or ObjectEvent with action OBSERVE to indicate the inferred integrity of that aggregation (without unpacking the aggregated children from the parent) on the basis of aggregation information (e.g., earlier EPCIS packing event data and/or ASN/DESADV) provided by an upstream supplier. Inferred children SHALL be explicitly listed when captured in an AggregationEvent, but SHALL NOT be listed when captured in an ObjectEvent.	A downstream recipient infers that the contents of a shipment below the outer packing layer are complete, as indicated in EPCIS packing and shipping events provided by the upstream supplier.

Value	Definition	Examples of use (non-exhaustive)
completeness_verified	<p>Applied as <code>Disposition of an AggregationEvent</code> with action <code>DELETE</code> and business step <code>unpacking</code> to explicitly indicate the verified integrity of that aggregation when the aggregated children are unpacked from their parent.</p> <p>Applied as <code>persistentDisposition of an ObjectEvent</code> with business step <code>inspecting</code>, if the inspection has verified the presence of each of the aggregated children.</p>	<p>A downstream recipient verifies that the contents of a shipment below the outer packing layer are complete, by means of unpacking and scanning the barcodes or EPC/RFID tags of the contents.</p>
conformant	<p>Outcome of a successful/passed inspection in an <code>inspecting</code> or <code>repairing</code> step.</p>	<p>A mechanical component has been successfully tested for conformity to safety or performance requirements.</p>
container_closed	<p>Object has been loaded onto a container, the doors have been closed and the shipment sealed.</p>	<p>Container is being closed and will be awaiting pickup in the yard.</p> <p>Container is being closed and electronic seal is applied.</p> <p>Business step (non-exclusive example): <code>staging_outbound</code></p>
container_open	<p>A container's doors have been opened; or a seal of a shipment has been broken.</p> <p>This disposition makes no indication as to whether the act of opening was authorised.</p>	<p>Container has been opened in the normal process of unloading,</p> <p>Container has been opened unexpectedly, with no apparent reason.</p>
damaged	<p>Object is impaired in its usefulness and/or reduced in value due to a defect.</p>	<p>Pallet pool operator P notices that a plank of a pallet is broken and records this incident by scanning the EPC of the pallet.</p> <p>Retailer R receives a shipment where the product packages on the pallet have been dented.</p> <p>Business steps:</p> <ul style="list-style-type: none"> <code>accepting</code> <code>inspecting</code> <code>receiving</code> <code>removing</code> <code>repairing</code> <code>replacing</code> <p> Note: "damaged" can also apply to non-apparent (physical) damage determined by means of sensor data. For example, product pH has dropped beyond a minimum acceptable threshold for viability.</p>
destroyed	<p>Object has been fully rendered non-usable.</p>	<p>Incinerator Operator B indicates that product and packaging have been incinerated</p> <p>Business step: <code>destroying</code></p>

Value	Definition	Examples of use (non-exhaustive)
dispensed	A full quantity of product is distributed to a consumer.	A pharmacist dispenses a pharmaceutical in a container's totality to fill a specific prescription written by a physician, to a consumer or patient. A deli manager slices the complete contents of a 5 pound package of turkey for sale. NOTE: this disposition reflects the disposition of the original object, not what was dispensed.
disposed	Object has been returned for disposal.	A package of pharmaceuticals has been picked up by a distributor and will be subsequently destroyed
encoded	An instance-level identifier has been written to a barcode or RFID tag, but not yet commissioned.	3rd Party has written EPCs to tags and returns spool of case tags to Manufacturer Business step: encoding
expired	Object's expiration date is in the past.	Distributor Y indicates that a product is past its expiration date Business step (examples): holding staging_outbound storing
in_progress	Optional disposition for object proceeding through points in the supply chain.	 Note: Omission of disposition is generally recommended instead of "in_progress", which adds little value to event data.
in_transit	Object being shipped between two trading partners.	Shipper Z pulled a container/product out of a manufacturer's yard on to a road Business step: shipping departing
inactive	Decommissioned object that may be reintroduced to the supply chain.	A reusable tag is removed from a reusable transport item. A digital coupon or an empties refund voucher has been redeemed at retail point-of-sale Business step: decommissioning
mismatch_class	Class-level identifiers do not correspond to the identifiers that were expected.	Recipient unpacks 10 of expected 10, but GTINs do not match data communicated via the EPCIS Packing event provided by the supplier.  Note: It is recommended to capture all "mismatch_" dispositions as persistentDisposition.
mismatch_instance	Instance-level identifiers do not correspond to the identifiers that were expected.	Recipient unpacks 10 of expected 10, but SGTINs do not match data communicated via the EPCIS Packing event provided by the supplier.  Note: It is recommended to capture all "mismatch_" dispositions as persistentDisposition.

Value	Definition	Examples of use (non-exhaustive)
mismatch_quantity	Quantity do not correspond to the quantity that was expected.	Recipient unpacks 9 of expected 10 (an 'underage'), or 11 of expected 10 (an 'overage').  Note: It is recommended to capture all "mismatch_" dispositions as persistentDisposition.
needs_replacement	Component(s) or other asset(s) must be replaced to ensure fulfilment of functional requirements.	An assembly component's service duration has exceeded its (theoretical, e.g., per EN 50126) mean time to failure, and is marked as needing replacement.
no_pedigree_match DEPRECATED	In validating the pedigree for the object, no match was found, causing the product to be quarantined for further investigation and disposition.	Distributor Y could not obtain a valid pedigree for a product from its Manufacturer A Business step: holding staging_outbound storing
non_conformant	Outcome of an unsuccessful/failed inspection in an inspecting or repairing step. (non_conformant is the opposite of available).	A mechanical component has been failed conformity testing against safety or performance requirements. If disposition is non_conformant, follow up steps may be used to capture subsequent and/or final disposition. For example, if the non_conformant object is not usable, it might be moved to a separate location for storage. If the object is still installed in an assembly but not function-critical, the assembly might be allowed to continue running until the next repair cycle; alternatively, a disassembly event might follow.
non_sellable_other	Object cannot be sold to a customer.	A product is not sellable pending further evaluation. A product is not sellable, and one of the other dispositions (expired, recalled, damaged) does not apply. Product has been sold and is awaiting customer pick-up. Business step: holding inspecting staging_outbound storing
partially_dispensed	A portion of a product is distributed to a customer, while additional product is retained for subsequent distribution.	A pharmacist dispenses 10 pills from a 100-count bottle to fill a customer prescription. A deli manager slides and packages one pound of a 10-pound ham for customer purchase. NOTE: This disposition reflects the disposition of the original object, not what was dispensed.

Value	Definition	Examples of use (non-exhaustive)
recalled	Object is non-sellable because of public safety reasons.	Manufacturer A requested that all Retailers and Distributors return its batteries that could overheat and explode Business step: holding staging_outbound storing
reserved	Instance-level identifier has been allocated for a third party.	Distributor receives EPC numbers and can encode tag with the numbers. Business step: reserving
retail_sold	Product has been purchased by a customer.	A customer at Retailer X purchased a screwdriver by checking it out through the point of sale system Business step: retail_selling
returned	Object has been sent or brought back for various reasons. It may or may not be sellable.	Product is received at a returns centre from a customer because of an over-shipment, recall, expired product, etc. Product is returned to retail POS by a customer, who no longer wants the product. Business step: receiving holding shipping
sellable_accessible	Product can be sold as is and customer can access product for purchase.	Retailer X puts a case of screwdrivers on to a shelf or display within customer reach Business step: stocking receiving
sellable_not_accessible	Product can be sold as is, but customer cannot access product for purchase.	Retailer X puts a case of screwdrivers on to a shelf in a store backroom Business step: receiving storing loading holding inspecting
stolen	An object has been taken without permission or right.	A pharmaceutical manufacturer completes an investigation of serial numbers that are missing from inventory, and concludes that they have been stolen
unavailable	Object has been removed from service or from the supply chain (e.g., pending repair).	A mechanical component in need of maintenance is taken out of service,
unknown	An object's condition is not known.	

7.2.3.1 Deprecated Disposition values

Earlier CBV versions defined several disposition values that are now deprecated. The following table lists the deprecated dispositions and, where applicable, values which replaced them in later versions of the CBV . Each new value applies to all the

situations that the corresponding, deprecated value did, but may also be applied to broader situations excluded by the earlier value's more narrow definition. For example, the disposition `damaged` may now be applied to a returnable asset, which was never considered "sellable" even when it was undamaged.

Deprecated Disposition (deprecated)	New Disposition
<code>non_sellable_expired</code>	<code>expired</code>
<code>non_sellable_damaged</code>	<code>damaged</code>
<code>non_sellable_disposed</code>	<code>disposed</code>
<code>non_sellable_no_pedigree_match</code>	<code>no_pedigree_match</code> (itself DEPRECATED in CBV 2.0)
<code>non_sellable_recalled</code>	<code>recalled</code>
<code>no_pedigree_match</code>	(none)

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7.3 Business Transaction Types

This section specifies standard identifier values for the EPCIS `BusinessTransactionTypeID` vocabulary. For each of the identifiers defined, equivalent terms and values are also included in the [GS1 Web Vocabulary](https://www.gs1.org/voc/) published at <https://www.gs1.org/voc/>.

These identifiers may be used to populate the `type` attribute of a `bizTransaction` element in an EPCIS event. See section 8.5 for details of when these identifiers should be used.

7.3.1 URI structure

All business transaction type values specified in this section have one of the following two forms:

- `urn:epcglobal:cbv:btt:payload`
- `https://ref.gs1.org/cbv/BTT-payload`

where the `payload` part is a string as specified in the next section. Every payload string defined herein contains only lower case letters and the underscore character.

Both URI structures are considered to be semantically equivalent via an `owl:sameAs` relationship.

7.3.2 Compliant usage

Each EPCIS event in a CBV-Compliant Document MAY include one or more `bizTransaction` elements. If `bizTransaction` elements are present, each such element MAY include a `type` attribute. If a given `bizTransaction` element includes a `type` attribute, the value of the `type` attribute SHALL either be a URI consisting of the prefix `urn:epcglobal:cbv:btt:` or a GS1 Digital Link URI beginning with `https://ref.gs1.org/cbv/BTT-`, followed by the string specified in the first column of some row of the table below. The portion following the prefix SHALL be written exactly as specified in the table below, in all lowercase letters (possibly including underscores, as indicated). See section 8.5 for more compliance requirements concerning business transaction types.

 **Note:** Examples (in XML and JSON/JSON-LD format) are published at <https://ref.gs1.org/docs/epcis/examples/>.

Each EPCIS event in a CBV-Compatible Document MAY include one or more `bizTransaction` elements. If `bizTransaction` elements are present, each such element MAY include a `type` attribute. If a given `bizTransaction` element includes a `type` attribute, the value of the `type` attribute MAY be a URI as specified above for a CBV-Compliant document, and MAY be any other URI that meets the general requirements specified in [EPCIS 2.0], section 6.4, except for those URIs which in this standard are forbidden or designated for a different purpose.

7.3.3 Business Transaction values and definitions

Business Transaction Types	
Value	Definition
<code>bol</code>	Bill of Lading. A document issued by a carrier to a shipper, listing and acknowledging receipt of goods for transport and specifying terms of delivery
<code>cert</code>	Certificate. A document confirming certain characteristics of an object (e.g. product), person, or organisation, typically issued by a third party.
<code>desadv</code>	Despatch Advice. A document/message by means of which the seller or consignor informs the consignee about the despatch of goods. Also called a "Advanced Shipment Notice," but the value <code>desadv</code> is always used regardless of local nomenclature.

Business Transaction Types	
inv	Invoice. A document/message claiming payment for goods or services supplied under conditions agreed by the seller and buyer.
pedigree	Pedigree. A record that traces the ownership or custody and transactions of a product as it moves among various trading partners.
po	Purchase Order. A document/message that specifies details for goods and services ordered under conditions agreed by the seller and buyer.
poc	Purchase Order Confirmation. A document that provides confirmation from an external supplier to the request of a purchaser to deliver a specified quantity of material, or perform a specified service, at a specified price within a specified time. (Sometimes internally referred to as a "Sales Order".)
prodorder	Production Order. An organisation-internal document or message issued by a producer that initiates a manufacturing process of goods.
recadv	Receiving Advice. A document/message that provides the receiver of the shipment the capability to inform the shipper of actual goods received, compared to what was advised as being sent.
rma	Return Merchandise Authorisation. A document issued by the seller that authorises a buyer to return merchandise for credit determination.
testprd	Test Procedure. A document that provides a formal specification of a sequence of instructions for the purpose of verifying one or several criteria.
testres	Test Result. A document that includes the outcome of the execution of a given test procedure.
upevt	Upstream EPCIS Event. Event ID URI(s) of event(s) provided by an upstream supplier, such as packing and shipping events (e.g., as the basis for the inferred completeness of inbound aggregations).

7.4 Source/Destination types

This section specifies standard identifier values for the EPCIS `SourceDestTypeID` vocabulary. For each of the identifiers defined, equivalent terms and values are also included in the [GS1 Web Vocabulary](https://www.gs1.org/voc/) published at <https://www.gs1.org/voc/>.

These identifiers may be used to populate the `type` attribute of a `source` or `destination` element in an EPCIS event. See section 8.6 for details of when these identifiers should be used.

SGLN EPC or GS1 Digital Link URI indicating the combination of AIs (414) and -- optionally -- (254) -- SHOULD be used to identify the endpoint of a business transfer, where the Source/Destination type is **location**; PGLN EPC or GS1 Digital Link URI indicating AI (417) SHOULD be used where the Source/Destination type is **owning party** or **possessing party**, although an SGLN EPC may be used in migration phases, in the interest of backward compatibility with EPCIS/CBV 1.2 and TDS 1.12.

7.4.1 URI structure

All source/destination type values specified in this section have one of the following two forms:

- `urn:epcglobal:cbv:sdt:payload`
- `https://ref.gs1.org/cbv/SDT-payload`

where the `payload` part is a string as specified in the next section. Every payload string defined herein contains only lower case letters and the underscore character.

Both URI structures are considered to be semantically equivalent via an `owl:sameAs` relationship.

7.4.2 Compliant usage

Each EPCIS event in a CBV-Compliant Document MAY include one or more `source` and/or `destination` elements. The value of the `type` attribute of the `source` or `destination` element SHALL be a URI consisting of one of the following two prefixes:

- `urn:epcglobal:cbv:sdt:`
- `https://ref.gs1.org/cbv/SDT-`

followed by the string specified in the first column of some row of the table below. The portion following the prefix SHALL be written exactly as specified in the table in section 7.4.3, in all lowercase letters (possibly including underscores, as indicated). See section 8.6 for more compliance requirements concerning source and destination types.

 **Note:** Examples (in XML and JSON/JSON-LD format) are published at <https://ref.gs1.org/docs/epcis/examples/>.

Each EPCIS event in a CBV-Compatible Document MAY include one or more `source` and/or `destination` elements. The value of the `type` attribute of the `source` or `destination` element MAY be a URI as specified above for a CBV-Compliant document, and MAY be any other URI that meets the general requirements specified in [EPCIS], section 6.4, except for those URIs which in this standard are forbidden or designated for a different purpose.

7.4.3 Source/Destination Type values and definitions

Source/Destination Types	
Value	Definition
<code>owning_party</code>	The source or destination identifier denotes the party who owns (or is intended to own) the objects at the originating endpoint or terminating endpoint (respectively) of the business transfer of which this EPCIS event is a part.
<code>possessing_party</code>	The source or destination identifier denotes the party who has (or is intended to have) physical possession of the objects at the originating endpoint or terminating endpoint (respectively) of the business transfer of which this EPCIS event is a part.
<code>location</code>	The source or destination identifier denotes the physical location of the originating endpoint or terminating endpoint (respectively) of the business transfer of which this EPCIS event is a part. When a source of this type is specified on an EPCIS event at the originating endpoint of a business transfer, the source identifier SHOULD be consistent with the Read Point specified in that event. When a destination of this type is specified on an EPCIS event at the terminating endpoint of a business transfer, the destination identifier SHOULD be consistent with the Read Point specified in that event.

7.5 Error reason identifiers

This section specifies standard identifier values for the EPCIS `ErrorReasonID` vocabulary. Each of the identifiers defined, equivalent terms and values is also included in the [GS1 Web Vocabulary](https://www.gs1.org/voc/) published at <https://www.gs1.org/voc/>.

