The DCC Wiki

This is an automatically generated PDF that contains the contents of the DCC Wiki.

If you want the latest version of the DCC Wiki, as well as further information about the DCC, please visit the website which is available at https://dccwiki.ptb.de.

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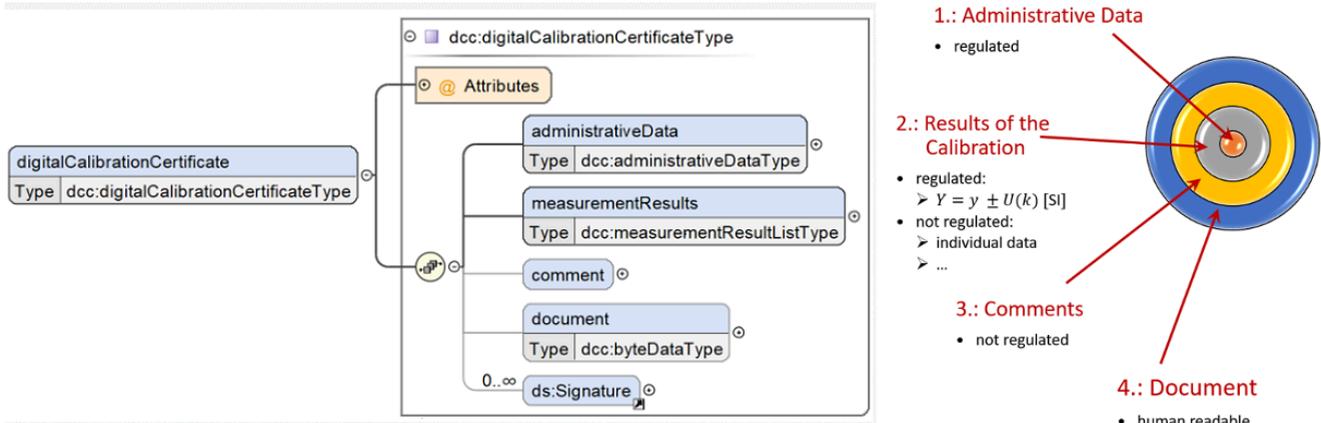
Closing

- Abbreviations

The root element and its elements

The root element *dcc:digitalCalibrationCertificate* has four child elements:

Description of the elements

See the list of abbreviations here

Element	Use	Description
dcc:administrativeData (Ring 1)	[M]	The element administrativeData contains all essential administrative information about the calibration. The entries in this area are basically the same in all DCCs and are regulated.
dcc:measurementResult (Ring 2)	[M]	In the element *measurementResults*, all information on the results of the measurements on the calibration material are stored. The measurement and result data must have a value and a unit of measurement. Ideally, a (base) SI unit is used as the unit of measurement. The element has at least one child element. The number of further child elements is unrestricted. Due to the different calibration requirements in the individual areas, the DCCs differ accordingly. It is logical, for example, that DCCs from the field of acoustics differ from those from the field of cyclotron radiation.
dcc:comment (Ring 3)	[O]	All further information and files agreed between the client and the performing calibration laboratory can be inserted into this element. Files of different file formats (e.g. results from spreadsheet programs) are converted using the Base64 method [1] so that they can be saved in the XML structure. They can then be extracted again from the XML structure and converted back identically into the original data format using the Base64 procedure.
dcc:document (Ring 4)	[O]	The element *document* contains the human-readable variant of the DCC.
ds:Signature	[O]	The signature of the DCC.

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[1] https://tools.ietf.org/html/rfc4648

Tree structure

The tree structure of the parent element *digitalCalibrationCertificateType* has the following appearance:

dcc_xsd_complex_type_dcc_digitalcalibrationcertificatetype.svg

Nomenclature of the figure: https://wiki.dcc.ptb.de/en/tools/oxygen#source

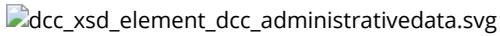# Extract from XML Schema: Type definition "digitalCalibrationCertificateType"

Click here to see the snippet in the wiki or have a look at the DCC schema.

dcc:administrativeData

The element *dcc:administrativeData* contains all essential administrative information, which describes various details of the calibration object, e. g. also details of the manufacturer, client, calibration mark etc. The information is familiar to many of you as the "first page" of an analogue calibration certificate. The entries in this area are basically the same in all DCCs.

Tree structure

The tree structure of the element *dcc:administrativeData* has the following appearance:

dcc_xsd_element_dcc_administrativedata.svg

Extract from the XML schema: Type definition "dcc:administrativeDataType"

Click here to see the snippet in the wiki or have a look at the DCC schema.

Description of the elements

See the list of abbreviations here

| Element	Use	Description
dcc:dccSoftware	[M]	Essential information to identify the software used to create the DCC is stored here.
dcc:refTypeDefinitions	[O]	Specification of refTypes used in this DCC.
dcc:coreData	[M]	Essential calibration information are stored in the child elements of dcc:coreData.
dcc:items	[M]	Unique identification, description and, if applicable, condition of the calibration item.
dcc:calibrationLaboratory	[M]	Essential information to identify the calibration laboratory.
dcc:respPersons	[M]	Identification of the person(s) responsible for the release of the report.
dcc:customer dcc:contactType	[M]	Identification of the customer ordering the calibration, e.g. name, address, contact details etc.
dcc:statements	[O]	Element for entering various statements.

dcc:dccSoftware

Essential information to identify the software used to create the DCC is stored here.

Which software (with version) was used to create the DCC. From this conclusions can be drawn, especially if errors occur in the interpretation of the XML code. This information is therefore immensely important for troubleshooting. The software used shall also be documented for the purpose of long-term preservation.

Tree structure

The element *dcc:dccSoftware* has one child element. It is the element *dcc:software*, which can be used as often as desired. Thus, more than one software used can be specified. The tree structure of the element *dcc:dccSoftware* has the following appearance:
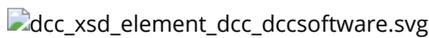
dcc_xsd_element_dcc_dccsoftware.svg

The tree structure of the element *dcc:software* has the following appearance:

Information about the software, including its name, version, type, and description.
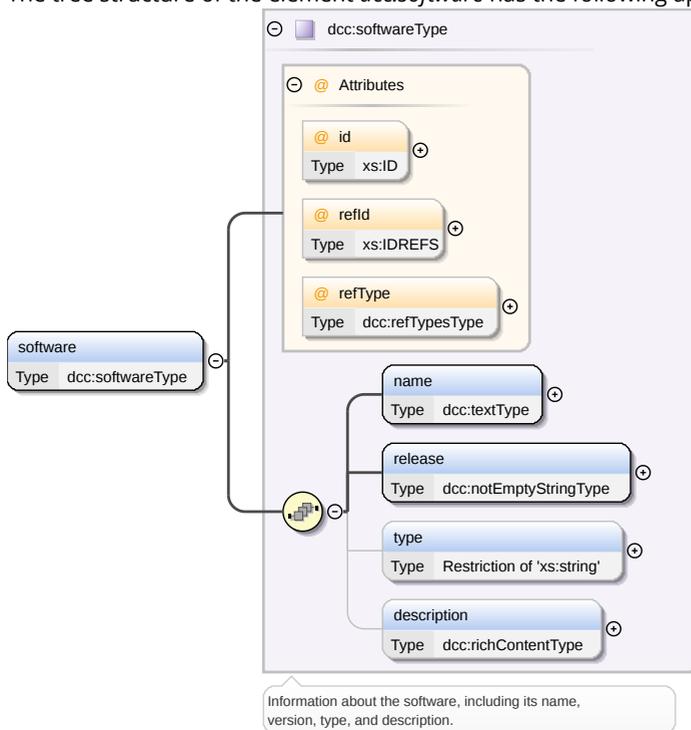
Extract from the XML schema: type definition "softwareType"

Click here to see the snippet in the wiki or have a look at the DCC schema.