These identifiers may be used to populate the `reason` attribute of an `errorDeclaration` element in an EPCIS event.

7.5.1 URI structure

All error reason identifier values specified in this section have one of the following two forms:

- `urn:epcglobal:cbv:er:payload`
- `https://ref.gs1.org/cbv/ER-payload`

where the `payload` part is a string as specified in the next section. Every payload string defined herein contains only lower case letters and the underscore character.

[Both URI structures are considered to be semantically equivalent via an owl:sameAs relationship.](#)

7.5.2 Compliant usage

Each EPCIS event in a CBV-Compliant Document MAY include an `ErrorDeclaration` element, and when present, the `ErrorDeclaration` element MAY include a `reason` field. When present in a CBV-Compliant Document, the value of the `reason` field of the `ErrorDeclaration` element SHALL be a URI consisting of one of the following two prefixes

- `urn:epcglobal:cbv:er:`
- `https://ref.gs1.org/cbv/ER-`

followed by the string specified in the first column of some row of the table in section 7.5.3. The portion following the prefix SHALL be written exactly as specified in the table below, in all lowercase letters (possibly including underscores, as indicated).

Each EPCIS event in a CBV-Compatible Document MAY include an `ErrorDeclaration` element, and when present, the `ErrorDeclaration` element MAY include a `reason` field. When present in a CBV-Compatible Document, the value of the `reason` attribute of the `ErrorDeclaration` element MAY be a URI as specified above for a CBV-Compliant document, and MAY be any other URI that meets the general requirements specified in [EPCIS2.0], section 6.4, except for those URIs which in this standard are forbidden or designated for a different purpose.

7.5.3 Error reason identifier values and definitions

Error reason identifiers	
Value	Definition
<code>did_not_occur</code>	The prior event is considered erroneous because it did not actually occur. There are no corrective events. (In a CBV-Compliant Document, this error reason SHALL NOT be used in an error declaration that contains one or more corrective event IDs.)
<code>incorrect_data</code>	The prior event is considered erroneous because some or all of the data in the event are incorrect. Subsequent events may provide a correct indication of what actually occurred when the prior event was captured. These events may be linked using the corrective event IDs in the error declaration.

7.6 Sensor measurement types

This section specifies standard values for EPCIS sensor measurement types.

For each of the measurement types defined, equivalent terms and values are also included in the [GS1 Web Vocabulary](https://www.gs1.org/voc/) published at <https://www.gs1.org/voc/>.

7.6.1 URI structure

A Linked Data code list will be defined in the GS1 Web vocabulary* for measurement types. Within the code list, values will be defined for specific measurable properties, such as Temperature, Pressure, Humidity etc.

Sensor measurement types SHALL be expressed using either URIs or Compact URI Expressions (CURIEs), as follows:

- `https://gs1.org/voc/X`
- `gs1:X`

where the `X` part is a string as specified in section 7.6.3, below.

For example, `https://gs1.org/voc/Temperature` and the CURIE `gs1:Temperature` are

considered equivalent ways of indicating that a measurement of temperature is expressed within `sensorReport` as the value of `type`.

For standard values of measurement types (e.g. for physical properties such as temperature, pressure etc.), each such URI or CURIE will resolve to an online definition within the GS1 Web vocabulary.

User-defined / vendor-defined values of `type` are permitted as an alternative where no appropriate value is available within the code list

at <https://gs1.org/voc/MeasurementType> ; in such situations, a user-defined / vendor-defined value SHALL be expressed as a Web URI or as a CURIE, with an accompanying declaration of how the CURIE prefix maps to a Web URI stem or namespace.

7.6.2 Compliant usage

Each EPCIS event in a CBV-Compliant Document MAY include one or more instances of `sensorElement`, which SHALL include one or more instances of `sensorReport` and MAY include an instance of `sensorMetadata`.

If expressing a **measurement**, each instance of `sensorReport` in a CBV-compliant document SHALL use the URI or CURIE form specified in section 7.6.1 to indicate the `type` of measurement that it is reporting.

7.6.3 Sensor measurement type values and definitions

Sensor measurement types are defined for physical properties that may be sensed and relevant for monitoring the condition of objects. The code list and measurement types are also included in the [GS1 Web Vocabulary](https://www.gs1.org/voc/) published at <https://www.gs1.org/voc/>.

Measurement type	SI unit	Definition
AbsoluteHumidity	kilogram per cubic metre	The ratio of the mass of water vapour in a sample of moist air to the volume of the sample.
AbsorbedDose	gray	The energy absorbed per unit mass of the patient from the decay of a radionuclide given to a patient for diagnostic or therapeutic purposes.
AbsorbedDoseRate	gray per second	The energy absorbed per unit time per unit mass of the patient from the decay of a radionuclide given to a patient for diagnostic or therapeutic purposes.
Acceleration	metre per second per second	The rate of change of velocity, a vector quantity with magnitude and direction.
Altitude	metres	The height above the surface of a defined geoid, typically the World Geodetic System (WGS 84) geoid for measurements from location sensors using satellite technology (e.g. GPS, GLONASS, Galileo) , which approximates to the surface of the earth at sea level. Positive values indicate height above the geoid surface. Negative values indicate depth below the geoid surface. Also known as <i>elevation</i> .
AmountOfSubstance	mole	The amount of substance that contains a number of atoms, molecules etc. that is equal to the Avogadro constant.
AmountOfSubstancePerUnitVolume	mole per cubic metre	The concentration of a solution expressed as the number of moles of dissolved substance per unit volume of solution.
Angle	degrees, radians, etc.	The inclination of one line or plane to another.
AngularAcceleration	radian per second per second	The rate of change of angular velocity with respect to time.
AngularMomentum	newton metre second, kilogram metre squared per second	The integral over time of the torque acting on a body that is free to rotate, resulting in a corresponding change in its angular momentum. Also known as <i>angular impulse</i> .

Measurement type	SI unit	Definition
AngularVelocity	radian per second	The rate of change of angle with respect to time; a measure of the number of revolutions per unit time.
Area	square metre	The amount of two-dimensional space occupied, measured in units of length squared.
Capacitance	farad	The capacitance of an isolated conductor is defined as the ratio of the total charge on it to its electric potential.
Conductance	siemen	The ratio of the current in the conductor to the potential difference between its ends; reciprocal of resistance.
Conductivity	siemen per metre	A measure of how strongly a material conducts electric current. The ratio of the current density to the electric field that causes the current to flow.
Count		A measure of the total quantity of something; the number of individual units present.
Density	kilogram per cubic metre	The mass of unit volume of a substance.
Dimensionless	parts per million etc.	The dimensionless ratio of a volume of one substance to the volume of solid, liquid or gas in which it is contained.
DoseEquivalent	sievert	The product of the absorbed dose multiplied by a Q factor (relating to the type of radiation) and a factor relating to all relevant aspects of the body being irradiated, multiplied by the exposure time. Also known as <i>effective dose</i> or <i>equivalent dose</i> .
DoseEquivalentRate	sievert per second	The product of the absorbed dose multiplied by a Q factor (relating to the type of radiation) and a factor relating to all relevant aspects of the body being irradiated. Also known as <i>effective dose rate</i> .
DynamicViscosity	pascal	The value of the tangential force per unit area which is necessary to maintain unit relative velocity between two parallel planes unit distance apart in a fluid.
ElectricCharge	coulomb	Quantity of unbalanced electricity in an object, i.e. excess or deficiency of electrons, resulting in negative or positive electrification, respectively.
ElectricCurrent	ampere	Rate of flow of charge in a substance, whether solid, liquid or gas.
ElectricCurrentDensity	ampere per square metre	Rate of flow of charge in a substance per unit area perpendicular to the current.
ElectricFieldStrength	volt per metre = newton / coulomb	The electric force acting on a unit charge. The linear gradient of the electrostatic potential.
Energy	joule	A measure of the capacity of a system or body to do work.
Exposure	lux second	The product of light intensity and time duration of the exposure.
Force	newton	The rate of change of linear momentum of a body on which a force acts. A force acting on a body which is free to move produces an acceleration in the motion of the body.
Frequency	hertz	The rate of repetition of a periodic oscillation or disturbance; the number of cycles per unit time.
Illuminance	lux = 1 lumen per square metre	The energy in the form of visible radiation reaching a surface per unit area in unit time; the amount of luminous flux per unit area.
Inductance	henry	The magnitude of the property of an element or circuit to form a magnetic field and store magnetic energy

Measurement type	SI unit	Definition
		when carrying a current. The property of an electric circuit or component that causes an electromotive force to be generated in it as a result of a change in the current flowing through the circuit (self inductance) or of a change in the current flowing through a neighbouring circuit with which it is magnetically linked (mutual inductance).
Irradiance	watt per square metre	The flux of radiant energy per unit area, especially an area perpendicular to the direction of travel through a medium. A measure of the radiant power per unit area that flows across a surface.
KinematicViscosity	square metres per second	The ratio of the viscosity of a liquid to its density.
Length	metre	The linear magnitude of any thing, as measured end to end.
LinearMomentum	newton seconds	The impulse is the integral over time of the force acting between two colliding bodies. Linear momentum of a body is the product of its mass and its velocity. Also known as <i>impulse</i> .
Luminance	candela per square metre	A measure of the light-emitting intensity of a light source, in a specific direction per unit area of the emitting surface. For a very narrow cone containing the direction, it is the ratio of the luminous flux emitted within that cone to the solid angle of the cone per unit area of the emitting surface.
LuminousFlux	lumen = 1 candela per steradian	A measure of the perceived power of light emitted by a source or received by a surface and irrespective of direction, considering the sensitivity of the human eye to different wavelengths of light.
LuminousIntensity	candela	A measure of the light-emitting intensity of a light source, in a specific direction. For a very narrow cone containing the direction, it is the ratio of the luminous flux emitted within that cone to the solid angle of the cone.
MagneticFlux	weber	A measure of the total magnetic field that passes through a specific area. The surface integral of the product of the permeability of the medium and the magnetic field intensity perpendicular to the surface.
MagneticFluxDensity	tesla = weber per square metre	The product of the magnetic field strength and the permeability of a material.
MagneticVectorPotential	weber per metre (Joules per ampere metre)	The potential energy per unit element of current (current multiplied by length).
Mass	kilogram	The quantity of matter in a body. Inertial mass is the measure of the inertia of a body; its resistance to acceleration.
MassConcentration	kilogram per cubic metre	The mass of the constituent (or solute) divided by the volume of the mixture (or solvent).
MassFlowRate	kilogram per second	The mass of fluid that passes per unit of time.
MassPerAreaTime	kilogram per second per square metre	The mass of fluid that passes per unit of time per unit area perpendicular to the flow direction. Also known as <i>mass flux</i> .
MemoryCapacity	byte	A measure of the size of a data structure or capacity of a data carrier, typically measured in bits (binary digits), bytes or octets (8 bits) or multiples thereof.
MolalityOfSolute	mole per kilogram	The concentration of a solution expressed as the number of moles of dissolved substance per unit mass of solvent.

Measurement type	SI unit	Definition
MolarEnergy	joule per mole	The ratio of the thermodynamic energy of a chemical compound to the amount of substance (atoms or molecules) contained within it, the amount of substance being measured in moles. Also known as <i>molar thermodynamic energy</i> .
MolarMass	kilogram per mole	The ratio of the mass of a chemical compound to the amount of substance (atoms or molecules) contained within it, the amount of substance being measured in moles.
MolarVolume	cubic metre per mole	The volume occupied by a substance per unit amount of substance at a specified temperature and pressure.
Power	watt	The rate of doing work or rate of production, transfer or consumption of energy; the amount of energy transferred or converted per unit time.
Pressure	pascal, newton per square metre	The perpendicular force per unit area acting on a material and tending to change its dimensions.
RadiantFlux	watt	The total power emitted, received or passing in the form of electromagnetic radiation; a measure of electromagnetic energy per unit time.
RadiantIntensity	watt / steradian	The radiant flux per unit solid angle emitted by a point source.
Radioactivity	becquerel	The rate of spontaneous disintegration or decay of certain natural heavy elements, accompanied by alpha-rays, beta-rays or gamma-rays.
RelativeHumidity	percent	The ratio of the partial pressure of water vapour in an air-water mixture to the saturated vapour pressure of water at a prescribed temperature.
Resistance	ohm	The ratio of the potential difference across an electrical component to the current passing through it. It is a measure of the opposition to the flow of electric charge. The real part of the impedance, characterised by the dissipation of energy as opposed to its storage.
Resistivity	ohm metre	A measure of how strongly a material resists the flow of electric current. The electric field required to achieve unit current density flowing through the material.
SolidAngle	steradian	A three-dimensional equivalent to planar angle, indicating a measure of the field of view subtended by an object when viewed from a specified point, the apex. The solid angle is the surface area subtended at radius r from the apex divided by the square of that radius r .
SpecificVolume	cubic metres per kilogram	The volume of a substance per unit mass. The reciprocal of density.
Speed	metre per second	The ratio of the linear distance travelled by a body to the time taken. Speed is a scalar quantity. Also known as <i>velocity</i> , whereby velocity is a vector with magnitude and direction.
SurfaceDensity	kilogram per square metre	The mass per unit area distributed over a surface.
SurfaceTension	newton per metre	The attractive force exerted upon the surface molecules of a liquid by the molecules beneath that tends to draw the surface molecules into the bulk of the liquid and makes the liquid assume the shape having the minimum surface area
Temperature	kelvin etc.	A measure of whether two systems are relatively hot or cold with respect to one another; two systems brought into contact will eventually reach thermal equilibrium and reach the same temperature as thermal energy (heat) flows from the system with higher temperature to the system with lower temperature.

Measurement type	SI unit	Definition
Time	second	A dimension that enables distinction between two otherwise identical events that occur at the same point in space. The interval between such events is the basis of time measurement.
Torque	newton metre	The product of a force and its perpendicular distance from a point about which it causes rotation or torsion.
Voltage	volt	The value of an electromotive force or electrostatic potential difference, expressed in volts.
Volume	cubic metre	The amount of three-dimensional space occupied by a body, measured in cubic length units.
VolumeFlowRate	cubic metre per second	The volume of fluid that passes per unit of time.
VolumeFraction	(dimensionless)	The dimensionless ratio of a volume of one substance to the volume of solid, liquid or gas in which it is contained.
VolumetricFlux	cubic metre per second per square metre	The volume of fluid that passes per unit of time per unit area perpendicular to the flow direction.
Wavenumber	reciprocal metre	The number of waves per unit length

7.7 Sensor alert types

This section specifies standard values for EPCIS sensor alert types.

Each of the alert types defined is also included in the [GS1 Web Vocabulary](https://www.gs1.org/voc/) published at <https://www.gs1.org/voc/>.

7.7.1 URI structure

A Linked Data code list will be defined in the GS1 Web vocabulary* for alert types. Within the code list, values will be defined for specific alert types, such as Alarm Condition and Error Condition.

Sensor alert types SHALL be expressed using either URIs or Compact URI Expressions (CURIEs), as follows:

- `https://gs1.org/voc/X`
- `gs1:X`

where the X part is a string as specified in section 7.7.3, below.

For example, `https://gs1.org/voc/ALARM_CONDITION` and the CURIE `gs1:ALARM_CONDITION` are considered equivalent ways of indicating that an alarm alert is expressed within `sensorReport` as the value of `exception`.

Each such URI or CURIE will resolve to an online definition within the GS1 Web vocabulary.

7.7.2 Compliant usage

Each EPCIS event in a CBV-Compliant Document MAY include one or more instances of `sensorElement`, which SHALL include one or more `sensorReport` elements and MAY include a `sensorMetadata` element.

If expressing an **alert**, each instance of `sensorReport` in a CBV-compliant document SHALL use the URI or CURIE form specified in section 7.6.1 to indicate the type of alert that it is reporting.

7.7.3 Sensor alert type values and definitions

Sensor alert types are defined for alarms and errors that may be sensed and relevant for monitoring the condition of objects. The code list and defined alert types is also included in the [GS1 Web Vocabulary](https://www.gs1.org/voc/) published at <https://www.gs1.org/voc/>.

Alert type	Definition
ALARM_CONDITION	Indicates the reporting of an alarm condition detected by a sensor device. Expected value type: xsd:boolean or xsd:anyURI
ERROR_CONDITION	Indicates the reporting of an error condition detected by a sensor device. Expected value type: xsd:boolean or xsd:anyURI

7.8 Sensor report component type

While some sensor measurements are scalars without direction (e.g. temperature, relative humidity), other sensor measurements are vectors, having magnitude and direction. A vector may exist in 2-dimensional space or 3-dimensional space and is typically expressed as a magnitude and a direction relative to a specified coordinate system, such as X, Y, Z Cartesian coordinate axes. A vector sensor measurement is therefore expressed as a set of typically 2 or 3 instances of `sensorReport` within the same `sensorElement`, each `sensorReport` instance having a different value of `component`.

This section specifies standard identifier values for the `cbv:comp` vocabulary.

These identifiers may be used to populate the `epcis:component` field of a `epcis:sensorReport` instance within an EPCIS event.

7.8.1 URI structure

All Component type values specified in this section have one of the following two forms:

- `urn:epcglobal:cbv:comp:payload`
- `https://ref.gs1.org/cbv/comp-payload`

where the `payload` part is a string as specified in the next section. Every payload string defined herein contains only upper case letters and the underscore character.

Both URI structures are considered to be semantically equivalent via an `owl:sameAs` relationship.

7.8.2 Compliant usage

Each EPCIS event in a CBV-Compatible Document MAY include one or more `SensorReport` elements. If `SensorReport` elements are present, each such element MAY include a `comp` attribute. If a given `SensorReport` element includes a `comp` attribute, the value of the type attribute MAY be a URI as specified above for a CBV-Compliant document, and MAY be any other URI that meets the general requirements specified in [EPCIS], except for those URIs which in this standard are forbidden or designated for a different purpose.

Note: Examples (in XML and JSON/JSON-LD format) are published at <https://ref.gs1.org/docs/epcis/examples/>.

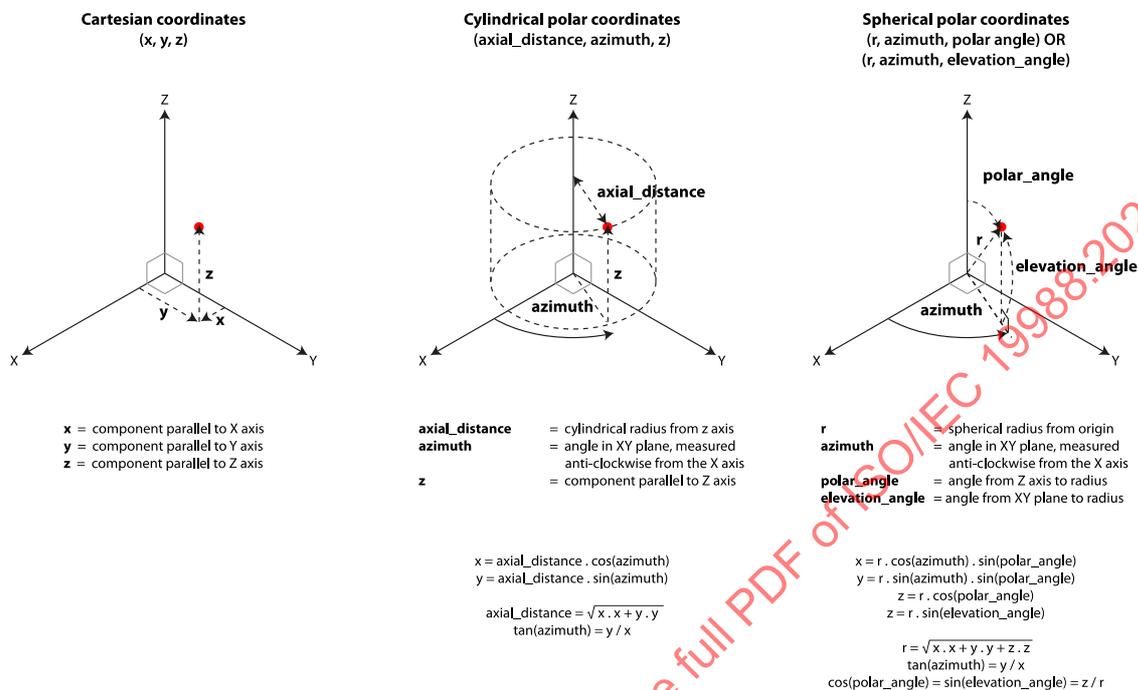
7.8.3 Sensor report component types and definitions

Standard values for <code>component</code> within <code>SensorReport</code>	
Value	Definition
x	Component or projection along the x axis in Cartesian coordinates (X,Y,Z) from a defined origin
y	Component or projection along the y axis in Cartesian coordinates (X,Y,Z) from a defined origin
z	Component or projection along the z axis in Cartesian coordinates (X,Y,Z) from a defined origin

Standard values for component within SensorReport	
axial_distance	Radial distance from the cylindrical axis in a cylindrical polar coordinate system; the magnitude of the projection of the vector in the plane perpendicular to the cylindrical axis. Positive values are outwards. Negative values are not typically expected
azimuth	Angle measured in the XY plane, anticlockwise from the X axis (in cylindrical or spherical polar coordinate systems) to the plane containing the vector and the Z axis.
height	Height parallel to the cylindrical axis in a cylindrical polar coordinate system, above (for positive values) or below (for negative values) a defined reference origin plane (typically the XY plane)
spherical_radius	Radial distance from the centre of a sphere in a spherical polar coordinate system; the magnitude of the vector. Positive values are outwards. Negative values are not typically expected.
polar_angle	Angle measured from the positive Z axis to the vector in a spherical polar coordinate system
elevation_angle	Angle measured from the XY plane to the vector in a spherical polar coordinate system. Positive values indicate that the vector is above the XY plane (with a projection on the positive Z axis). Negative values indicate that the vector is below the XY plane (with a projection on the negative Z axis).
easting	A component or projection along an east-pointing axis from a defined origin in a geographic Cartesian coordinate system.
northing	A component or projection along a north-pointing axis from a defined origin in a geographic Cartesian coordinate system
latitude	The angle of elevation from the equatorial plane in a geographic coordinate system. Positive values indicate a vector above the equatorial plane, i.e. in the northern hemisphere. Negative values indicate a vector below the equatorial plane, i.e. in the southern hemisphere.
longitude	The angle (measured within the equatorial plane) to the east of the prime meridian in a geographic coordinate system. Negative values are considered to indicate angles to the west of the prime meridian.
altitude	The height above a defined surface (such as mean sea level) in a geographic coordinate system. Negative values are considered to indicate that the vector points to a location below the defined surface (e.g. below mean sea level).

The following diagrams illustrate the relationships between these values of component in Cartesian, cylindrical polar and spherical polar coordinate systems.

Figure 7-1 Coordinate reference systems



8 User vocabularies

This section specifies syntax templates that end users may use to define vocabulary elements for identifiers within EPCIS user vocabularies

- Instance-level objects
- Class-level objects
- Locations (for read points and business locations)
- Business transactions
- Source/Destination
- Transformations
- Events
- Chemical Substances
- Microorganisms

8.1 General considerations and syntax forms

Unlike the standard vocabularies discussed in section 7, a vocabulary element in a user vocabulary is created by an end user. For example, an end user who creates a new business location such as a new warehouse may create a business location identifier to refer to that location in EPCIS events. The specific identifier string is defined by the End User, and its meaning may be described to trading partners via master data exchange, or via some other mechanism outside of the EPCIS Query Interface.

The EPCIS standard (section 6.4) places general constraints on the identifiers that End Users may create for use as user vocabulary elements. Specifically, an identifier must conform to URI syntax, and must either conform to syntax specified in GS1 standards or must belong to a subspace of URI identifiers that is under the control of the end user who assigns them.

The CBV provides additional constraints on the syntax of identifiers for user vocabularies, so that CBV-Compliant documents will use identifiers that have a predictable structure. This in turn makes it easier for trading partners to understand the meaning of such identifiers.

For each user vocabulary considered here, multiple syntax options are provided for user vocabulary in order to provide flexibility for end users to meet their business requirements. Further details about each of these forms are specified in the subsections below.

8.1.1 EPC URI

An Electronic Product Code “pure identity” URI may be used as a user vocabulary element. EPCs have a structure and meaning that is widely understood. EPCs may also be encoded into data carriers such as RFID tags and barcodes according to GS1 standards.

Where an EPC URI is used as a User Vocabulary Element, both CBV-Compliant and CBV-Compatible documents SHALL use an EPC Pure Identity URI, except as noted below. An EPC Pure Identity URI is a URI as specified in [TDS], section 6 (specifically, a URI matching the grammar production EPC-URI in [TDS, section 6.3]). EPC “pure identity” URIs begin with `urn:epc:id:...`

Both CBV-Compliant and CBV-Compatible documents SHALL NOT use any of the other URI forms for EPCs defined in [TDS]. In particular, documents SHALL NOT use EPC Tag URIs (`urn:epc:tag:...`), EPC Pure Identity Pattern URIs (`urn:epc:idpat:...`), or EPC Pattern URIs (`urn:epc:pat:...`), except that both CBV-Compliant and CBV-Compatible documents MAY use EPC Pattern URIs for class-level identification of objects as specified in section 8.3.1. Both CBV-Compliant and CBV-Compatible documents MAY use EPC Raw URIs (`urn:epc:raw:...`) as defined in [TDS], section 12, provided that the raw value cannot be decoded as an EPC. Both CBV-Compliant and CBV-Compatible documents SHALL NOT use an EPC Raw URI representing EPC memory bank contents that could be successfully decoded into an EPC Pure Identity URI according to [TDS].

8.1.2 GS1 Digital Link URI

A GS1 Digital Link URI may be used as a user vocabulary element. GS1 Digital Links URIs in EPCIS events SHALL have the form normatively specified in the [GS1 Digital Link standard](#) [GS1DL1.1] and SHALL be restricted to a **highly constrained set of GS1 Digital Link URIs** corresponding to each of the EPC Pure Identity URI schemes defined in TDS.

8.1.3 Private or Industry-wide URN

A Uniform Resource Name (URN) of the form `urn:URNNamespace:...` may be used as a user vocabulary element. Doing so requires that the user who creates the vocabulary element be authorised to use the URN namespace that appears following the `urn:` prefix. For example, the End User may register its own URN namespace with the Internet Assigned Numbers Authority (IANA). Alternatively, an industry consortium or other trading group could register a URN namespace, and define a syntax template beginning with this namespace for use by its members in creating vocabulary elements. Because of the difficulty of registering a URN namespace, this method is typically used by trading groups, not individual end users.

Where specified in section 8.2 through 8.5, a CBV-Compliant document or CBV-Compatible document MAY use a private or industry-wide URN as specified below.

A Private or Industry-wide URN SHALL have the following form:

```
urn:URNNamespace:**:qual:Remainder
```

where the components of this template are as follows:

Template Component	Description
urn:	The characters u, r, n, and : (colon).
URNNamespace	A URN Namespace registered with the Internet Assigned Numbers Authority according to [RFC8141].
:**:	Denotes either a single colon character or any string that conforms to the requirements of [RFC8141] and any syntax rules defined for the registered URN namespace, and which begins and ends with a colon character. In other words, any number of additional subfields may be included between the URN Namespace and the <i>qual</i> component, in order to provide flexibility for URN Namespace owners to administer their namespace.
qual:	An optional qualifier as specified in section 8.2 through 8.5, depending on the type of identifier. This component may be omitted.
Remainder	The remainder of the identifier as specified in section 8.2 through 8.5.

In addition, an identifier of this form SHALL be 128 characters or fewer, and SHOULD be 60 characters or fewer.

Identifiers of this form must be assigned by the owner of the URN Namespace. The owner of the URN Namespace may delegate the authority to assign new identifiers to End Users or other parties, provided that appropriate rules are employed to ensure global uniqueness.

8.1.4 HTTP or HTTPS URL

A Uniform Resource Locator (URL) of the form `http://Domain/..._or` `https://Domain/..._` may be used as a user vocabulary element. Doing so requires that the user who creates the vocabulary element be authorised to use the Internet domain name that appears following the `http:` prefix. Often a subdomain of the End User’s organisation domain is used, for example, the Example Corporation may choose to use `epcis.example.com` as a domain name for constructing user vocabulary identifiers. Because registering an Internet domain name is relatively easy, this method is quite appropriate for use by individual end users as well as by industry groups.

- Note that HTTP and HTTPS URLs used as EPCIS user vocabulary elements do not necessarily refer to a web page. They are just identifiers (names) that happen to use the HTTP or HTTPS URI scheme for the sake of convenience.
- Use of HTTPS is more secure and is therefore recommended as best practice for security reasons. HTTPS URLs should be used in place of HTTP URLs, unless there is a strong reason to do otherwise; EPCIS/CBV 1.x implementations currently using HTTP may continue to do so, but should migrate to HTTPS URLs as soon as is practical for their operations.

Where specified in section 8.2 through 8.5, a CBV-Compliant document or CBV-Compatible document MAY use an HTTP or HTTPS URL.

An HTTP or HTTPS URL SHALL have the following form:

`http://[Subdomain.]Domain/**/qual/Remainder`

or

`https://[Subdomain.]Domain/**/qual/Remainder`

where the components of this template are as follows:

Template Component	Description
<code>http://</code> or <code>https://</code>	The seven characters h, t, t, p, appended by the character s if an HTTPS URL is used in place of an HTTP URL, : (colon), / (slash), and / (slash)

Template Component	Description
[Subdomain.]Domain	<p>An Internet Domain name that has been registered with an Internet Domain Name Registrar, optionally preceded by one or more subdomain names.</p> <p>For example, if <code>example.com</code> is a registered Internet Domain Name, then the following are acceptable values for this component: <code>example.com</code> <code>epcis.example.com</code> <code>a.rather.verbose.example.com</code></p> <p>Unless there is a reason to do otherwise, <code>epcis.example.com</code> is recommended for most End Users (where the End User substitutes its own company or organisational Domain Name for <code>example.com</code>).</p> <p>Explanation (non-normative): Use of a subdomain dedicated to EPCIS, such as <code>epcis.example.com</code>, helps to avoid the possibility of conflict with other uses of the company or organisational domain name, such as URLs of web pages on the company web site. While HTTP and HTTPS URLs used as identifiers in EPCIS events are not usually intended to be dereferenced via a web browser, it is usually helpful to emphasise this fact by making the URL distinct from the URLs used by the company web site.</p>
/**/	<p>Denotes either a single slash character, or any string that matches the grammar rule <code>path-absolute</code> defined in [RFC3986], section 3.3. In other words, any number of additional path components may be included between the authority component and the <code>obj</code> component, in order to provide flexibility for domain owners to administer their namespace.</p>
qual/	<p>An optional qualifier as specified in section 8.2 through 8.5, depending on the type of identifier. This component may be omitted.</p>
Remainder	<p>The remainder of the identifier as specified in section 8.2 through 8.5.</p>

In addition, an identifier of this form SHALL be 128 characters or fewer, and SHOULD be 60 characters or fewer.

Identifiers of this form must be assigned by the owner of the Internet domain `Domain`. The owner of the domain may delegate the authority to assign new identifiers to other parties, provided that appropriate rules are employed to ensure global uniqueness.

Further details about each of these three forms are specified below.

- 
Non-Normative: Explanation: The reason that several different syntax templates are provided for each user vocabulary is to provide flexibility for end users to meet their business requirements. Use of an EPC is preferred for most end user vocabularies; however, EPC codes are somewhat constrained in syntax (e.g., limitations on character set and number of characters allowed), and may not easily accommodate the construction of identifiers based on codes already in use within legacy business systems. The other forms provide an alternative.

8.2 Physical or digital objects (Instance-Level Identification)

Instance-level identifiers for physical or digital objects populate the “what” dimension of EPCIS events. This includes the `epcList`, `parentID`, `childEPCs`, `inputEPCList` and `outputEPCList` fields that may appear within an `EPCIS ObjectEvent`, `AggregationEvent`, `TransactionEvent`, `TransformationEvent` and `AssociationEvent`. See section 1 of [EPCIS] for a further definition of “object” in this sense, also reproduced below.