The DCC XML file is created using software. The name of this software(s) (one or several) shall be documented.

Description of the elements

See the list of abbreviations here

Element Element type	Use	Description
dcc:software dcc:softwareListType	[M]	The element *dcc:software* may occur more than once. Each entry represents exactly one software that was used to create the XML file.

Element Element type	Use	Description
dcc:name dcc:textType	[M]	This element specifies the name of the software.
dcc:release dcc:notEmptyStringType	[M]	The release of the software. Possible specifications: Release, version, etc. This serves to uniquely identify the software in connection with the name.
dcc:type xs:string	[O]	To specify the type of software. Allowed values are application, bios, driver, editor, firmware, library, os, other.
dcc:description dcc:richContentType	[O]	Other information not specified in the elements *dcc:name* is specified here in order to describe the software.

Attributes

Attribute Attribute type	Use	Description
id xs:ID	[O]	This standard XML data type is used to represent a unique ID. It is used to clearly identify the object in the DCC. The data type xs:ID is deliberately used here, as this enables validation in various tools without any add-ons.
refId xs:IDREF	[O]	IDREF represents the IDREF attribute type from [XML 1.0 (Second Edition)]. The value space of IDREF is the set of all strings that match NCNameproduction in [Namespaces in XML]. The lexical space of IDREF is the set of strings that match NCNameproduction in [Namespaces in XML]. The base type of IDREF is NCName.
refType dcc:refTypesType	[O]	An XML List to link to reference types.

Examples

The examples show extracts from DCC's.

Example 1

In this example, the software "Notepad++" was used to create the DCC. Only the mandatory fields have been filled in. Here is the result:

```
<dcc:dccSoftware>
    <dcc:software>
        <dcc:name>
            <dcc:content>Notepad++ (32-bit)</dcc:content>
            <dcc:type>editor</dcc:type>
        </dcc:name>
        <dcc:release>v7.7.1</dcc:release>
    </dcc:software>
</dcc:dccSoftware>
```

Example 2

Based on example 1, further information is given:

```
<dcc:dccSoftware>
    <dcc:software>
        <dcc:name>
            <dcc:content>Notepad++ (32-bit)</dcc:content>
            <dcc:type>editor</dcc:type>
        </dcc:name>
        <dcc:release>v7.7.1</dcc:release>
        <dcc:description>
            <dcc:content>Extension: XML Tools Plugin version 2.3.2 unicode beta4 r908</dcc:content>
        </dcc:description>
        <dcc:description>
            <dcc:content>Installation from the Software Centre</dcc:content>
        </dcc:description>
    </dcc:software>
</dcc:dccSoftware>
```

Example 3

Like example 2, but in two languages: German and English

```
<dcc:dccSoftware>
    <dcc:software>
        <dcc:name>
            <dcc:content>Notepad++ (32-bit)</dcc:content>
            <dcc:type>editor</dcc:type>
        </dcc:name>
        <dcc:release>v7.7.1</dcc:release>
        <dcc:description>
            <dcc:content lang="de">Erweiterung: XML Tools Plugin Version 2.3.2 unicode beta4
r908</dcc:content>
            <dcc:content lang="en">Extension: XML Tools Plugin version 2.3.2 unicode beta4 r908</dcc:content>
        </dcc:description>
        <dcc:description>
            <dcc:content lang="de">Installation über das Software-Center</dcc:content>
            <dcc:content lang="en">Installation from the Software Centre</dcc:content>
        </dcc:description>
    </dcc:software>
</dcc:dccSoftware>
```
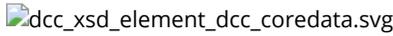
dcc:coreData

The element *dcc:coreData* contains essential information on the global classification of the calibration.

Tree structure

The tree structure of the element *dcc:coreData* has the following appearance:

dcc_xsd_element_dcc_coredata.svg

Extract from the XML schema: type definition "coreDataType"

Click here to see the snippet in the wiki or have a look at the DCC schema.

Fill-in instructions

PTB
PTB-specific entries are marked by the PTB logo.

Description of the elements

See the list of abbreviations here

Element Element type	Use	Description
dcc:countryCodeISO3166_1 dcc:stringISO3166Type	[M]	In which country was the calibration performed? The information is given in the country code specified in ISO 3166 (two capital letters). For more details, see the page on handling of multiple languages. `<countryCodeISO3166_1>DE</countryCodeISO3166_1>`

dcc:usedLangCodeISO639_1
dcc:stringISO639Type
	[M]	Indication of the official language(s) in which the DCC was created. The specification is made in the code for the official languages defined in ISO 639 (two lower case letters). For more details, see the page on handling of multiple languages.
		
		In Germany and at the PTB, DCCs are very often issued in German (de) and English (en):
		`<usedLangCodeISO639_1>de</usedLangCodeISO639_1>`
		`<usedLangCodeISO639_1>en</usedLangCodeISO639_1>`

dcc:mandatoryLangISO639_1 dcc:stringISO639Type	[M]	Determination of the official language(s) valid in case of doubt. The specification shall be made in the code for official languages (two lower case letters) specified in ISO 639. More details can be found in the description of the data type. In Germany and in the PTB, German (de) is very often specified: `<mandatoryLangCodeISO639_1>de</mandatoryLangCodeISO639_1>`

Element Element type	Use	Description
dcc:uniqueIdentifier dcc:notEmptyStringType	[M]	A worldwide unique identifier for the DCC (calibration certificate number) shall be specified here. A necessary condition is that the identifier is unique in the organisation where the calibration laboratory is located.
dcc:identifications dcc:identificationListType	[O]	Identifications in coreDate contains further identifiers which describe exactly this calibration certificate. The item also contains an element Identification, which describes the calibration object exactly.
dcc:receiptDate xs:date	[M|O]	Date of receipt of the calibration item. The date shall be given if it has a temporal influence on the calibration result.
dcc:beginPerformanceDate xs:date	[M]	Date at the start of the performance of the laboratory activity. In DIN EN ISO/IEC 17025:2018-03 [1] it is specified that the date or period of calibration is an essential part of a calibration certificate. Therefore, the elements beginPerformanceDate and endPerformanceDate shall be filled in. In case the calibration is performed on one day, the same date shall be entered in both elements.
dcc:endPerformanceDate xs:date	[M]	Date at the end of the performance of the laboratory activity. In DIN EN ISO/IEC 17025:2018-03 [1] it is specified that the date or period of calibration is an essential part of a calibration certificate. Therefore, the elements beginPerformanceDate and endPerformanceDate shall be filled in. In case the calibration is performed on one day, the same date shall be entered in both elements.
dcc:performanceLocation dcc:performanceLocationType	[M]	This element specifies the location of the calibration. The choices are "laboratory", "customer", "laboratoryBranch", "customerBranch" and "other". Where Laboratory and Customer refer to the respective postal address.
dcc:issueDate xs:date	[O]	Due to the decision that the issuing of the DCC must be possible without a signature, an alternative was created in order to be able to indicate the date of issue required in ISO 17025.
dcc:reportAmendedSubstituted dcc:reportAmendedSubstitutedType	[O]	With this element it is possible to specify whether the DCC is amending or substituting a previous DCC.
dcc:previousReport dcc:hashType	[O]	The element *dcc:previousReport* gives the possibility to refer to the previous calibration certificate which was replaced by this DCC. A chain of calibration certificates can be specified.