A CBV-Compliant document SHALL use one of the URI forms specified in this section to populate the above fields of EPCIS events, for every such field that is not null. A CBV-Compatible document MAY use one of the URI forms specified in this section, or MAY

use any other URI that meets the general requirements specified in [EPCIS2.0], section 6.4, except for those URIs which in this standard are forbidden or designated for a different purpose.

Both CBV-Compliant and CBV-Compatible documents SHOULD use the EPC URI form as specified in section 8.2.1 or the GS1 Digital Link URI specified in section 8.2.2 unless there is a strong reason to do otherwise.

 **Non-Normative:** Explanation, quoted from [EPCIS2.0]: “Objects” in the context of EPCIS typically refers to physical objects that are identified either at a class or instance level and which are handled in physical handling steps of an overall business process involving one or more organisations. Examples of such physical objects include trade items (products), logistic units, returnable assets, fixed assets, physical documents, etc. “Objects” may also refer to digital objects, also identified at either a class or instance level, which participate in comparable business process steps. Examples of such digital objects include digital trade items (music downloads, electronic books, etc.), digital documents (electronic coupons, etc.), and so forth. Throughout this document the word “object” is used to denote a physical or digital object, identified at a class or instance level, that is the subject of a business process step. Section 8.2 of this CBV standard defines identifier structures for instance-level identification of Objects; section 8.3 defines identifier structures for class-level identification of Objects.

8.2.1 EPC URI for Instance-level identification of objects

A CBV-Compliant document or CBV-Compatible document MAY use an EPC Pure Identity URI as specified in section 8.1.1 to populate the `epcList`, `inputEPCList`, `outputEPCList`, `parentID`, and `childEPCs` fields that may appear within an EPCIS `ObjectEvent`, `AggregationEvent`, `TransactionEvent`, `TransformationEvent` or `AssociationEvent`. Both CBV-Compliant and CBV-Compatible documents SHOULD use either this form or the GS1 Digital Link URI form (section 8.2.2) unless there is a strong reason to do otherwise.

Both CBV-Compliant and CBV-Compatible documents SHALL NOT use an SGLN EPC (`urn:epc:id:sgln:...`) or PGLN EPC (`urn:epc:id:pgl:n:...`) as an Object identifier.

Both CBV-Compliant and CBV-Compatible documents SHALL NOT use any of the other URI forms for EPCs defined in [TDS].

8.2.2 GS1 Digital Link URIs for Instance-level identification of objects

A CBV-Compliant document or CBV-Compatible document MAY use a GS1 Digital Link URI to populate the `epcList`, `inputEPCList`, `outputEPCList`, `parentID`, and `childEPCs` fields that may appear within an EPCIS `ObjectEvent`, `AggregationEvent`, `TransactionEvent`, `TransformationEvent` or `AssociationEvent`. Both CBV-Compliant and CBV-Compatible documents SHOULD use either this form or the EPC URI form (section 8.2.1) unless there is a strong reason to do otherwise.

A GS1 Digital Link URI suitable for populating the `epcList`, `parentID`, and `childEPCs` fields of EPCIS events SHALL have the form normatively specified in the [GS1 Digital Link standard](#) [GS1DL1.1] and SHALL be restricted to a **highly constrained set of GS1 Digital Link URIs** corresponding to each of the EPC Pure Identity URI schemes defined in TDS, summarised as follows:

EPC Scheme supported by GS1 Digital Link URI	Corresponding GS1 Application Identifier(s)	GS1 Digital Link URI structure prefixed by canonical prefix: <code>https://id.gs1.org</code> or non-canonical prefix: <code>https://example.com/some/path/info</code>	GS1 Digital Link URI example prefixed by canonical prefix: <code>https://id.gs1.org</code> or non-canonical prefix: <code>https://example.com/some/path/info</code>
SGTIN	(01) + (21)	<code>/(01){gtin}/(21){ser}</code>	<code>/01/09521321123459/21/10X8GGUP08</code>
SSCC	(00)	<code>/00/{sscc}</code>	<code>/00/395213212345678909</code>

EPC Scheme supported by GS1 Digital Link URI	Corresponding GS1 Application Identifier(s)	GS1 Digital Link URI structure prefixed by canonical prefix: <code>https://id.gs1.org</code> or non-canonical prefix: <code>https://example.com/some/path/info</code>	GS1 Digital Link URI example prefixed by canonical prefix: <code>https://id.gs1.org</code> or non-canonical prefix: <code>https://example.com/some/path/info</code>
GRAI	(8003)	/8003/{grai}	/8003/95213218900091234AX01
GIAI	(8004)	/8004/{giai}	/8004/9521321481cd14225
GSRN	(8018)	/8018/{gsrn}	/8018/952132153123456784
GSRNP	(8017)	/8017/{gsrnp}	/8017/952132160000000039
GDTI	(253)	/253/{gdti}	/253/95213214000170003555480001000
CPI	(8010) + (8011)	/8010/{cpi}/8011/{cpiserial}	/8010/95213215PQ7%2F243/8011/12345
SGCN	(255)	/255/{gcn}	/255/952132167890404711
GINC	(401)	/401/{ginc}	/401/9521321xyz47%2F11
GSIN	(402)	/402/{gsin}	/402/95213211234567897
ITIP	(8006) + (21)	/8006/{itip}/21/{ser}	/8006/095213211234590102(21)mw133
UPUI	(01) + (235)	/01/{gtin}/235/{tpx}	/01/09521321543219/235/9vs%2A%29%3Ek85Jp3%2Aj7

 **Non-Normative:** Example (non-normative):

The following GS1 Element String:

(01) 09521141123455 (21) 4711

would be encoded as a **canonical** GS1 Digital Link URI as follows:

`https://id.gs1.org/01/09521141123455/21/4711`

or as a **non-canonical** GS1 Digital Link URI as follows:

`https://example.com/some/path/info/01/09521141123455/21/4711`

The following GS1 Element Strings:

(01) 09521141123455 (17)201231 (21) 4711

(01) 09521141123455 (10)S018456 (21) 4711

MAY NOT be encoded in this combination as a GS1 Digital Link URI for populating the `epcList`, `parentID`, and `childEPCs` fields of EPCIS events, because neither of these combinations correspond to one of the EPC Pure Identity URI schemes. Instead, each of these two element strings would be encoded as the identical canonical GS1 Digital Link URI equivalent of the SGTIN EPC, as follows:

`https://id.gs1.org/01/09521141123455/21/4711`

8.2.3 Private or Industry-wide URN for Instance-level identification of objects

A CBV-Compliant document or CBV-Compatible document MAY use a private or industry-wide URN as specified below to populate the `epcList`, `parentID`, and `childEPCs` fields that may appear within an EPCIS `ObjectEvent`, `AggregationEvent`, `TransactionEvent` or `AssociationEvent`. However, both CBV-Compliant and CBV-Compatible documents SHOULD use either the EPC URI form (section 8.2.1) or the GS1 Digital Link URI form (section 8.2.2) unless there is a strong reason to do otherwise. See section 8.1 for general considerations regarding the use of Private or Industry-wide URI identifiers.

A Private or Industry-wide URI suitable for populating the `epcList`, `parentID`, and `childEPCs` fields of EPCIS events SHALL have the following form:

`urn:URNNamespace:**:obj:Objid`

where the components of this template are as follows:

Template Component	Description
urn:URNNamespace:**:	As specified in section 8.1.3 .
obj:	The characters o, b, j, and : (colon).
Objid	An identifier for the object that complies with the requirements of [RFC8141] and any syntax rules defined for the registered URN namespace <i>URNNamespace</i> , and which does not contain a colon character. This identifier must be unique relative to all other identifiers that begin with the same prefix.

Identifiers of this form must be assigned by the owner of the URN Namespace. The owner of the URN Namespace may delegate the authority to assign new identifiers to End Users or other parties, provided that appropriate rules are employed to ensure global uniqueness.

8.2.4 HTTP or HTTPS URLs for Instance-level identification of objects

A CBV-Compliant document or CBV-Compatible document MAY use an **HTTP or HTTPS** URL as specified below to populate the *epcList*, *parentID*, and *childEPCs* fields that may appear within an EPCIS *ObjectEvent*, *AggregationEvent*, *TransactionEvent* or *AssociationEvent*. However, both CBV-Compliant and CBV-Compatible documents SHOULD use the EPC URI form (section [8.2.1](#)) or the GS1 Digital Link URI form (section [8.2.2](#)) unless there is a strong reason to do otherwise. See section [8.1](#) for general considerations regarding the use of HTTP URL identifiers.

An HTTP or HTTPS URL (i.e., all URLs other than GS1 Digital Link URIs defined in section [8.2.2](#)) suitable for populating the *epcList*, *parentID*, and *childEPCs* fields of EPCIS events SHALL have the following form:

`http://[Subdomain.]Domain/**/obj/Objid`

or

`https://[Subdomain.]Domain/**/obj/Objid`

where the components of this template are as follows:

Template Component	Description
<code>http://[Subdomain.]Domain/**/</code> or <code>https://[Subdomain.]Domain/**/</code>	As specified in section 8.1.4 .
<code>obj/</code>	The characters o, b, j, and / (slash).
<code>Objid</code>	An identifier for the object that matches the grammar rule <i>segment-nz</i> defined in [RFC3986], and which is unique relative to all other identifiers that begin with the same prefix. Note that <i>Objid</i> may not contain a slash character; only one URI path component SHALL follow the /obj/ in a CBV-compliant http-based identifier.

Identifiers of this form must be assigned by the owner of the Internet domain *Domain*. The owner of the domain may delegate the authority to assign new identifiers to other parties, provided that appropriate rules are employed to ensure global uniqueness.



Non-Normative: Examples of correct and incorrect usage:

Correct:

```
<epc>http://epcis.example.com/user/vocab/obj/1234
5.67890</epc>
```

Incorrect:

```
<epc>http://epcis.example.com/user/vocab/obj/id/1
2345.67890</epc> WRONG
```

- ✔ **Note:** Examples (in XML and JSON/JSON-LD format) are published at <https://ref.gs1.org/docs/epcis/examples/>.

8.3 Physical or digital objects (Class-level identification)

Class-level identifiers for physical or digital objects populate the “what” dimension of EPCIS events. This includes the `epcClass`, `quantityList`, `childQuantityList`, `inputQuantityList` and `outputQuantityList` fields within the `quantityElement` structures that may appear within an EPCIS `ObjectEvent`, `AggregationEvent`, `TransactionEvent`, `TransformationEvent` or `AssociationEvent`. See section 1 of [EPCIS] for a further definition of “object” in this sense, also reproduced below.

A CBV-Compliant document SHALL use one of the three URI forms specified in this section to populate the above fields of EPCIS events, for every such field that is not null. A CBV-Compatible document MAY use one of the three URI forms specified in this section, or MAY use any other URI that meets the general requirements specified in [EPCIS1.2], section 6.4, except for those URIs which in this standard are forbidden or designated for a different purpose.

Both CBV-Compliant and CBV-Compatible documents SHOULD use either the EPC URI form, as specified in section 8.3.1, or the GS1 Digital Link URI form, as specified in section 8.3.2, unless there is a strong reason to do otherwise.

- ✔ **Non-Normative:** Explanation (non-normative), quoted from [EPCIS2.0]: “Objects” in the context of EPCIS typically refers to physical objects that are identified either at a class or instance level and which are handled in physical handling steps of an overall business process involving one or more organisations. Examples of such physical objects include trade items (products), logistic units, returnable assets, fixed assets, physical documents, etc. “Objects” may also refer to digital objects, also identified at either a class or instance level, which participate in comparable business process steps. Examples of such digital objects include digital trade items (music downloads, electronic books, etc.), digital documents (electronic coupons, etc.), and so forth. Throughout this document the word “object” is used to denote a physical or digital object, identified at a class or instance level, that is the subject of a business process step. Section 8.2 of this CBV standard defines identifier structures for instance-level identification of Objects; section 8.3 defines identifier structures for class-level identification of Objects.

8.3.1 EPC URI for Class-level identification of objects

A CBV-Compliant document or CBV-Compatible document MAY use one of the following URI forms specified in the EPC Tag Data Standard [TDS] to populate the `epcClass` field within the EPCIS `QuantityEvent` (deprecated in EPCIS 1.1) and within the `quantityElement` structures that may appear within an EPCIS `ObjectEvent`, `AggregationEvent`, `TransactionEvent`, `TransformationEvent` or `AssociationEvent`:

Identifier Type	URI Form	GS1 Digital Link URI structure prefixed by canonical prefix: <code>https://id.gs1.org</code> <i>or</i> non-canonical prefix: <code>https://example.com/some/path/info</code>
GTIN	<code>urn:epc:idpat:sgtin:CCC.III.*</code>	<code>/(01){gtin}</code>

Identifier Type	URI Form	GS1 Digital Link URI structure prefixed by canonical prefix: <code>https://id.gs1.org</code> or non-canonical prefix: <code>https://example.com/some/path/info</code>
GTIN+batch/lot	<code>urn:epc:class:lgtn:CCC.III.LLL</code>	<code>/(01)/{gtin}/(10)/{lot}</code>
GRAI (no serial)	<code>urn:epc:idpat:grai:CCC.TTT.*</code>	<code>/8003/{grai}</code>
GDTI (no serial)	<code>urn:epc:idpat:gdti:CCC.TTT.*</code>	<code>/253/{gdti}</code>
GCN (no serial)	<code>urn:epc:idpat:sgcn:CCC.TTT.*</code>	<code>/255/{gcn}</code>
CPI (no serial)	<code>urn:epc:idpat:cpi:CCC.TTT.*</code>	<code>/8010/{cpi}</code>
ITIP (no serial)	<code>urn:epc:idpat:itip:CCC.III.PPP.SSS</code>	<code>/8006/{itip}</code>

where:

- CCC is the GS1 Company Prefix portion of an EPC Pure Identity Pattern URI
- III is the Indicator + Item Reference portion of an SGTIN EPC Pure Identity Pattern URI, the Indicator + Item Reference portion of an LGTIN EPC Class URI or an ITIP EPC Pure Identity Pattern URI
- TTT is the Returnable Asset Type, Document Type, Coupon Reference, or Component/Part Type portion of an EPC Pure Identity Pattern for GRAI, GDTI, SGCN, or CPI, respectively.
- PPP is the Piece portion of an ITIP EPC Pure Identity Pattern URI
- SSS is the Total portion of an ITIP EPC Pure Identity Pattern URI

A CBV-Compliant document or CBV-Compatible document SHALL NOT use any other Pure Identity Pattern URI form specified in [TDS, section 8]. This includes, for example, an SSCC Pure Identity Pattern URI, or an SGTIN Pure Identity Pattern URI with two "*" wildcards.

Both CBV-Compliant and CBV-Compatible documents SHALL NOT use any of the other URI forms for EPCs defined in [TDS].

8.3.1.1 Explanation (non-normative)

TDS defines EPC Pure Identity Pattern URIs as a way to specify a pattern that matches many instance-level EPCs. For example, the EPC Pure Identity Pattern URI `urn:epc:idpat:sgtin:9521141.112345.*` matches any SGTIN URI that begins with `urn:epc:idpat:sgtin:9521141.112345`, for example the specific SGTIN URI `urn:epc:idpat:sgtin:9521141.112345.400`. In the EPCIS Simple Event Query, such a pattern may be used to match EPCIS events whose "what" dimension contains instance-level identifiers that have a specified GTIN and any serial number.

The table above specifies the use of EPC Pure Identity Pattern URIs to achieve a second purpose, namely as class-level identifiers for use in the Quantity Element fields of EPCIS events. In this usage, the URI

`urn:epc:idpat:sgtin:9521321.012345.*` refers to the object class identified by GTIN 09521321123458.

Not all EPC Pure Identity Pattern URIs make sense as class-level identifiers. For example, when `urn:epc:idpat:sgtin:9521321.*.*` is used in an EPCIS query to match instance-level identifiers, it matches all SGTIN identifiers that include GS1 Company Prefix 9521321. This is valid as a matching condition for a query, but there is no corresponding object class and so this is not a valid class-level identifier. A similar argument applies to a URI such as `urn:epc:idpat:sscc:9521321.*`, and the other EPC Pattern URIs not included in the table above.

8.3.2 GS1 Digital Link URIs for Class-level identification of objects

A GS1 Digital Link URI suitable for populating the `epcClass` fields of EPCIS events SHALL have the form normatively specified in the [GS1 Digital Link standard](#) [GS1DL1.1] and SHALL be restricted to a **highly constrained set of GS1 Digital**

Link URIs corresponding to each of the EPC Pure Identity URI schemes defined in TDS, summarised as follows:

EPC Scheme supported by GS1 Digital Link URI	Corresponding GS1 Application Identifier(s)	GS1 Digital Link URI structure prefixed by canonical prefix: <code>https://id.gs1.org</code> <i>or</i> non-canonical prefix: <code>https://example.com/some/path/info</code>	GS1 Digital Link URI example prefixed by canonical prefix: <code>https://id.gs1.org</code> <i>or</i> non-canonical prefix: <code>https://example.com/some/path/info</code>
SGTIN pattern	(01)	<code>/(01)/{gtin}</code>	<code>/01/09521321123459</code>
LG TIN	(01) + (10)	<code>/(01)/{gtin}/(10)/{lot}</code>	<code>/01/09521321123459/10/94519E</code>
GRAI no serial	(8003)	<code>/8003/{grai}</code>	<code>/8003/9521321890009</code>
GDTI no serial	(253)	<code>/253/{gdti}</code>	<code>/253/9521321400017</code>
GCN	(255)	<code>/255/{gcn}</code>	<code>/255/9521321678904</code>
CPI no serial	(8010)	8010	<code>/8010/95213215FQ7%2FZ43/</code>
ITIP no serial	(8006)	<code>/8006/{itip}</code>	<code>/8006/095213211234590102</code>

8.3.3 Private or Industry-wide URN for Class-level identification of objects

A CBV-Compliant document or CBV-Compatible document MAY use a private or industry-wide URN as specified below to populate the `epcClass` field within the `EPCIS QuantityEvent` (deprecated in EPCIS 1.1) and within the `quantityElement` structures that may appear within an `EPCIS ObjectEvent`, `AggregationEvent`, `TransactionEvent`, `TransformationEvent` or `AssociationEvent`. However, both CBV-Compliant and CBV-Compatible documents SHOULD use the EPC URI form (section 8.3.1) unless there is a strong reason to do otherwise. See section 8.1 for general considerations regarding the use of Private or Industry-wide URI identifiers.

A Private or Industry-wide URI suitable for populating the `epcClass` field of EPCIS events SHALL have the following form:

`urn:URNNamespace:**:class:ObjClassid`

where the components of this template are as follows:

Template Component	Description
<code>urn:URNNamespace:**:</code>	As specified in section 8.1.3
<code>class:</code>	The characters <code>c</code> , <code>l</code> , <code>a</code> , <code>s</code> , <code>s</code> , and <code>:</code> (colon).
<code>ObjClassid</code>	An identifier for the object class that complies with the requirements of [RFC8141] and any syntax rules defined for the registered URN namespace <code>URNNamespace</code> , and which does not contain a colon character. This identifier must be unique relative to all other identifiers that begin with the same prefix.

Identifiers of this form must be assigned by the owner of the URN Namespace. The owner of the URN Namespace may delegate the authority to assign new identifiers to End Users or other parties, provided that appropriate rules are employed to ensure global uniqueness.

 **Note:** Examples (in XML and JSON/JSON-LD format) are published at <https://ref.gs1.org/docs/epcis/examples/>.

8.3.4 HTTP or HTTPS URLs for Class-level identification of objects

A CBV-Compliant document or CBV-Compatible document MAY use an **HTTP or HTTPS** URL as specified below to populate the `epcClass` field within the `EPCIS QuantityEvent` (deprecated in EPCIS 1.1) and within the `quantityElement`

structures that may appear within an EPCIS `ObjectEvent`, `AggregationEvent`, `TransactionEvent`, `TransformationEvent` or `AssociationEvent`. However, both CBV-Compliant and CBV-Compatible documents SHOULD use the EPC URI form (section 8.3.1) or GS1 Digital Link URI form (section 8.3.2) unless there is a strong reason to do otherwise. See section 8.1 for general considerations regarding the use of HTTP and HTTPS URL identifiers.

An HTTP or HTTPS URL (i.e., all URLs other than GS1 Digital Link URIs defined in section 8.3.2) suitable for populating the `epcClass` fields of EPCIS events SHALL have the following form:

`http://[Subdomain.]Domain/**/class/ObjClassid`

or

`https://[Subdomain.]Domain/**/class/ObjClassid`

where the components of this template are as follows:

Template Component	Description
<code>http://[Subdomain.]Domain/**/</code> OR <code>https://[Subdomain.]Domain/**/</code>	As specified in section 8.1.4.
<code>class/</code>	The characters <code>c</code> , <code>l</code> , <code>a</code> , <code>s</code> , <code>s</code> , and <code>/</code> (slash).
<code>ObjClassid</code>	An identifier for the object class that matches the grammar rule <code>segment-nz</code> defined in [RFC3986], and which is unique relative to all other identifiers that begin with the same prefix. Note that <code>ObjClassid</code> may not contain a slash character; only one URI path component SHALL follow the <code>/class/</code> in a CBV-compliant http-based identifier.

Identifiers of this form must be assigned by the owner of the Internet domain `Domain`. The owner of the domain may delegate the authority to assign new identifiers to other parties, provided that appropriate rules are employed to ensure global uniqueness.

 **Non-Normative:** Examples of correct and incorrect usage:

Correct:

`<epc>http://epcis.example.com/user/vocab/class/12345.67890</epc>`

Incorrect:

`<epc>http://epcis.example.com/user/vocab/class/id/12345.67890</epc>` **WRONG**

 **Note:** Examples (in XML and JSON/JSON-LD format) are published at <https://ref.gs1.org/docs/epcis/examples/>.

8.4 Locations

Identifiers for locations populate the “where” dimension of EPCIS events. This includes the `readPoint` and `bizLocation` fields in all EPCIS event types.

A CBV-Compliant document SHALL use one of the four URI forms specified in this section to populate the above fields of EPCIS events, for every such field that is not null. A CBV-Compatible document MAY use one of the four URI forms specified in this section, or MAY any other URI that meets the general requirements specified in [EPCIS], section 6.4, except for those URIs which in this standard are forbidden or designated for a different purpose.

Both CBV-Compliant and CBV-Compatible documents SHOULD use the EPC URI form as specified in section 8.4.1 unless there is a strong reason to do otherwise.

8.4.1 EPC URI for Location identification

A CBV-Compliant document or CBV-Compatible document MAY use an EPC Pure Identity URI as specified in section 8.1.1 to populate the readPoint and bizLocation fields in all EPCIS event types. Both CBV-Compliant and CBV-Compatible documents SHOULD use either this form or the GS1 Digital Link URI form specified in section 8.4.2 unless there is a strong reason to do otherwise.

Both CBV-Compliant and CBV-Compatible documents SHOULD NOT use EPC schemes other than SGLN EPCs (urn:epc:id:sgln:...) for location identifiers, unless there is a strong reason to do so.

Both CBV-Compliant and CBV-Compatible documents SHALL NOT use any of the other URI forms for EPCs defined in [TDS].

8.4.2 GS1 Digital Link URIs for Location identification

A GS1 Digital Link URI suitable for populating the readPoint and businessLocation fields of EPCIS events SHALL have the form normatively specified in the GS1 Digital Link standard [GS1DL] and SHALL be restricted to a **highly constrained set of GS1 Digital Link URIs** corresponding to each of the EPC Pure Identity URI schemes defined in TDS, summarised as follows:

EPC Scheme supported by GS1 Digital Link URI	Corresponding GS1 Application Identifier(s)	GS1 Digital Link URI structure prefixed by canonical prefix: https://id.gs1.org or non-canonical prefix: https://example.com/some/path/info	GS1 Digital Link URI example prefixed by canonical prefix: https://id.gs1.org or non-canonical prefix: https://example.com/some/path/info
SGLN	(414) + (254)	/414/{g1n}/254/{g1nx}	/414/9521321123459/254/5678

8.4.3 Private or Industry-wide URN for Location identification

A CBV-Compliant document or CBV-Compatible document MAY use a private or industry-wide URN as specified below to populate the readPoint and bizLocation fields in all EPCIS event types. However, both CBV-Compliant and CBV-Compatible documents SHOULD use the EPC URI form (section 8.4.1) unless there is a strong reason to do otherwise. See section 8.1 for general considerations regarding the use of Private or Industry-wide URI identifiers.

A Private or Industry-wide URI suitable for populating the readPoint and bizLocation fields in all EPCIS event types SHALL have the following form:

urn:URNNamespace:**:loc:Locid

where the components of this template are as follows:

Template Component	Description
urn:URNNamespace:**:	As specified in section 8.1.3.
loc:	The characters l, o, c, and : (colon).
Locid	An identifier for the location that complies with the requirements of [RFC8141] and any syntax rules defined for the registered URN namespace URN <i>Namespace</i> , and which does not contain a colon character. This identifier must be unique relative to all other identifiers that begin with the same prefix.

Identifiers of this form must be assigned by the owner of the URN Namespace. The owner of the URN Namespace may delegate the authority to assign new identifiers to End Users or other parties, provided that appropriate rules are employed to ensure global uniqueness.

 **Note:** Examples (in XML and JSON/JSON-LD format) are published at <https://ref.gs1.org/docs/epcis/examples/>.

8.4.4 HTTP or HTTPS URLs for Location identification

A CBV-Compliant document or CBV-Compatible document MAY use an **HTTP or HTTPS** URL as specified below to populate the `readPoint` and `bizLocation` fields in all EPCIS event types. However, both CBV-Compliant and CBV-Compatible documents SHOULD use the EPC URI form (section 8.4.1) or GS1 Digital Link URI form (section 8.4.2) unless there is a strong reason to do otherwise. See section 8.1 for general considerations regarding the use of HTTP and HTTPS URL identifiers.

An HTTP or HTTPS URL (i.e., all URLs other than GS1 Digital Link URIs defined in section 8.4.2) suitable for populating the `readPoint` and `bizLocation` fields in all EPCIS event types SHALL have the following form:

```
http://[Subdomain.]Domain/**/loc/Locid
```

or

```
https://[Subdomain.]Domain/**/loc/Locid
```

where the components of this template are as follows:

Template Component	Description
http://[Subdomain.]Domain/**/ or https://[Subdomain.]Domain/**/	As specified in section 8.1.4.
loc/	The characters l, o, c, and / (slash).
Locid	An identifier for the location that matches the grammar rule <code>segment-nz</code> defined in [RFC3986], , and which is unique relative to all other identifiers that begin with the same prefix. Note that Locid may not contain a slash character; only one URI path component SHALL follow the /loc/ in a CBV-compliant http-based identifier.

Identifiers of this form must be assigned by the owner of the Internet domain `Domain`. The owner of the domain may delegate the authority to assign new identifiers to other parties, provided that appropriate rules are employed to ensure global uniqueness.

✔ **Non-Normative:** Examples of correct and incorrect usage:

Correct:

```
<epc>http://epcis.example.com/user/vocab/loc/1234  
5.67890</epc>
```

Incorrect:

```
<epc>http://epcis.example.com/user/vocab/loc/id/1  
2345.67890</epc> WRONG
```

✔ **Note:** Examples (in XML and JSON/JSON-LD format) are published at <https://ref.gs1.org/docs/epcis/examples/>.

8.4.5 Geographic Location URIs for Location identifiers

A CBV-Compliant document or CBV-Compatible document MAY use a geographic location URI as specified in [RFC5870] to populate the `readPoint` and `bizLocation` fields in all EPCIS event types. Such identifiers may be used in situations where it is not feasible to assign a unique location identifier; for example, to indicate the location of a ship on the open ocean. Both CBV-Compliant and CBV-Compatible documents SHOULD use a location identifier as specified in section 8.4.1 through 8.4.4 (with preference given to the EPC URI form as specified in section 8.4.1 or the GS1 Digital Link URI form specified in section 8.4.2) unless a geographic location URI is the only feasible alternative.

The syntax and meaning of geographic location URIs is specified in [RFC5870].

-  **Non-Normative:** Explanation (non-normative): The simplest form of RFC5870-compliant geographic location URI looks like this: `geo:22.300,-118.44`. This example denotes the geographic location with latitude 22.300 degrees (north) and longitude 118.44 degrees (west). Other forms of the `geo` URI allow for the inclusion of altitude, uncertainty radius, and reference coordinate system. Please consult [RFC5870] for details of these and other considerations that apply to the use of the geographic location URI.

8.5 Business transactions

Identifiers for business transactions populate the “why” dimension of EPCIS events. This includes the `bizTransactionList` field in all EPCIS event types.

The EPCIS standard provides for a business transaction to be identified by a pair of identifiers, the “business transaction identifier” (hereinafter “BTI”) that names a particular business transaction, and an optional “business transaction type” (hereinafter “BTT”) that says what kind of business transaction the identifier denotes (purchase order, invoice, etc.). Section 7.3 of this standard provides standardised values for BTTs.

URI forms for BTIs are specified below. A CBV-Compliant document SHALL use one of the six URI forms specified in this section to populate the BTI field (text content of the `bizTransaction` element) of EPCIS events, for every such field that is not null. A CBV-Compatible document MAY use one of the six URI forms specified in this section, or MAY use any other URI that meets the general requirements specified in [EPCIS2.0], section 6.4, except for those URIs which in this standard are forbidden or designated for a different purpose.

A `bizTransaction` element in an EPCIS event includes a BTI and an optional BTT in any of the following three combinations:

-  If the goal is to communicate a business transaction identifier without indicating its type, a BTI is included and the BTT omitted.
-  If the goal is to communicate a business transaction identifier and to indicate its type, and furthermore the type is one of the CBV standard types specified in section 7.3, a BTI is included, and one of the URIs specified in section 7.3 is included as the BTT.
-  If the goal is to communicate a business transaction identifier and to indicate its type, and furthermore the type is not one of the CBV standard types specified in section 7.3, the BTI is included, and some URI that does not begin with `urn:epcglobal:cbv:...` is included as the BTT. (This is CBV-Compatible but not CBV-Compliant.)

8.5.1 EPC URI for Business transaction identifiers

A CBV-Compliant document or CBV-Compatible document MAY use an EPC Pure Identity URI as specified in section 8.1.1 as a business transaction identifier in all EPCIS event types.

If EPC URIs are used, CBV-Compliant and CBV-Compatible documents SHOULD use GDTI EPCs (`urn:epc:id:gdti:...`) or GSRN EPCs (`urn:epc:id:gsrc:...`) for business transaction identifiers. GDTI EPCs SHOULD only be used as business transaction identifiers when they have been assigned to denote a business transaction, rather than a physical document not connected with any business transaction.

Both CBV-Compliant and CBV-Compatible documents SHALL NOT use any of the other URI forms for EPCs defined in [TDS].

-  **Non-Normative:** Explanation (non-normative): One of the intended uses of the Global Document Type Identifier (GDTI) is to identify business transactions such as invoices, purchase orders, and so on. When a GDTI is used in this way, it is suitable for use as a business transaction identifier in EPCIS. However,

many business information systems use other types of identifiers for business transactions, and so the use of GDTI is not as strongly recommended as SGLNs are for locations or other types of EPCs are for physical or digital objects. It is also for this reason that the form in section 8.5.2 is provided.



Note: Examples (in XML and JSON/JSON-LD format) are published at <https://ref.gs1.org/docs/epcis/examples/>.

8.5.2 GS1 Digital Link URIs for business transaction identification

A GS1 Digital Link URI suitable for use as a business transaction identifier in EPCIS events SHALL have the form normatively specified in the [GS1 Digital Link standard](#) [GS1DL] and SHALL be restricted to a **highly constrained set of GS1 Digital Link URIs** corresponding to each of the EPC Pure Identity URI schemes defined in TDS, summarised as follows:

EPC Scheme supported by GS1 Digital Link URI	Corresponding GS1 Application Identifier(s)	GS1 Digital Link URI structure prefixed by canonical prefix: https://id.gs1.org or non-canonical prefix: https://example.com/some/path/info	GS1 Digital Link URI example prefixed by canonical prefix: https://id.gs1.org or non-canonical prefix: https://example.com/some/path/info
GDTI	(253)	/253/{gdti}	/253/95213214000170003555480001000
GSRN	(8018)	/8018/{gsrn}	/8018/952132153123456784

8.5.3 GLN-based identifier for legacy system business transaction identifiers

A CBV-Compliant document or CBV-Compatible document MAY use a GLN-based identifier as specified below as a business transaction identifier in all EPCIS event types.