Examples

The following examples do not use the *dcc:previousReport* element.

Example 1

The DCC was issued in Switzerland. The language used and thus logically also the language that applies in case of doubt is German. The unique identification number (the calibration certificate number) is "1234" and the calibration was carried out in the calibration laboratory on 2002-09-25.

```
<dcc:coreData>
  <dcc:countryCodeISO3166_1>CH</dcc:countryCodeISO3166_1>
  <dcc:usedLangCodeISO639_1>en</dcc:usedLangCodeISO639_1>
  <dcc:mandatoryLangCodeISO639_1>en</dcc:mandatoryLangCodeISO639_1>
  <dcc:uniqueIdentifier>1234</dcc:uniqueIdentifier>
  <dcc:beginPerformanceDate>2002-09-25</dcc:beginPerformanceDate>
  <dcc:endPerformanceDate>2002-09-25</dcc:endPerformanceDate>
  <dcc:performanceLocation>laboratory</dcc:performanceLocation>
</dcc:coreData>
```

Example 2

The DCC was issued in Belgium. The languages used are French, Dutch and German. The valid languages in case of doubt are French and Dutch. The unique identification number (the calibration certificate number) is "5678" and the calibration was started at the customer's site on 2002-07-25 and ended on 2002-07-27.

```xml
<dcc:coreData>
   <dcc:countryCodeISO3166_1>BE</dcc:countryCodeISO3166_1>
   <dcc:usedLangCodeISO639_1>fr</dcc:usedLangCodeISO639_1>
   <dcc:usedLangCodeISO639_1>nl</dcc:usedLangCodeISO639_1>
   <dcc:usedLangCodeISO639_1>en</dcc:usedLangCodeISO639_1>
   <dcc:mandatoryLangCodeISO639_1>fr</dcc:mandatoryLangCodeISO639_1>
   <dcc:mandatoryLangCodeISO639_1>nl</dcc:mandatoryLangCodeISO639_1>
   <dcc:uniqueIdentifier>5678</dcc:uniqueIdentifier>
   <dcc:receiptDate>2002-09-10</dcc:receiptDate>
   <dcc:beginPerformanceDate>2002-07-25</dcc:beginPerformanceDate>
   <dcc:endPerformanceDate>2002-07-27</dcc:endPerformanceDate>
   <dcc:performanceLocation>customer</dcc:performanceLocation>
</dcc:coreData>
```

[1] DIN EN ISO/IEC 17025:2018-03 General requirements for the competence of testing and calibration laboratories

dcc:items

The element *dcc:items* contains all necessary information to identify and describe a system of calibration items or a single calibration item. The element with its child elements can represent a complex composition. Therefore, the context of several or a single item is described in this part (dcc:items). The description of the individual components takes place in the sub-element *dcc:item*.

Tree structure

The rough tree structure of the element *dcc:items* has the following appearance:
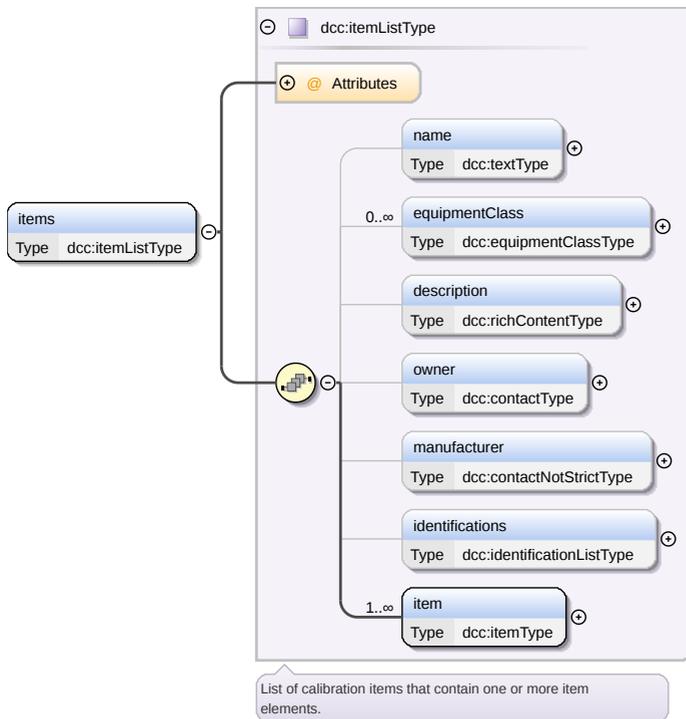
Extract from the XML schema: type definition "dcc:itemListType"

Click here to see the snippet in the wiki or have a look at the DCC schema.

Description of the elements

See the list of abbreviations here

Element Element type	Use	Description
dcc:name dcc:textType	[O]	This element shall specify the name of the system of celibration items.
dcc:equipmentClass dcc:equipmentClassType	[O]	The equipmentClass element contains all the necessary information to uniquely identify a system of calibration items or a single calibration item using a classification scheme.
dcc:description dcc:richContentType	[O]	Other information not given in the elements *dcc:name* is given here to describe the calibration item.
dcc:owner dcc:contactType	[O]	The element *dcc:owner* contains all necessary information to uniquely identify the owner of the calibration item(s).

Element Element type	Use	Description
dcc:manufacturer dcc:contactNotStrictType	[O]	The element *dcc:manufacturer* contains all necessary information to uniquely identify the manufacturer of the calibration item(s). This is possible under *dcc:items* and *dcc:item*. If we have multiple items from different manufacturers, the manufacturer has to be specified in every *dcc:item* element. If we have mutliple items from the same manufacturer, the manufacturer may be specified only one time in the *dcc:items* element in order to avoid to have to specify the same manufacturer multiple times. This can make sense for weight sets where all items have the same manufacturer. Since it may not be possible to enter the manufacturer's address at all, the data type *dcc:contactNotStrict* is used here, which contains few mandatory fields.
dcc:identifications dcc:identificationListType	[O]	Identifications in *dcc:items* contains identifiers describing exactly the combination of *dcc:item* whose calibration this DCC documents. At the dcc:item there is also an element identification, at which the individual calibration item is precisely identified.
dcc:item	[M]	The element *dcc:item* contains all necessary information of each individual calibration item.