A GLN-based URI suitable for use as a business transaction identifier in all EPCIS event types SHALL have the following form: `urn:epcglobal:cbv:bt:gln:transID` where the components of this template are as follows:

Template Component	Description
<code>urn:epcglobal:cbv:bt:</code>	The 21 characters <code>u</code> , <code>r</code> , <code>n</code> , ..., <code>b</code> , <code>t</code> , and <code>:</code> (colon).
<code>gln:</code>	A 13-digit Global Location Number (GLN) that identifies the business system within which <code>transID</code> is defined, followed by a colon. This is typically a "party GLN" that identifies the organisation responsible for the business transaction identifier, or a division of an organisation that maintains a separate divisional business information system.
<code>transID</code>	An identifier for the business transaction that complies with the requirements of [RFC8141] and which does not contain a colon character. This identifier must be unique relative to all other identifiers that begin with the same prefix.

Identifiers of this form must be assigned by the owner of the GLN that is embedded in the identifier. The owner of the GLN may delegate the authority to assign new identifiers to other parties, provided that appropriate rules are employed to ensure global uniqueness.



Note: Examples (in XML and JSON/JSON-LD format) are published at <https://ref.gs1.org/docs/epcis/examples/>.

8.5.4 Private or Industry-wide URN for business transaction identifiers

A CBV-Compliant document or CBV-Compatible document MAY use a private or industry-wide URN as specified below as a business transaction identifier in all EPCIS event types.

A private or industry-wide URN suitable for use as a business transaction identifier in all EPCIS event types SHALL have the following form:
 urn:URNNamespace:**:bt:transID where the components of this template are as follows:

Template Component	Description
urn:URNNamespace:**:	As specified in section 8.1.3.
bt:	The characters b, t, and : (colon).
transID	An identifier for the business transaction that complies with the requirements of [RFC8141] and any syntax rules defined for the registered URN namespace URN <i>Namespace</i> , and which does not contain a colon character. This identifier must be unique relative to all other identifiers that begin with the same prefix.

Identifiers of this form must be assigned by the owner of the URN Namespace. The owner of the URN Namespace may delegate the authority to assign new identifiers to End Users or other parties, provided that appropriate rules are employed to ensure global uniqueness.

 **Note:** Examples (in XML and JSON/JSON-LD format) are published at <https://ref.gs1.org/docs/epcis/examples/>.

8.5.5 HTTP or HTTPS URLs for business transaction identifiers

A CBV-Compliant document or CBV-Compatible document MAY use an **HTTP or HTTPS** URL as specified below as a business transaction identifier in all EPCIS event types.

An HTTP or HTTPS URL (i.e., all URLs other than GS1 Digital Link URIs defined in section 8.5.2) suitable for use as a business transaction identifier in all EPCIS event types SHALL have the following form:

`http://[Subdomain.]Domain/**/bt/transID`

or

`https://[Subdomain.]Domain/**/bt/transID`

where the components of this template are as follows:

Template Component	Description
<code>http://[Subdomain.]Domain/**/</code> or <code>https://[Subdomain.]Domain/**/</code>	As specified in section 8.1.4.
<code>bt/</code>	The characters b, t, and / (slash).
<code>transID</code>	An identifier for the business transaction that matches the grammar rule <code>segment-nz</code> defined in [RFC3986], and which is unique relative to all other identifiers that begin with the same prefix. Note that transid may not contain a slash character; only one URI path component SHALL follow the /bt/ in a CBV-compliant http-based identifier.

Identifiers of this form must be assigned by the owner of the Internet domain `Domain`. The owner of the domain may delegate the authority to assign new identifiers to other parties, provided that appropriate rules are employed to ensure global uniqueness.

 **Non-Normative:** Examples of correct and incorrect usage:

Correct:

```
<epc>http://epcis.example.com/user/vocab/bt/12345.67890</epc>
```

Incorrect:

```
<epc>http://epcis.example.com/user/vocab/bt/id/12
345.67890</epc> WRONG
```



Note: Examples (in XML and JSON/JSON-LD format) are published at <https://ref.gs1.org/docs/epcis/examples/>.

8.6 Hash URI for business transaction identifiers

A CBV-Compliant document or CBV-Compatible document MAY use a URI notation according to [RFC6920] to embed hashed data as specified below as a business transaction identifier in all EPCIS event types.

Note that a hash value by itself is not a viable identifier for business transactions. In this regard, a Hash URI should only be used in situations in which it is necessary to embed the hash value of a given business document, e.g. to validate that a data file has not been tampered with. Both CBV-Compliant and CBV-Compatible documents SHALL insert one of the business transaction IDs as specified in section 8.5.1 to 8.5.2 into the query string of a Hash URI.

A Hash URI suitable for use as a business transaction identifier in all EPCIS event types SHALL have the following form:

`ni://[authority]/hashAlgorithm;hashValue?btid=bturi&mt=mediaType` where the components of this template are as follows:

Template Component	Description
<code>ni://</code>	The characters <code>n</code> , <code>i</code> , <code>:</code> (colon), <code>/</code> (slash) and <code>/</code> (slash) Remark: 'ni' indicates the URI scheme ('Named Information')
<code>[authority]</code>	(Optional) Domain name
<code>/</code>	The character <code>/</code> (slash)
<code>hashAlgorithm</code>	The name of the hash algorithm as specified in the IANA Named Information Hash Algorithm Registry (https://www.iana.org/assignments/named-information/named-information.xhtml)
<code>;</code>	The character <code>;</code> (semicolon)
<code>hashValue</code>	Value of the hash function, which SHALL have a base64url encoding without the character <code>=</code> (equals sign)
<code>?</code>	The character <code>?</code> (question mark) – query parameter separator
<code>btid=</code>	The characters <code>b</code> , <code>t</code> , <code>i</code> , <code>d</code> and <code>=</code> (equals sign)
<code>bturi</code>	Business transaction URI as specified in section 8.5.1 to 8.5.4 of this standard, complying with the requirements of [RFC8141]. Characters that are not permitted to appear in the query string of a URI (see section 3.4 of [RFC3986]), e.g., such as <code>#</code> (number sign), must be percent-encoded using the method defined in section 2.1 of [RFC3986].
<code>&mt=</code>	The characters <code>&</code> (ampersand), <code>m</code> , <code>t</code> and <code>=</code> (equals sign)
<code>mediaType</code>	The media type of the referred document/file (e.g. "application/pdf" or "application/zip") as indexed in https://www.iana.org/assignments/media-types/media-types.xhtml



Non-Normative: Examples:

Taking the example of hash algorithm SHA-256, a Hash URI looks as follows:

```
ni:///sha256;9ed1b204ec3f1b37d318ceab3f79dfd7d9743234512bc34818b4c7
36f829876?btid=urn:epc:id:gdti:4012345.11111.987&mt=application/pdf
```

In this case, users can verify – with a reasonable level of certainty – that the content of a given document or file, identified with a GDTI EPC URI (here: "urn:epc:id:gdti:4012345.11111.987"), is authentic. For that purpose, they just need to verify if the hash value of the document identified by the `bturi` is identical to the `hashValue` included in the Hash URI.

In addition to the example above, the following notation enables online access to the referred file:

```
ni://api.example.com/sha-
256;9ed1b204ec3f1b37d318ceaeb3f79dfd7d9743234512bc348
18b4c736f829876?btid=urn:epc:id:gdti:4012345.11111.987&mt=applicatio
n/pdf
```

Following the mapping approach described in section 4 of [RFC6920], the corresponding HTTP(S) URL of the previous Hash URI would appear as follows:

```
https://api.example.com/.well-
known/ni/sha256/9ed1b204ec3f1b37d318ceaeb3f79dfd7
d9743234512bc34818b4c736f829876?btid=urn:epc:id:gdti:4012345.11111.9
87&mt=application/pdf
```

8.7 Source/Destination identifiers

Identifiers for sources and destinations populate the `source` and `destination` elements in the `sourceList` and `destinationList` (respectively) in the “why” dimension of EPCIS events.

A CBV-Compliant document SHALL use one of the four URI forms specified in this section to populate the above fields of EPCIS events. A CBV-Compatible document MAY use one of the four URI forms specified in this section, or MAY use any other URI that meets the general requirements specified in [EPCIS], section 6.4, except for those URIs which in this standard are forbidden or designated for a different purpose.

Both CBV-Compliant and CBV-Compatible documents SHOULD use the EPC URI form as specified in section 8.7.1 or GS1 Digital Link URI form specified in section 8.7.2 unless there is a strong reason to do otherwise.

8.7.1 EPC URI for Source/Destination identifiers

Both CBV-Compliant and CBV-Compatible documents SHOULD NOT use EPC schemes other than SGLN EPCs (`urn:epc:id:sgln:...`) for source and destination identifiers, unless there is a strong reason to do so.

In particular, SGLNs should be used to identify the endpoints of a business transfer, where the Source/Destination type is location; PGLN the preferred EPC scheme for identifying the owning party or possessing party, though SGLN may be used in migration phases, in the interest of backward compatibility with EPCIS/CBV 1.2 and TDS 1.12.

Both CBV-Compliant and CBV-Compatible documents SHALL NOT use any of the other URI forms for EPCs defined in [TDS].

8.7.2 GS1 Digital Link URIs for Source/Destination identification

A GS1 Digital Link URI suitable for populating the `source` and `destination` fields of EPCIS events SHALL have the form normatively specified in the [GS1 Digital Link standard](#) [GS1DL1.1] and SHALL be restricted to a **highly constrained set of GS1 Digital Link URIs** corresponding to each of the EPC Pure Identity URI schemes defined in TDS, summarised as follows:

EPC Scheme supported by GS1 Digital Link URI	Corresponding GS1 Application Identifier(s)	GS1 Digital Link URI structure prefixed by canonical prefix: <code>https://id.gs1.org</code> <i>or</i> non-canonical prefix: <code>https://example.com/some/path/info</code>	GS1 Digital Link URI example prefixed by canonical prefix: <code>https://id.gs1.org</code> <i>or</i> non-canonical prefix: <code>https://example.com/some/path/info</code>
SGLN	(414) + (254)	/414/{gln}/254/{glnx}	/414/9521321123459/254/5678
PGLN	(417)	/417/{pgln}	/417/9521321543211

8.7.3 Private or Industry-wide URN for Source/Destination identifiers

A CBV-Compliant document or CBV-Compatible document MAY use a private or industry-wide URN as specified below, or a private or industry-wide URN as specified in section 8.4.3, to populate the `source` and `destination` fields in all EPCIS event types. However, both CBV-Compliant and CBV-Compatible documents SHOULD use the EPC URI form (section 8.7.1) unless there is a strong reason to do otherwise. See section 8.1 for general considerations regarding the use of Private or Industry-wide URI identifiers.

In addition to the private or industry-wide URN form as specified in section 8.4.3, a Private or Industry-wide URI suitable for populating the `source` and `destination` fields in all EPCIS event types SHALL have the following form:

`urn:URNNamespace:**:sd:Locid` where the components of this template are as follows:

Template Component	Description
<code>urn:URNNamespace:**:</code>	As specified in section 8.1.3..
<code>sd:</code>	The characters <code>s</code> , <code>d</code> , and <code>:</code> (colon).
<code>Locid</code>	An identifier for the location that complies with the requirements of [RFC8141] and any syntax rules defined for the registered URN namespace <code>URNNamespace</code> , and which does not contain a colon character. This identifier must be unique relative to all other identifiers that begin with the same prefix.

Identifiers of this form must be assigned by the owner of the URN Namespace. The owner of the URN Namespace may delegate the authority to assign new identifiers to End Users or other parties, provided that appropriate rules are employed to ensure global uniqueness.

8.7.4 HTTP or HTTPS URLs for Source/Destination identification

A CBV-Compliant document or CBV-Compatible document MAY use an **HTTP or HTTPS** URL as specified below, or an HTTP or HTTPS URL as specified in section 8.4.3, to populate the `source` and `destination` fields in all EPCIS event types. However, both CBV-Compliant and CBV-Compatible documents SHOULD use the EPC URI form (section 8.7.1) unless there is a strong reason to do otherwise. See section 8.1 for general considerations regarding the use of HTTP and HTTPS URL identifiers.

In addition to the HTTP and HTTPS URL form as specified in section 8.4.3, an HTTP or HTTPS URL (i.e., all URLs other than GS1 Digital Link URIs defined in section 8.7.2) suitable for populating the `source` and `destination` fields in all EPCIS event types SHALL have the following form:

`http://[Subdomain.]Domain/**/sd/SourceOrDestId`

where the components of this template are as follows:

Template Component	Description
<code>http://[Subdomain.]Domain/**/</code>	As specified in section 8.1.4.
<code>sd/</code>	The characters <code>s</code> , <code>d</code> , and <code>/</code> (slash).
<code>SourceOrDestId</code>	An identifier for the location that matches the grammar rule <code>segment-nz</code> defined in [RFC3986], and which is unique relative to all other identifiers that begin with the same prefix. Note that <code>SourceOrDestId</code> may not contain a slash character; only one URI path component SHALL follow the <code>/sd/</code> in a CBV-compliant http-based identifier.

Identifiers of this form must be assigned by the owner of the Internet domain `Domain`. The owner of the domain may delegate the authority to assign new identifiers to other parties, provided that appropriate rules are employed to ensure global uniqueness.

 **Non-Normative:** Examples of correct and incorrect usage:

Correct:

```
<epc>http://epcis.example.com/user/vocab/sd/12345
.67890</epc>
```

Incorrect:

```
<epc>http://epcis.example.com/user/vocab/sd/id/12
345.67890</epc> WRONG
```

 **Note:** Examples (in XML and JSON/JSON-LD format) are published at <https://ref.gs1.org/docs/epcis/examples/>.

8.8 Transformation identifiers

Identifiers for transformations populate the `transformationID` field within an EPCIS `TransformationEvent`.

URI forms for transformation identifiers are specified below. A CBV-Compliant document SHALL use one of the five URI forms specified in this section to populate the `transformationID` field within an EPCIS `TransformationEvent`, for every such field that is not null. A CBV-Compatible document MAY use one of the four URI forms specified in this section, or MAY use any other URI that meets the general requirements specified in [EPCIS2.0], section 6.4, except for those URIs which in this standard are forbidden or designated for a different purpose.

8.8.1 EPC URI for Transformation identifiers

A CBV-Compliant document or CBV-Compatible document MAY use an EPC Pure Identity URI as specified in section 8.1.1 to populate the `transformationID` field within an EPCIS `TransformationEvent`.

8.8.2 GS1 Digital Link URIs for Transformation identification

A GS1 Digital Link URI suitable for populating the `transformationID` field of EPCIS events SHALL have the form normatively specified in the [GS1 Digital Link standard](#) [GS1DL1.1] and SHALL be restricted to a **highly constrained set of GS1 Digital Link URIs** corresponding to each of the EPC Pure Identity URI schemes defined in TDS, summarised as follows:

EPC Scheme supported by GS1 Digital Link URI	Corresponding GS1 Application Identifier(s)	GS1 Digital Link URI structure prefixed by canonical prefix: <code>https://id.gs1.org</code> or non-canonical prefix: <code>https://example.com/some/path/info</code>	GS1 Digital Link URI example prefixed by canonical prefix: <code>https://id.gs1.org</code> or non-canonical prefix: <code>https://example.com/some/path/info</code>
GDTI	(253)	/253/{gdti}	/253/9521321400017

8.8.3 GLN-based Identifier for Legacy System Transformation identifiers

A CBV-Compliant document or CBV-Compatible document MAY use a GLN-based identifier as specified in this section to populate the `transformationID` field within an EPCIS `TransformationEvent`.

A GLN-based URI SHALL have the following form:

urn:epcglobal:cbv:xform:gln:xformID where the components of this template are as follows:

Template Component	Description
urn:epcglobal:cbv:xform:	The 24 characters u, r, n, ..., r, m, and : (colon).
gln:	A 13-digit Global Location Number (GLN) that identifies the business system within which xformID is defined, followed by a colon. This is typically a "party GLN" that identifies the organisation responsible for the transformation identifier, or a division of an organisation that maintains a separate divisional business information system.
xformID	An identifier for the transformation that complies with the requirements of [RFC8141] and which does not contain a colon character. This identifier must be unique relative to all other identifiers that begin with the same prefix.

Identifiers of this form must be assigned by the owner of the GLN that is embedded in the identifier. The owner of the GLN may delegate the authority to assign new identifiers to other parties, provided that appropriate rules are employed to ensure global uniqueness.

8.8.4 Private or Industry-wide URN for Transformation Identifiers

A CBV-Compliant document or CBV-Compatible document MAY use a private or industry-wide URN as specified below to populate the transformationID field within an EPCIS TransformationEvent.

A private or industry-wide URN SHALL have the following form:

urn:URNNamespace:**:xform:transID where the components of this template are as follows:

Template Component	Description
urn:URNNamespace:**:	As specified in section 8.1.3.
xform:	The characters x, f, o, r, m, and : (colon).
xformID	An identifier for the transformation that complies with the requirements of [RFC8141] and any syntax rules defined for the registered URN namespace URNNamespace, and which does not contain a colon character. This identifier must be unique relative to all other identifiers that begin with the same prefix.

Identifiers of this form must be assigned by the owner of the URN Namespace. The owner of the URN Namespace may delegate the authority to assign new identifiers to End Users or other parties, provided that appropriate rules are employed to ensure global uniqueness.

8.8.5 HTTP or HTTPS URLs for Transformation identification

A CBV-Compliant document or CBV-Compatible document MAY use an **HTTP** or **HTTPS** URL as specified below to populate the transformationID field within an EPCIS TransformationEvent.

An HTTP or HTTPS URL (.e., all URLs other than GS1 Digital Link URIs defined in section 8.8.2) suitable for populating the transformationID field of EPCIS TransformationEvents SHALL have the following form:

http://[Subdomain.]Domain/**/xform/xformID

or

https://[Subdomain.]Domain/**/xform/xformID

where the components of this template are as follows:

Template Component	Description
<code>http://[Subdomain.]Domain/**/</code> or <code>https://[Subdomain.]Domain/**/</code>	As specified in section 8.1.4 .
<code>xform/</code>	The characters <code>x</code> , <code>f</code> , <code>o</code> , <code>r</code> , <code>m</code> , and <code>/</code> (slash).
<code>xformID</code>	An identifier for the transformation that matches the grammar rule <code>segment-nz</code> defined in [RFC3986 and which is unique relative to all other identifiers that begin with the same prefix. Note that <code>xformid</code> may not contain a slash character; only one URI path component SHALL follow the <code>/xform/</code> in a CBV-compliant http-based identifier.

Identifiers of this form must be assigned by the owner of the Internet domain `Domain`. The owner of the domain may delegate the authority to assign new identifiers to other parties, provided that appropriate rules are employed to ensure global uniqueness.

✓ **Non-Normative:** Examples of correct and incorrect usage:

Correct:

```
<epc>http://epcis.example.com/user/vocab/xform/12345.67890</epc>
```

Incorrect:

```
<epc>http://epcis.example.com/user/vocab/xform/id/12345.67890</epc> WRONG
```

✓ **Note:** Examples (in XML and JSON/JSON-LD format) are published at <https://ref.gs1.org/docs/epcis/examples/>.

8.9 Event identifiers

An event identifier may populate the `eventID` and `correctiveEventID` fields of an EPCIS event. When an EPCIS event includes an `eventID` field, the identifier in that field SHALL be a globally unique URI. Note that an EPCIS event is not required to include an event identifier.

A CBV-Compliant document SHALL use one of the two URI forms specified in section [8.9.1](#) and [8.9.2](#) to populate the `eventID` field of EPCIS events, for every such field that is not null. A CBV-Compatible document MAY use the URI forms specified in section [8.9.1](#) and [8.9.2](#), or MAY use any other URI that meets the general requirements specified in [EPCIS] section 6.4, except for those URIs which in this standard are forbidden or designated for a different purpose.

Note that `correctiveEventID` points to the `eventID` value(s) of one or more events that serve as a correction of an event that was previously captured and subsequently deemed incorrect, this being indicated via a duplicate event with an error declaration. (See section 7.4.1.2 of [EPCIS].)

! **Non-Normative note:**

Applying the EPCIS Event Hash ID as specified in section [8.9.2](#) has a number of advantages. It enables organisations to (re)calculate the ID of a given EPCIS event solely based on its intrinsic values and in an independent manner; this could be useful if a capturing application does not populate the `eventID` field, while an EPCIS server (which may or may not be operated by a third party) does. Additionally, especially in conjunction with digital signatures and unique timestamps, the EPCIS Event Hash ID enables organisations to store a unique

fingerprint of an EPCIS event (e.g., for notarisation purposes or integrity validations). It can also be useful for detecting duplicate events, as well as matching error declaration events with original events (see EPCIS standard, section 7.4.1.4).

8.9.1 Universally Unique Identifier (UUID) URIs for Event identification

If an EPCIS Event Hash ID (see section 8.9.2) is not used, a CBV-Compliant document SHALL and a CBV-Compatible document MAY use a UUID Version 1 or Version 4 URI as specified in [RFC4122] to populate the `eventID` fields in any EPCIS event where that field is not omitted.



Non-Normative: Example:

```
<eventID>urn:uuid:f81d4fae-7dec-11d0-a765-00a0c91e6bf6</eventID>
```

8.9.2 EPCIS Event Hash ID

If a UUID Version 1 or 4 (see previous section) is not used, a CBV-Compliant document SHALL and a CBV-Compatible document MAY use an EPCIS Event Hash ID specified as follows to populate the `eventID` fields in any EPCIS event where that field is not omitted.

The EPCIS Event Hash ID denotes a method to calculate a unique fingerprint of any given EPCIS event based on its intrinsic values. It ensures to arrive at the same hash value irrespective of an EPCIS event's data binding (be it in XML, JSON/JSON-LD or any future data binding) and how its elements are ordered.

For hashing strings, well-established algorithms such as SHA-256 [SHA256] are available. The focus of this specification is the canonicalization of a *pre-hash string* representation of an EPCIS event, which can be passed to any standard hashing algorithm.

To calculate this pre-hash string, the algorithm requires to extract and concatenate EPCIS event key-value pairs to one string exactly according to the following set of rules:

1. For all EPCIS event types, data elements SHALL be extracted according to the *canonical property order* specified below.
2. All elements SHALL be concatenated without separators between successive elements.
3. If a field contains a value (i.e. is not a parent element), each value SHALL be assigned its key through an equal sign ('=').
4. Data elements SHALL NOT be added if they are omitted in a given EPCIS event or do not apply.
5. Whitespace characters at the beginning or end of values SHALL be truncated.
6. Quantitative values SHALL NOT have trailing zeros. (For example, a quantity of one SHALL be expressed as '1', and SHALL NOT be expressed as '1.0'; 0.3434 SHALL be expressed as 0.3434, with any trailing zeros truncated.)
7. Numeric values SHALL be expressed without single quotes.
8. All timestamps SHALL be expressed in UTC; the zero UTC offset SHALL be expressed with the capital letter 'Z'.
9. All timestamps SHALL be expressed with millisecond precision. If an EPCIS event lacks the latter, the millisecond field SHALL be zero-filled (e.g., YYYY-MM-DDTHH:MM:SS.000Z).
10. Strings SHALL be sorted according to their case-sensitive lexical ordering, considering UTF-8/ASCII code values of each successive character.
11. All child elements as part of a list (e.g. `epc` in `epcList`, `bizTransaction` in `bizTransactionList`, etc.) SHALL be sequenced according to their case-sensitive lexical ordering, considering UTF-8/ASCII code values of each successive character.

12. If a child element of a list itself comprises one or more key-value pairs itself (e.g. `quantityElement` in `quantityList`, `sensorReport` in `sensorElement`), the latter SHALL be concatenated to a string (similar to the procedure specified above) and, if they belong to the same level, sequenced according to their case-sensitive lexical ordering, considering UTF-8/ASCII code values of each successive character.
13. If an EPCIS field comprises a `type` attribute (e.g. `Business Transaction Type` in `bizTransaction` or `Source/Destination Type` in `source`), the value SHALL be prefixed with the `type` before the alphabetical ordering takes place.
14. If present, any URN-based standard vocabulary value (starting with `'urn:epcglobal:cbv'`) SHALL be expressed in its corresponding GS1 Web Vocabulary URI equivalent (starting with `'https://ref.gs1.org/cbv'`). Example: `'urn:epcglobal:cbv:bizstep:receiving'` --> `'https://ref.gs1.org/cbv/BizStep-receiving'`
15. If an EPCIS event is represented in JSON/JSON-LD, standard vocabulary elements are not expressed as URIs, but in bare string notation (i.e. `'in_transit'` instead of `'https://ref.gs1.org/cbv/Disp-in_transit'`). All standard vocabulary elements expressed in bare string notation SHALL be expanded to their corresponding GS1 Web URI (starting with `'https://ref.gs1.org/cbv'`).
16. If present, EPC URIs (starting with `'urn:epc:id'`), EPC Class URIs (starting with `'urn:epc:class'`) or EPC Pattern URIs (starting with `'urn:epc:idpat'`) SHALL be converted into the corresponding canonical GS1 Digital Link URI (starting with `'https://id.gs1.org'`). Canonical GS1 Digital Link URIs are specified in [GS1 Digital Link: URI Syntax, release 1.2], section 4.11.
17. If a GS1 Digital Link URI is present, it SHALL take the form of a constrained canonical GS1 Digital Link URI. Specifically: (I) A custom domain SHALL be replaced by `'https://id.gs1.org'`. (II) The query string SHALL be stripped off. (III) It SHALL only contain the most fine-granular level of identification, i.e. contain the following GS1 keys/key qualifiers only: 00 / 01 / 01 21 / 01 10 / 01 235 / 253 / 255 / 401 / 402 / 414 / 414 254 / 417 / 8003 / 8004 / 8006 / 8006 21 / 8006 10 / 8010 / 8010 8011 / 8017 / 8018
18. If an EPCIS event comprises ILM elements, the latter SHALL comprise their key names (full namespace embraced by curly brackets ('{' and '}') and the respective local name), as well as, if present, the contained value, prefixed by an equal sign ('='). The resulting substrings SHALL be sorted according to their case-sensitive lexical ordering, considering UTF-8/ASCII code values of each successive character when they are appended to the pre-hash string.
19. If an EPCIS event comprises user extension elements at event level – irrespective whether they appear at top level or are nested – the latter SHALL comprise their key names (full namespace embraced by curly brackets ('{' and '}') and the respective local name), as well as, if present, the contained value, prefixed by an equal sign ('='). The resulting substrings SHALL be sorted according to their case-sensitive lexical ordering, considering UTF-8/ASCII code values of each successive character when they are appended to the pre-hash string.
20. If an EPCIS event comprises user extension elements as part of an EPCIS standard field with an extension point (namely `readPoint`, `bizLocation`, `sensorElement`, `sensorMetadata`, and `sensorReport`), the top-level user extension element(s) SHALL be prefixed with the corresponding EPCIS standard field name. Apart from that, it SHALL be added to the pre-hash string similarly as specified in the previous step.
21. The resulting pre-hash string SHALL be embedded in a `'ni'` URI scheme as specified in RFC 6920, as follows:


```
ni:/// {digest algorithm}; {digest value}?ver={CBV version}
```

 i.e. characters `'n'`, `'i'`, followed by one colon (`':'`), three slash characters (`'/'`), the digest algorithm, one semicolon (`';'`), the digest value, one question mark (`'?'`), the characters `'v'`, `'e'`, `'r'`, one equal sign (`'='`), and the version of the EPCIS Event

Hash ID algorithm that was used to generate the pre-hash string, indicated by the CBV version.

22. The `digest` algorithm SHALL contain one of the hash name string values as listed in the Named Information Hash Algorithm Registry (see <https://www.iana.org/assignments/named-information/named-information.xhtml>)
23. The `CBV version` SHALL be indicated as follows: the three characters 'C', 'B', 'V', followed by one or several digits indicating the major release version, one dot character ('.') and one or more digits indicating the minor release version. In addition, it MAY be appended with one dot character ('.') and one or more digits indicating a revision of a given CBV standard release, if applicable (i.e. if a revision of the CBV standard specifies an updated version of the EPCIS Event Hash ID algorithm).

Canonical property order

1. `eventType`
2. `eventTime`
3. `eventTimeZoneOffset`
4. `epcList - epc`
5. `parentID`
6. `inputEPCList - epc`
7. `childEPCs - epc`
8. `quantityList - quantityElement (epcClass, quantity, uom)`
9. `childQuantityList - quantityElement (epcClass, quantity, uom)`
10. `inputQuantityList - quantityElement (epcClass, quantity, uom)`
11. `outputEPCList - epc`
12. `outputQuantityList - quantityElement (epcClass, quantity, uom)`
13. `action`
14. `transformationID`
15. `bizStep`
16. `disposition`
17. `persistentDisposition - (set, unset)`
18. `readPoint - id`
19. `bizLocation - id`
20. `bizTransactionList - bizTransaction (business transaction type, business transaction ID)`
21. `sourceList - source (source type, source ID)`
22. `destinationList - destination (destination type, destination ID)`
23. `sensorElement (sensorMetadata (time, startTime, endTime, deviceID, deviceMetadata, rawData, dataProcessingMethod, bizRules), sensorReport (type, deviceID, deviceMetadata, rawData, dataProcessingMethod, time, microorganism, chemicalSubstance, value, component, stringValue, booleanValue, hexBinaryValue, uriValue, minValue, maxValue, meanValue, sDev, percRank, percValue, uom))`
24. `ilmd - {ILMD elements}`

25. {User extension elements}

**Example (non-normative):**

The EPCIS ObjectEvent in the left column corresponds to the pre-hash string and resulting hash value in the right column:

Figure 8-1 EPCIS Event HashID example

ObjectEvent		Corresponding pre-hash string (line breaks/indentation just included for better clarity):
eventTime	2020-03-04T11:00:30.000+01:00	eventType=ObjectEvent
recordTime	2020-03-04T11:00:30.999+01:00	eventTime=2020-03-04T10:00:30.000Z
eventTimeZoneOffset	+01:00	eventTimeZoneOffset=+01:00
epcList		epcList
epc	urn:epc:id:sscc:4012345.0000000333	epc=https://id.gs1.org/00/040123450000001112
epc	urn:epc:id:sscc:4012345.0000000111	epc=https://id.gs1.org/00/040123450000002225
epc	urn:epc:id:sscc:4012345.0000000222	epc=https://id.gs1.org/00/040123450000003338
action	OBSERVE	action=OBSERVE
bizStep	urn:epcglobal:cbv:bizstep:departing	bizStep=https://ref.gs1.org/cbv/BizStep-departing
readPoint	urn:epc:id:sgln:4012345.00011.987	readPoint
example:myField1		id=https://id.gs1.org/414/4012345000115/254/987
mySubField1	2	{https://ns.example.com/epcis}myField1
mySubField2	5	{https://ns.example.com/epcis}mySubField1=2
example:myField2	0	{https://ns.example.com/epcis}mySubField2=5
example:myField3		{https://ns.example.com/epcis}myField2=0
mySubField3	3	{https://ns.example.com/epcis}myField3
mySubField3	1	{https://ns.example.com/epcis}mySubField3=1
		{https://ns.example.com/epcis}mySubField3=3
		Resulting hash value (based on sha-256), embedded in NI Hash URI:
		ni:///sha-256;6ae96341e0acc6d7a261364751f60e68278a81cdf51da0abb6b4e617014e39d7?ver=CBV2.0



Note that **Error Declaration Events should NOT calculate an EPCIS Event Hash ID**, but instead use the original eventID (i.e., of the erroneous event); if the original (erroneous) event captured no eventID, the corresponding Error Declaration Event should likewise omit the eventID. For this reason, an Event Hash ID cannot serve as a unique fingerprint of an Error Declaration Event; organisations applying the Event Hash ID for notarisation purposes should be aware that it would not protect from tampering with data within the errorDeclaration element.

**Limitations on proof of authenticity or authorship**

Note that the Event Hash ID algorithm has limited applicability when EPCIS events are redacted (e.g., where shared EPCIS events omit or reduce the granularity of specific fields); see also EPCIS and CBV Implementation Guide, section 6.7). In such a case, the content of a redacted EPCIS event will in no case yield the hash value of the original one.