Attributes

Attribute Attribute type	Use	Description
id xs:ID	[O]	This standard XML data type is used to represent a unique ID. It is used to uniquely identify the object in the DCC. The data type xs:ID is deliberately used here because it enables validation without any add-ons in various tools.
refId xs:IDREFS	[O]	IDREF represents the IDREF attribute type from [XML 1.0 (Second Edition)]. The value space of IDREF is the set of all strings that match the NCName production in [Namespaces in XML]. The lexical space of IDREF is the set of strings that match the NCName production in [Namespaces in XML]. The base type of IDREF is NCName.

dcc:item

The element *dcc:item* has the data type *dcc:itemType*. It contains all the necessary information to identify and describe a single calibration item. The element with its child elements can represent a complex composition. Therefore, the rough structure of the element is presented here first. For a more detailed breakdown, please refer to the links.

Tree structure

The rough tree structure of the element *dcc:item* has the following appearance:

dcc_xsd_element_dcc_item.svg

Extract from the XML schema: type definition "itemType"

Click here to see the snippet in the wiki or have a look at the DCC schema.

Description of the elements

See the list of abbreviations here

Element Element type	Use	Description
dcc:name dcc:textType	[M]	This element specifies the name of the calibration equipment.
dcc:equipmentClass dcc:equipmentClassType	[O]	The equipmentClass element contains all the information necessary to uniquely identify a system of calibration items or a single calibration item using a classification scheme.
dcc:description dcc:richContentType	[O]	Other information not given in the elements *dcc:name* is given here in order to describe the calibration item.
dcc:owner dcc:contactType	[O]	The information of the actual owner of the calibration item.
dcc:installedSoftwares dcc:softwareListType	[O]	In case that the calibration item has installed Software, it can be listed here.
dcc:manufacturer dcc:contactNotStrictType	[O]	The information on the manufacturer of the calibration item can be entered here, this makes sense if every calibration item has a different manufacturer. Since it may not be possible to enter the manufacturer's address at all, the data type *dcc:contactNotStrict* is used here, which contains few mandatory fields.
dcc:model dcc:notEmptyStringType	[O]	Other information which has not made a statement about the model or variant of the calibration object used in the previously listed elements.
dcc:identifications dcc:identificationListType	[M]	Each calibration item is uniquely identified by one or more identifier IDs in addition to its contents listed in the elements above. The element *dcc:identifications* is the place where this information is stored.
dcc:itemQuantities	[O]	The element dcc:itemQuantity was introduced to specify machine-readable physical properties. It is used exclusively to specify unchangeable values which originate, for example, from the manufacturer's data sheet. This field is not used to reproduce the entire data sheet.
dcc:subItems dcc:itemListType	[O]	In case that the item has other items on it. For example weight sets or a technical part with different sensors, the subitems of this item can be listed here.

Attributes

Attribute Attribute type	Use	Description
id xs:ID	[O]	This standard XML data type is used to represent a unique ID. It is used to clearly identify the object in the DCC. The data type xs:ID is deliberately used here, as this enables validation in various tools without any add-ons.
refId xs:IDREFS	[O]	IDREF represents the IDREF attribute type from [XML 1.0 (Second Edition)]. The value space of IDREF is the set of all strings that match the NCName production in [Namespaces in XML]. The lexical space of IDREF is the set of strings that match the NCName production in [Namespaces in XML]. The base type of IDREF is NCName.
refType dcc:refTypesType	[O]	An XML List to link to reference types.

dcc:itemQuantities

The element *dcc:itemQuantities* contains a list of value(s) which belongs to the to be calibrated item.

Tree structure

The tree structure of the element *dcc:itemQuantities* has the following appearance:
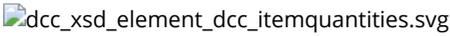
dcc_xsd_element_dcc_itemquantities.svg

Extract from the XML schema: type definition "itemQuantityListType"

Click here to see the snippet in the wiki or have a look at the DCC schema.

Description of the elements

See the list of abbreviations here

Element Element type	Use	Description
dcc:itemQuantity dcc:primitiveQuantityType	[M]	This item contains measurable value(s).

dcc:calibrationLaboratory

The element type *dcc:calibrationLaboratory* contains essential information about the calibration laboratory.

Tree structure

The tree structure of the element *dcc:calibrationLaboratory* results from the element type *dcc:calibrationLaboratoryType*. It has the following appearance:

dcc_xsd_element_dcc_calibrationlaboratory.svg

Extract from the XML schema: type definition "dcc:calibrationLaboratory"

Click here to see the snippet in the wiki or have a look at the DCC schema.

Description of the elements

See the list of abbreviations here

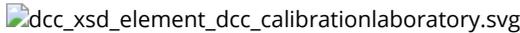| PTB	DAkkS
PTB-specific entries are marked by the logo of the PTB.	DAkkS-specific entries are marked by the logo of the DAkkS.

Element Element type	Use	Description
dcc:calibrationLaboratoryCode dcc:notEmptyStringType	[M|O]	If the calibration laboratory has an identifier assigned to it, it shall be entered at this point. **PTB** The PTB has no assigned identifier. Therefore, this element remains empty. **DAkkS** The calibration laboratories accredited by the Deutsche Akkreditierungsstelle GmbH (DAkkS) have been assigned an identifier. This is to be entered here.
dcc:contact dcc:contactType	[M]	The element *dcc:contact* contains all necessary information to uniquely identify the calibration laboratory.
dcc:cryptElectronicSeal xs:boolean	[O]	Is the calibration laboratory responsible for applying the cryptographic electronic seal? In this case, the element *dcc:cryptElectronicSeal* shall have the value "TRUE".
dcc:cryptElectronicSignature xs:boolean	[O]	Is the calibration laboratory responsible for affixing the cryptographic electronic signature? In this case, the element *dcc:cryptElectronicSignature* shall have the value "TRUE".
dcc:cryptElectronicTimeStamp xs:boolean	[O]	Is the calibration laboratory responsible for applying the cryptographic electronic time stamp? In this case, the eLement *dcc:cryptElectronicTimeStamp* shall have the value "TRUE".

dcc:respPerson

The element type *dcc:respPersonType* is used to identify the person responsible for releasing the report.

Tree structure

The tree structure of the element type *dcc:respPersonListType* has the following appearance:
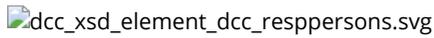
![dcc_xsd_element_dcc_resppersons.svg]

The tree structure of the element type *dcc:respPersonType* has the following appearance:

Person responsible for the DCC.
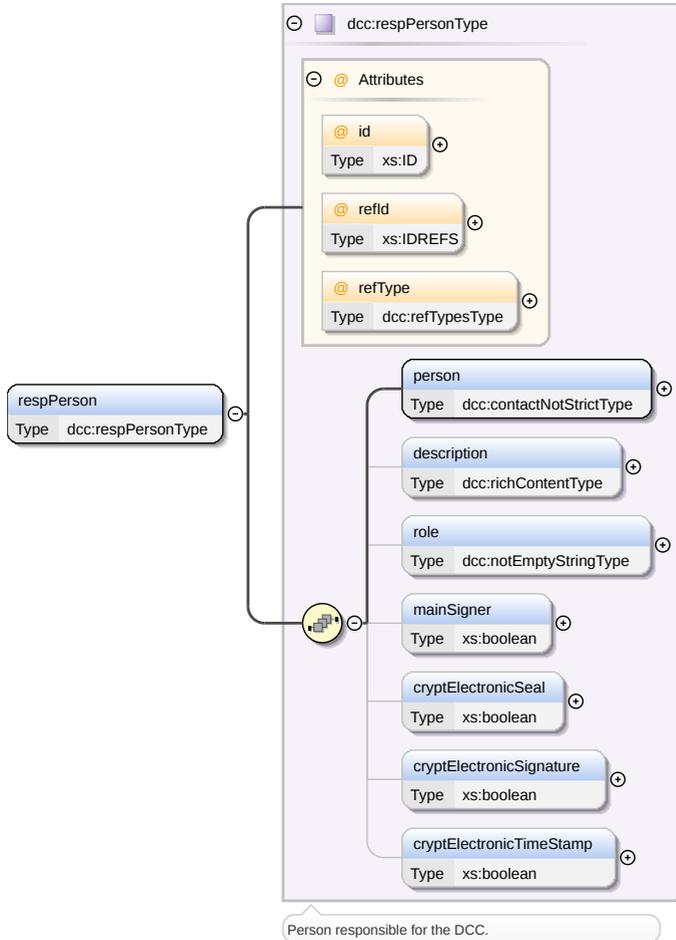
Extract from the XML schema: type definition "dcc:respPersonListType"

Click here to see the snippet in the wiki or have a look at the DCC schema.

Click here to see the snippet in the wiki or have a look at the DCC schema.

Description of the elements

See the list of abbreviations here

Element Element type	Use	Description
dcc:person dcc:contactNotStrictType	[M]	Name of the person and their contact details.

Element Element type	Use	Description
dcc:description dcc:richContentType	[O]	Further description about the person, as far as it could not be done in the *person* element.
dcc:role dcc:notEmptyStringType	[O]	Role of the responsible person.
dcc:mainSigner xs:boolean	[M|O]	A person shall take overall responsibility for the DCC. Therefore, the value for the child element *mainSigner* shall have the value "TRUE" for exactly one element of *respPerson*.
dcc:cryptElectronicSeal xs:boolean	[O]	Is the person responsible for applying the cryptographic electronic seal? In this case, the element *cryptElectronicSeal* shall have the value "TRUE".
dcc:cryptElectronicSignature xs:boolean	[O]	Is the person responsible for affixing the cryptographic electronic signature? In this case, the element *cryptElectronicSignature* shall have the value "TRUE".
dcc:cryptElectronicTimeStamp xs:boolean	[O]	Is the person responsible for applying the cryptographic electronic time stamp? In this case, the ELement *cryptElectronicTimeStamp* shall have the value "TRUE".

Attributes

| Attribute Attribute type	Use	Description
id xs:ID	[O]	This standard XML data type is used to represent a unique ID. It is used to uniquely identify the object in the DCC. The data type xs:ID is deliberately used here because it enables validation without any add-ons in various tools.
refId xs:IDREFS	[O]	IDREF represents the IDREF attribute type from [XML 1.0 (Second Edition)]. The value space of IDREF is the set of all strings that match the NCName production in [Namespaces in XML]. The lexical space of IDREF is the set of strings that match the NCName production in [Namespaces in XML]. The base type of IDREF is NCName.
refType dcc:refTypesType	[O]	A list of refTypes in XML.

dcc:statement

With the help of the element type *dcc:statementListType* and the *dcc:statementMetaDataType*, statements on calibration are stored which apply to the entire calibration process.

Tree structure

The tree structure of the element type *dcc:statementListType* has the following appearance:
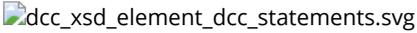
dcc_xsd_element_dcc_statements.svg

The tree structure of the element type *dcc:measurementMetaDataListType* has the following appearance:

dcc_xsd_complex_type_dcc_measurementmetadatalisttype.svg

The tree structure of the element type *dcc:statementMetaDataType* has the following appearance:

dcc:statementMetaDataType

@ Attributes

name
Type   dcc:textType

description
Type   dcc:richContentType

0..∞   countryCodeISO3166_1
Type   dcc:stringISO3166Type

convention
Type   dcc:notEmptyStringType

traceable
Type   xs:boolean

0..∞   norm
Type   dcc:notEmptyStringType

0..∞   reference
Type   dcc:notEmptyStringType

0..∞   link
Type   xs:anyURI

declaration
Type   dcc:richContentType

valid
Type   xs:boolean

validXMLList
Type   dcc:booleanXMLListType

date
Type   xs:date

period
Type   xs:duration

respAuthority
Type   dcc:contactType

conformity
Type   dcc:stringConformityStatementStatusType

conformityXMLList
Type   dcc:stringConformityStatementStatusX ...

data
Type   dcc:dataType

nonSIDefinition
Type   dcc:notEmptyStringType

nonSIUnit
Type   dcc:notEmptyStringType

location
Type   dcc:locationType

statement
Type   dcc:statementMetaDataType

a) Additional information (metadata) related to a measurement result or (lists of) quantities, or b) statement...

Extract from the XML schema: type definition "dcc:statementListType"

Click here to see the snippet in the wiki or have a look at the DCC schema.

Extract from the XML schema: type definition "dcc:statementMetaDataType"

Click here to see the snippet in the wiki or have a look at the DCC schema.

Description of the elements

See the list of abbreviations here

Element Element type	Use	Description
dcc:name dcc:textType	[O]	This element specifies the name of the statement.
dcc:description dcc:richContentType	[O]	Other information not given in the element *dcc:name* is given here in order to describe the statement.
dcc:countryCodeISO3166_1 dcc:stringISO3166Type	[O]	Country code for this statement [1].
dcc:convention dcc:notEmptyStringType	[O]	Convention followed for this statement.
dcc:traceable xs:boolean	[O]	Indicates whether the measurement result is traceable [2]. Boolean has the value space required to support the mathematical concept of binary-valued logic: {true, false}.
dcc:norm dcc:notEmptyStringType	[O]	Reference is made here to the standards and guidelines that were taken into account in the measurement
dcc:reference dcc:notEmptyStringType	[O]	The String data type represents strings in XML. more information
dcc:link xs:anyURI	[O]	External link(s) to the statement.
dcc:declaration dcc:richContentType	[O]	Text as well as images and formulas can be stored in this element.
dcc:valid xs:boolean	[O]	Indicates that the result is in valid range.
dcc:validXMLList dcc:booleanXMLListType	[O]	This element is used to specify foot notes for si:realListXMLList. dcc:validXMLList
dcc:date xs:date	[O]	Fill in a valid date.
dcc:period xs:duration	[O]	DIN ISO 8601-1:2020-12 Date and time - Presentation for the exchange of information - Part 1: Basic rules (ISO 8601-1:2019) doi: 10.31030/3178552 [3]
dcc:respAuthority dcc:contactType	[O]	Information about a responsible authority, in regards to the statement it is defined in, can be specified here by contact information.
dcc:conformity dcc:stringConformityStatementStatusType	[O]	Used to enter compliance statements.
dcc:conformityXMLList dcc:stringConformityStatementStatusXMLListType	[O]	Used to enter compliance statements in a XMLList.
dcc:data dcc:dataType	[O]	With the help of the element type dcc:dataType different data formats are made known.
dcc:nonSIDefinition dcc:notEmptyStringType	[O]	Definition of a non-SI unit used by the DCC.
dcc:nonSIUnit dcc:notEmptyStringType	[O]	The used non-SI unit used by the DCC.
dcc:location dcc:locationType	[O]	An additional location can be described here.

Attributes

Attribute Attribute type	Use	Description
id xs:ID	[O]	This standard XML data type is used to represent a unique ID. It is used to clearly identify the object in the DCC. The data type xs:ID is deliberately used here, as this enables validation in various tools without any add-ons.
refId xs:IDREFS	[O]	IDREFS represents the IDREFS attribute type from [XML 1.0 (Second Edition)]. The ·value space· of IDREFS is the set of finite, non-zero-length sequences of IDREFs. The ·lexical space· of IDREFS is the set of space-separated lists of tokens, of which each token is in the ·lexical space· of IDREF. The ·itemType· of IDREFS is IDREF.
refType dcc:refTypesType	[O]	An XML List to link to reference types.

Examples

Examples

Example: Norm

The calibration certificate was created according to ISO/IEC 17025.

```
<dcc:statement>
  <dcc:norm>ISO/IEC 17025:2018</dcc:norm>
  <dcc:declaration>
    <dcc:content lang="en">It is hereby confirmed that the calibration certificate has been issued in
accordance with ISO/IEC 17025:2018. (if applicable, the same sentence that already appears on the analogue
calibration certificate).
    </dcc:content>
    <dcc:content lang="de">Hiermit wird bestätigt, dass der Kalibrierschein nach der ISO/IEC 17025:2018
erstellt wurde. (ggf. der selbe Satz der bereits auf dem Analogen Kalibrierschein steht.)</dcc:content>
  </dcc:declaration>
</dcc:statement>
```

Example: Conformity

The client, Company XY, specifies the conditions for the declaration of conformity. The statement refers to an overall statement of conformity for the entire calibration certificate.

If the statement of conformity refers generally to a standard or other document that applies to the entire DCC, it belongs in a statement. The direct comparison values (numerical values) are specified on the dcc:quantity or dcc:list to be evaluated under dcc:measurmentMetaData. {.is-info}

```xml
<dcc:statement refType="/conformity">
  <dcc:convention>Conformity statement/ Konformitätsaussage</dcc:convention>
  <dcc:declaration>
    <dcc:content lang="en">The conditions for the conformity statement were specified by Company XY.
    </dcc:content>
    <dcc:content lang="de">Die Bedingungen für die Konformitätsaussage wurde von Company XY vorgegeben.
    </dcc:content>
  </dcc:declaration>
  <dcc:resposibleAuthority>
    <dcc:name>
      <dcc:content>Company XY</dcc:content>
    </dcc:name>
    <dcc:eMail>xy@CompanyXY.com</dcc:eMail>
    <dcc:location>
      <dcc:city>Berlin</dcc:city>
      <dcc:postCode>10587</dcc:postCode>
      <dcc:countryCode>DE</dcc:countryCode>
    </dcc:location>
  </dcc:resposibleAuthority>
  <dcc:conformity>pass</dcc:conformity>
</dcc:statement>
```

Example: Accreditation

The calibration certificate was issued by a DAkkS accredited laboratory.

The laboratory number assigned by the accreditation body has to be entered at dcc:calibrationLaboratoryCode under dcc:calibrationLaboratory. {.is-info}

```xml
<dcc:statement id="dakks" refType="accreditation" >
    <dcc:declaration>
    <dcc:content lang="en">This calibration certificate documents the metrological traceability to national
standards, which realize the units of measurement according to the International System of Units (SI).The
DAkkS is signatory to the multilateral agreements of the European co-operation for Accreditation (EA) and of
the International Laboratory Accreditation Cooperation (ILAC) for the mutual recognition of calibration
certificates. The user is obliged to have the object recalibrated at appropriate intervals.</dcc:content>
        <dcc:content lang="de">Dieser Kalibrierschein dokumentiert die metrologische Rückführbarkeit auf
nationale Normale zur Darstellung der Einheiten in Übereinstimmung mit dem Internationalen Einheitensystem
(SI). Die DAkkS ist Unterzeichner der multilateralen Übereinkommen der European co-operation for Accreditation
(EA) und der International Laboratory Accreditation Cooperation (ILAC) zur gegenseitigen Anerkennung der
Kalibrierscheine. Für die Einhaltung einer angemessenen Frist zur Wiederholung der Kalibrierung ist der
Benutzer verantwortlich.</dcc:content>
    </dcc:declaration>
  <dcc:valid>true</dcc:valid>
</dcc:statement>
```

Further comments

Further remarks can be added with dcc:declaration.

Click here to see the snippet in the wiki or have a look at the DCC schema.

Since the *dcc:statementMetaDataType* is a very universal type, the use cases are listed separately.

[1] https://www.iso.org/iso-3166-country-codes.html

[2] https://de.wikipedia.org/wiki/R%C3%BCckf%C3%BChrbarkeit

[3] https://www.beuth.de/de/norm/din-iso-8601-1/325848480
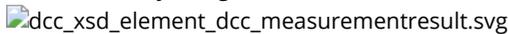
dcc:measurementResult

The element *dcc:measurementResult* contains all results of the measurements, evaluations and information about the calibration. The entries in this area are such that a value is always linked to a unit. SI units should always be used.

Tree structure

The tree structure of the parent element *dcc:measurementResults* has the following appearance:
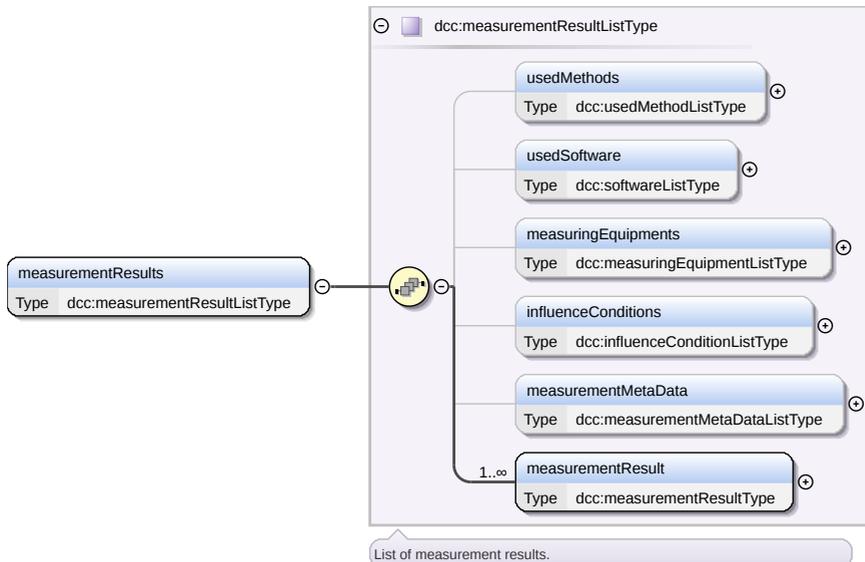
All elements used alongside *dcc:measurementResult* are valid for all following *dcc:measurementResult*. *dcc:measurementResult* can override this by using it for itself. The tree structure of the element *dcc:measurementResult* has the following appearance:
dcc_xsd_element_dcc_measurementresult.svg

Extract from the XML schema: type definition "measurementResultListType"

Click here to see the snippet in the wiki or have a look at the DCC schema.