The Event Hash ID **does not guarantee absolute proof of authenticity or authorship** of an EPCIS event; for example, a man-in-the-middle attack could modify the content of an EPCIS event and re-compute the hash after tampering. In order to prevent tampering, a digital signature scheme leveraging the EPCIS Event Hash ID algorithm may be applied.

8.10 Chemical substance identifiers

A chemical substance identifier may populate the chemicalSubstance field of an EPCIS event. When an EPCIS event includes a chemicalSubstance field as part of a sensorReport element, the identifier in that field must be globally unique.

A CBV-Compliant document SHALL use the InChI URI form specified in section 8.10.1 to populate the chemicalSubstance field of EPCIS events, for every such field that is

not null. A CBV-Compatible document MAY use any URI that meets the general requirements specified in [EPCIS], section 6.4, except for those URIs which in this standard are forbidden or designated for a different purpose.

8.10.1 InChI (International Chemical Identifier) Key URI

A CBV-Compliant document or CBV-Compatible document SHOULD use an International Chemical Identifier (InChI) Key URN as specified below to populate the `chemicalSubstance` field of an EPCIS event.

An InChI Key URI SHALL have the following form:

`https://identifiers.org/inchikey:InChIKey`

where the components of this template are as follows:

Template Component	Description
<code>https://identifiers.org/inchikey:</code>	The 33 characters <code>h, t, t, ..., e, y</code> and <code>:</code> (colon). Note: 'identifiers.org' is a resolving system that enables the referencing of scientific data, so far focussing on the life sciences domain. For more information, see https://docs.identifiers.org/
<code>InChIKey</code>	A 27 character, condensed (i.e. hashed) representation of an International Chemical Identifier (InChI), a non-proprietary identifier for chemical substances, developed by the International Union of Pure and Applied Chemistry (IUPAC). For more information, see https://iupac.org/who-we-are/divisions/division-details/inchi/



Non-Normative: Example (InChI Key for sucrose):

`https://identifiers.org/inchikey:CZMRCDWAGMRECN-UGDNZRGBSA-N`

8.11 Microorganism identifiers

A microorganism identifier MAY populate the `microorganism` field of an EPCIS event. When an EPCIS event includes a `microorganism` field as part of a `sensorReport` element, the identifier in that field SHALL be globally unique.

A CBV-Compliant document SHALL use the URI form specified in section 8.11.1 to populate the `microorganism` field of EPCIS events, for every such field that is not null. A CBV-Compatible document MAY use the URI form specified in section 8.11.1, or MAY use any other URI that meets the general requirements specified in [EPCIS], section 6.4, except for those URIs which in this standard are forbidden or designated for a different purpose.

8.11.1 NCBI Web URI

A CBV-Compliant document or CBV-Compatible document MAY use a National Center for Biotechnology Information (NCBI) Web URI as specified below to populate the `microorganism` field of an EPCIS event.

An NCBI Web URI SHALL have the following form:

`https://www.ncbi.nlm.nih.gov/TaxonomyID` where the components of this template are as follows:

Template Component	Description
<code>https://www.ncbi.nlm.nih.gov/taxonomy/</code>	The 39 characters <code>h,t,t,p,s, ... o,m,y</code> and <code>/</code> (forward slash).
<code>TaxonomyID</code>	A unique identifier assigned by the National Center for Biotechnology Information (NCBI) for a species. For more information, see https://www.ncbi.nlm.nih.gov/taxonomy

- ✓ **Non-Normative:** Example (containing the taxonomy ID for 'Listeria monocytogenes'):

<https://www.ncbi.nlm.nih.gov/taxonomy/1126011>

9 Master data

9.1 Data type restrictions

9.1.1 Dates

All CBV attributes of type "Date" SHALL be restricted to the following subset of W3C primitive datatypes for date formats:

W3C datatype	example	invalid usage example
<code>xsd:date</code>	2019-02-28	2019-02-00
<code>xsd:gYearMonth</code>	2019-02	2019/2
<code>xsd:gYear</code>	2019	19

9.1.2 Master data attribute names

In the master data section of an **EPCIS header**, in an **EPCIS Master Data Document**, and in the response to an **EPCIS Master Data Query**, a master data attribute MAY be expressed either as a name/value pair or as an XML QName.

Master data attributes in the **ILMD** section of an EPCIS event SHALL be specified as an XML QName

9.1.2.1 Name/value pair

When expressed as a name/value pair, the name of every trade item master data attribute defined in this section consists of the following namespace identifier:

`urn:epcglobal:cbv:mda`

followed by a pound sign (#) character, followed by a local name as specified in section [9.2.1](#).

As an exception, the master data attributes `site`, `sst`, `ssa`, and `ssd` use a colon (:) character instead of a pound sign as the separator, for backward compatibility to CBV 1.1 and earlier.

9.1.2.2 QName

When a master data attribute is expressed as an XML element, its element name is an XML QName whose namespace is the same namespace identifier specified above and whose local name is the local name as specified in section [9.2.1](#).

- ✓ **Non-Normative:** Example: Here is how the attribute `sellByDate` might appear in the EPCIS header, Master Data Document or Master Data Query response, using a **name/value pair**:

```
<VocabularyElement id="urn:epc:class:lgtin:9521141.012345.L123">
  <attribute id="urn:epcglobal:cbv:mda#sellByDate">2016-03-
15</attribute>
</VocabularyElement>
```

✓ Here is how the same attribute would appear in the ILMD section of an event, using a **Qname**:

```

✓ <epcis:EPCISDocument xmlns:cbvmda="urn:epcglobal:cbv:mda" ...>
...
<ObjectEvent>
...
<QuantityElement>
  <epcClass>urn:epc:class:lgтин:9521141.012345.L123</epcClass>
</QuantityElement>
...
<ilmд>
  <cbvmda:sellByDate>2016-03-15</cbvmda:sellByDate>
</ilmд>
...
</ObjectEvent>
...
</epcis:EPCISDocument>
    
```

9.1.3 Certification attributes

Certification details are EITHER:

- expressed as a URL in the certificationInfo field of the EPCISEvent base type, specified in section 7.4.1 ("EPCISEvent") of EPCIS 2.0. If present, this URL indicates where certification details can be found. Certification details SHOULD ideally be machine-readable and be expressed using properties within the gs1:CertificationDetails class of the GS1 Web Vocabulary

OR:

- included as Master Data, as specified in section 9.1.3.1.

9.1.3.1 CertificationList

The value of type certificationList consist of one or more elements named certification, which contains the following sub-elements:

Field	Type	Description
gs1:certificationAgency	rdf:langString	Name of the organization issuing the certification standard or other requirement being met. Example: Marine Stewardship Council
gs1:certificationAgencyURL	gs1:Organization	URL of the organisation issuing the certification standard or other requirement being met. Example: https://www.msc.org , https://www.fsc.org
gs1:certificationAuditDate	xsd:date	Date of completion of the auditing needed for certification
gs1:certificationEndDate	xsd:date	Last date of validity for the certification. (After this date the certification lapses and would need to be renewed/replaced.)
gs1:certificationIdentification	xsd:string	A reference (i.e. to a certificate instance) issued to confirm that a product, party or location has passed certification. Example: MSC-C-12345
gs1:certificationStandard	rdf:langString	Name of the certification standard. Free text. Example: 'Egg classification'
gs1:certificationStartDate	xsd:date	First date of validity for the certification.

Field	Type	Description
gs1:certificationStatement	rdf:langString	Certification scope statement of the individual certification instance. The same certificationStandard can be issued with different values of certificationStatement in different instances.
gs1:certificationStatus	gs1:CertificationStatus	Indicates the current status of the certification, e.g. active or inactive.
gs1:certificationSubject	owl:Thing	References the object (e.g. product, asset, container), party or location being certified. If multiple values are specified, the certification details apply to the logical conjunction (AND) of groups of different types, while a logical disjunction (OR) applies within each group of the same type. For example, two sibling organisations O1 and O2 can process products P1 and P2 at locations L1 and L2: meaning that either organisation can process either product at either location (OR); but the certificate holds for the combinations of organisation (either O1 OR O2) AND product (either P1 OR P2) AND location (either L1 OR L2)
gs1:certificationType	owl:Thing	Indicates the type of certification
gs1:certificationURI	xsd:anyURI	If gs1:certificationURI is present, it should point to data about this individual certificate within a repository maintained by the certification agency.
gs1:certificationValue	rdf:langString	The certification standard value for the certified product, party or location. Example: Quality class 4
gs1:initialCertificationDate	xsd:date	The date when the certification was originally issued. May differ from the certificationStartDate of the current recertification cycle.

When a value of type `certificationList` appears as attribute of a `VocabularyElement`, it takes the form illustrated below.

```
<attribute id="https://gs1.org/cbv/cbvmda:certificationList">
  <gs1:CertificationDetails>
    <certificationStandard>MSC Chain of Custody
Standard</gs1:certificationStandard>
    <certificationAgency>Marine Stewardship
Council</gs1:certificationAgency>
    <certificationValue>4</gs1:certificationValue>
    <certificationIdentification>MSC-C-
12345</gs1:certificationIdentification>
  </gs1:CertificationDetails>
</attribute>
```

When a value of type `certificationList` appears in an EPCIS event extension, it takes the form illustrated below.

```
<cbvmda:certificationList>
  <gs1:CertificationDetails>
    <gs1:certificationStandard>MSC Chain of Custody
Standard</gs1:certificationStandard>
    <gs1:certificationAgency>Marine Stewardship
Council</gs1:certificationAgency>
    <gs1:certificationValue>4</gs1:certificationValue>
    <gs1:certificationIdentification>MSC-C-
12345</gs1:certificationIdentification>
  </gs1:CertificationDetails>
</cbvmda:certificationList>
```

9.2 Trade item master data

This section specifies master data attributes that may be used to describe a trade item identifier that appears in the “what” dimension of an EPCIS event, including the EPC, Parent ID, and EPC Class fields.

Different trade item identifiers are used at different levels of trade item identification. Each master data attribute defined in the CBV for trade item identifiers specifies one or more of the following three levels of identification to which it is applicable:

Identification Level	Description	Typical Identifier	Identifier use in EPCIS Event
Trade item-level	A master data attribute that applies to all instances of a given trade item. As trade items are usually identified by a GTIN, this is often called “GTIN-level”.	urn:epc:idpat:sgtin:9521141.112345.*	EPC Class
Lot-level	A master data attribute that applies to all instances of a given trade item within a specified batch or lot.	urn:epc:class:lgtin:9521141.112345.L123	EPC Class
Instance-level	A master data attribute that applies to a specific instance of a trade item	urn:epc:id:sgtin:9521141.112345.400	EPC Parent ID

A CBV-Compliant or CBV-Compatible document MAY include any of the master data attributes specified in this section within the master data section of the EPCIS Header, subject to the constraints specified elsewhere in this section. The master data attributes specified in this section may also be used in an EPCIS Master Data Document or in the response to an EPCIS Master Data Query. A CBV-Compliant or CBV-Compatible document MAY include any of the lot-level or instance-level master data attributes specified in this section in the ILM D section of an EPCIS event, but SHOULD NOT include trade item-level attributes in the ILM D section.

When a master data attribute specified in this section is used in the master data section of the EPCIS Header, in an EPCIS Master Data Document, or in the response to an EPCIS Master Data Query, each such attribute applies to the specific identifier cited and also all matching identifiers at a lower level. For example, a master data attribute specified for the trade item-level identifier

urn:epc:idpat:sgtin:9521141.112345.* would also apply to lot-level and instance-level identifiers that share the same GTIN. A master data attribute specified for the lot-level identifier urn:epc:class:lgtin:9521141.112345.L123 would also apply to instance-level identifiers that share the same GTIN and lot.

When a master data attribute specified in this section is used in the ILMD section of an EPCIS event, it applies to all identifiers appearing in any `EPC` or `QuantityElement` field within that event.

9.2.1 Trade item master data attributes

The tables below specify master data attributes that may be used to describe a trade item identifier.

The meaning of the "Level" column is as follows:

- **Trade Item:** the master data attribute is a trade item-level attribute as specified in section [8.9.2](#).
- **Lot:** the master data attribute is a lot-level attribute as specified in section [8.9.2](#).
- **Instance:** the master data attribute is an instance-level attribute as specified in section [8.9.2](#).
- **Trade Item or Instance:** the master data attribute is either a trade item-level attribute or an instance-level attribute as specified in section [8.9.2](#), depending on the trade item. For example, `netWeight` is a trade item-level attribute for a fixed weight product but an instance-level attribute for a variable weight product.
- **Trade Item or Lot or Instance:** the master data attribute is either a trade item-level attribute or a lot-level attribute or an instance-level attribute as specified in section [8.9.2](#), depending on the trade item. For example, `countryOfOrigin` may be consistent across all instances of a trade item for a manufactured product, or consistent across all instances in a lot but varying across lots for fish species harvested in lots in varying territorial waters, or varying across all instances for fish species harvested individually in varying territorial waters.

Master data attributes for each level are shown below in separate tables. Master data attributes that may be used at multiple levels are repeated in more than one table as appropriate. Within each table, attributes are listed alphabetically.

9.2.2 Trade item master data attributes – trade item level

The following attributes may be used to describe a trade item identifier at the trade item (GTIN) level.

Local Name	Type	Description	Level
<code>additionalTradeItemIdentification</code>	list of <AdditionalTradeItemID> (see section 9.2.2.1)	A trade item identifier that is in addition to the GTIN. Example: 12345111111 See section 9.2.2.1	Trade Item
<code>countryOfOrigin</code> (repeating)	Code	Country from which the goods are supplied. The code list for this attribute is the ISO 3166-1 [ISO3166-1] Alpha-2 list of 2-letter country codes; see http://www.iso.org/iso/country_codes Example: UK Note: When multiple countries of origin are included, the dominant country of origin SHALL be included as the first element.	Trade Item or Lot or Instance
<code>descriptionShort</code>	String (1–35 characters)	A free form short length description of the trade item that can be used to identify the trade item at point of sale. Example: Acme Red Widgets	Trade Item
<code>dosageFormType</code>	String (1–35 characters)	A dosage form is the physical form of a medication that identifies the form of the pharmaceutical item. Example: PILL	Trade Item

Local Name	Type	Description	Level
drainedWeight	Measurement (see section 9.2.5)	The weight of the trade item when drained of its liquid. For example "225 GRM", Jar of pickles in vinegar. Applies to defined bricks of GCI Global trade item Classification - Mainly food trade item. Must be associated with a valid UoM. Example: [see section 9.2.5]	Trade Item or Instance
functionalName	String (1-35 characters)	Describes use of the product or service by the consumer. Should help clarify the product classification associated with the GTIN. Example: Widget	Trade Item
grossWeight	Measurement (see section 9.2.5)	Used to identify the gross weight of the trade item. The gross weight includes all packaging materials of the trade item. At pallet level the trade item-GrossWeight includes the weight of the pallet itself. For example, "200 grm", value - total pounds, total grams, etc. Has to be associated with a valid UOM. Example: [see section 9.2.5]	Trade Item or Instance
manufacturerOfTradeItemPartyName	String (1-200 characters)	Party name information for the manufacturer of the trade item. Example: Acme Corporation	Trade Item
netContentDescription	String (1-500 characters)	Free text describing the amount of the trade item contained by a package, usually as claimed on the label. Example: 253 grams	Trade Item
netWeight	Measurement (see section 9.2.5)	Used to identify the net weight of the trade item. Net weight excludes any packaging materials and applies to all levels but consumer unit level. For consumer unit, Net Content replaces Net Weight (can then be weight, size, volume). Has to be associated with a valid UoM. Example: [see section 9.2.5]	Trade Item or Instance
labelDescription	String (1-500 characters)	A literal reproduction of the text featured on a product's label in the same word-by-word order in which it appears on the front of the product's packaging. This may not necessarily match the GTIN description as loaded by the supplier into the GTIN description field in GDSN. Example: Acme Corporation Tiny Red Widgets	Trade Item
preservationTechniqueCode	Code	Code value indicating the preservation technique used to preserve the product from deterioration. The code list for this attribute is defined in GDSN; see http://apps.gs1.org/GDD/Pages/clDetails.aspx?semanticURN=urn:gs1:gdd:cl:PreservationTechniqueTypeCode Example: COLD_SMOKE_CURING	Trade Item