Extract from the XML schema: type definition "measurementResultType"

Click here to see the snippet in the wiki or have a look at the DCC schema.

The element *dcc:measurementResults* has only the child element *dcc:measurementResult*. The element *dcc:measurementResult* can be called any number of times. {.is-info}

Description of the elements

See the list of abbreviations here

Element Element type	Use	Description
dcc:name dcc:textType	[M]	This element specifies the name of the calibration item.

Element Element type	Use	Description
dcc:description dcc:richContentType	[O]	Other information not given in the elements *dcc:name* is given here to describe the element.
dcc:usedMethods dcc:usedMethodListType	[O]	The method used for calibration can be entered in this element.
dcc:usedSoftware dcc:softwareListType	[O]	In this element the used software can be entered, which contributed to the generation of the measurement results.
dcc:measuringEquipments dcc:measuringEquipmentListType	[O]	In this element the equipment used can be entered.
dcc:influenceConditions dcc:influenceConditionListType	[O]	In this element, the influences (e.g., environmental parameters) on the measurement can be entered. Measurement results can also be stored here that are no longer up-to-date due to adjustment or repair.
dcc:results dcc:resultListType	[M]	The results of the calibration must be entered in this element.
dcc:measurementMetaData dcc:measurementMetaDataListType	[O]	All other additional information can be entered in this element.

Attributes

Attribute Attribute type	Use	Description
id xs:ID	[O]	This standard XML data type is used to represent a unique ID. It is used to uniquely identify the object in the DCC. The data type xs:ID is deliberately used here because it enables validation without any add-ons in various tools.
refId xs:IDREFS	[O]	IDREF represents the IDREF attribute type from [XML 1.0 (Second Edition)]. The value space of IDREF is the set of all strings that match the NCName production in [Namespaces in XML]. The lexical space of IDREF is the set of strings that match the NCName production in [Namespaces in XML]. The base type of IDREF is NCName.
refType dcc:refTypesType	[O]	A list of refTypes in XML.

dcc:document

This area can be used to store a single document that represents the result of the calibration in a human-readable form. For example, a version of the calibration certificate saved in PDF-A format can be stored in the previous appearance of the analogue calibration certificate that was previously issued in paper format to the client after the calibration service provider fulfilled the calibration order. The users of the DCC and also the authorised persons in the field of quality management thus have the possibility to see an image of the analogue calibration certificate they were used to seeing during the phase of conversion to a digital representation of calibration certificates. By using Base64 encoding, the PDF-A document can be stored together with the above-mentioned information in the XML file. The authors of the DCC assume that HTML5 will establish itself as a human-readable format over time. An output of the calibration certificate based on browser technologies has the advantage that it is format-free. The output of larger tables is then easily possible and more efficient for the user. For example, units outside the SI system of units can additionally be displayed (e.g. nautical miles, millimetres of mercury, degrees Oechsle), provided that this facilitates and improves the readability of the calibration certificate by the user. The non-SI units should only be used in the human readable part. Here they are useful because in this way non-metrologists can find "their familiar units" again. For communication between machines, the use of SI units is indispensable in order to exclude confusion from the outset. The conversion of SI units and non-SI units should be reserved for the metrologists at the calibration service provider, who guarantee the correctness of the conversion.

Tree structure

The tree structure of the element *dcc:document* has the following appearance: dcc_xsd_element_dcc_document.svg
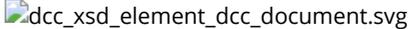
Extract from the XML schema: type definition "byteDataType"

Click here to see the snippet in the wiki or have a look at the DCC schema.

Example

```xml
<dcc:document>
    <dcc:fileName>GEMIMEG-Tool_gp_temp.pdf</dcc:fileName>
    <dcc:mimeType>application/pdf</dcc:mimeType>
    <dcc:dataBase64>VeryLongBase64String...==</dcc:dataBase64>
</dcc:document>
```
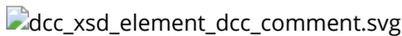
dcc:comment

The element *dcc:comment* contains an unlimited count of optional files and comments, e.g. spreadsheets and graphics in any individual file formats. The "comments" area contains individual information of a measurement process, providing further details about the measurement results. This area can be used optionally. Possible details are, for example, graphics of measurement curves, video or audio documents or individual measurement series in any file formats. The transmission of cost accounting in .pdf format for the execution of calibration activities is another conceivable use case. These files are stored encoded in Base64 format in this area of the DCC.

Tree structure

The tree structure of the *dcc:comment* element has the following appearance:

![dcc_xsd_element_dcc_comment.svg]

The element has the setting *dcc:any*, that means the number of elements is not limited and a namespace has not to be specified but can be specified.

Extract from the XML schema: element definition "comment"

Click here to see the snippet in the wiki or have a look at the DCC schema.

Filling instructions

There are two examples for filling the *dcc:comment* element.

Expample 1 for filling dcc:comment with XML-elements from a corresponding namespace/ schema

In this case a namespace will be specified, as an example we use the si-Namespace and use the D-SI XML schema within the dcc:comment-Element

Click here to see the snippet in the wiki or have a look at the DCC schema.

Expample 2 for filling dcc:comment

It is also possible to fill XML elements without a certain namespace/ XML schema:

Click here to see the snippet in the wiki or have a look at the DCC schema.

dcc:byteDataType

The element type *dcc:byteDataType* is used to enter any information that is available as electronic data.

Tree structure

The rough tree structure of the element type *byteDataType* has the following appearance:

dcc_xsd_complex_type_dcc_bytedatatype.svg

Extract from the XML schema: type definition "dcc:byteDataType"

Click here to see the snippet in the wiki or have a look at the DCC schema.

Minimum specifications

If an element of type *dcc:byteDataBlock* is used, it contains mandatory fields identified as follows.

Description of the elements

See the list of abbreviations here

Element Element type	Use	Description
dcc:name dcc:textType	[M]	Statement of the subject of the file attached.
dcc:description dcc:richContentType	[M]	Statement of the content of the attached file.
dcc:fileName dcc:notEmptyStringType	[M]	Name of the attached file.
dcc:mimeType dcc:notEmptyStringType	[M]	Indication of the MIME type of the attached file e.g., image/png [1].
dcc:dataBase64 xs:base64Binary	[M]	This element is used to store the data after it has been encoded [2] using the base64 method.

Description:

The byteDataBlock defines a type that allows binary encoded files to be added. It is a best practice to use the Base64 Data Encodings Standard, RFC 4648
[2].

Examples of content are image files or ZIP archives. The element fileName specifies the name of the original file. The element mimeType is the underlying file type (e.g. zip, jpeg, png). Element data contains the base64Binary encoded file.

Attributes

Attribute Attribute type	Use	Description
id xs:ID	[O]	This standard XML data type is used to represent a unique ID. It is used to clearly identify the object in the DCC. The data type xs:ID is deliberately used here, as this enables validation in various tools without any add-ons.

Attribute Attribute type	Use	Description
refId xs:IDREF	[O]	IDREF represents the IDREF attribute type from [XML 1.0 (Second Edition)]. The value space of IDREF is the set of all strings that match the NCName production in [Namespaces in XML]. The lexical space of IDREF is the set of strings that match the NCName production in [Namespaces in XML]. The base type of IDREF is NCName.
refType dcc:refTypesType	[O]	A list of refTypes in XML.

[1] MimeTypes see: https://developer.mozilla.org/en-US/docs/Web/HTTP/Basics_of_HTTP/MIME_types/Common_types

[2] Base64 Data Encodings standard, see RFC 4648: https://tools.ietf.org/html/rfc4648

dcc:contactNotStrictType

The element type *dcc:contactNotStrictType* is used to enter contact data. It is usually called from other elements.

Tree structure

The rough tree structure of the element type *dcc:contactNotStrictType* has the following appearance:
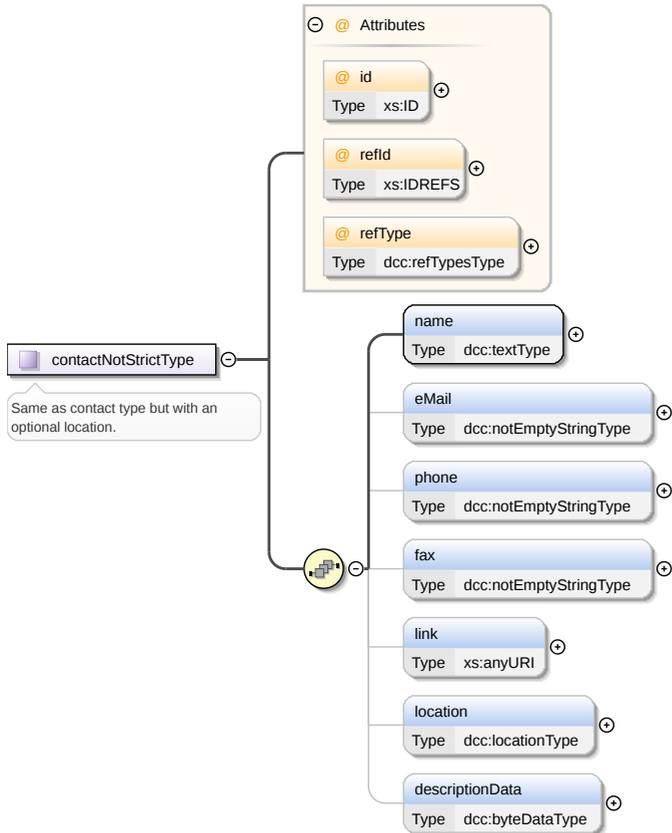
Extract from the XML schema: type definition "dcc:contactNotStrictType"

Click here to see the snippet in the wiki or have a look at the DCC schema.

Minimum specifications

If an element of type *dcc:contactNotStrict* is used, it contains mandatory fields identified as follows.

The following applies to the registered office in Germany: In the case of legal entities, the details from the commercial register and, in the case of natural persons, the primary residence must be stated.	In the case of public authorities, the details from the imprint of the website must be stated. In the case of public authorities, the details from the imprint of the website must be stated.

Description of the elements

See the list of abbreviations here

Element Element type	Use	Description
dcc:name dcc:textType	[M]	Indication of the name of the legal or natural person.
dcc:eMail dcc:notEmptyStringType	[O]	Statement of the e-mail address of the legal or natural person.
dcc:phone dcc:notEmptyStringType	[O]	Statement of the telephone number of the legal or natural person.
dcc:fax dcc:notEmptyStringType	[O]	Statement of the fax number of the legal or natural person.
dcc:link xs:anyURI	[O]	External link to the contact.
dcc:location dcc:locationType	[O]	Information on the address of the legal or natural person.
dcc:descriptionData dcc:byteDataType	[O]	Additional information of the legal or natural person.

Attributes

Attribute Attribute type	Use	Description
id xs:ID	[O]	This standard XML data type is used to represent a unique ID. It is used to clearly identify the object in the DCC. The data type xs:ID is deliberately used here, as this enables validation in various tools without any add-ons.
refId xs:IDREFS	[O]	IDREFS represents the IDREFS attribute type from [XML 1.0 (Second Edition)]. The ·value space· of IDREFS is the set of finite, non-zero-length sequences of IDREFs. The ·lexical space· of IDREFS is the set of space-separated lists of tokens, of which each token is in the ·lexical space· of IDREF. The ·itemType· of IDREFS is IDREF.
refType dcc:refTypesType	[O]	An XML List to link to reference types.

dcc:contactType

The element type *dcc:contactType* is used to enter contact data. It is called from other called from other elements.

Tree structure

The rough tree structure of the element type *dcc:contactType* has the following appearance:
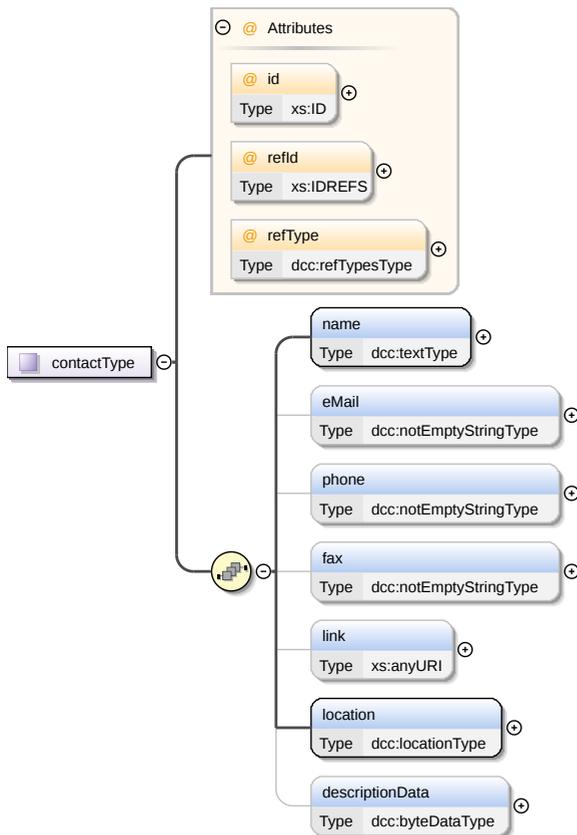
Extract from the XML schema: type definition "dcc:contactType"

Click here to see the snippet in the wiki or have a look at the DCC schema.

Minimum specifications

If an element of type *dcc:contactType* is used, it contains mandatory fields marked as follows.

The following applies to the registered office in Germany: In the case of legal entities, the details from the commercial register and, in the case of natural persons, the primary residence must be stated.	In the case of public authorities, the details from the imprint of the website must be stated. In the case of public authorities, the details from the imprint of the website must be stated.

Description of the elements

See the list of abbreviations here

Element Element type	Use	Description
dcc:name dcc:textType	[M]	Indication of the name of the legal or natural person.
dcc:eMail dcc:notEmptyStringType	[O]	Statement of the e-mail address of the legal entity or natural person.
dcc:phone dcc:notEmptyStringType	[O]	Statement of the telephone number of the legal or natural person.
dcc:fax dcc:notEmptyStringType	[O]	Statement of the fax number of the legal or natural person.
dcc:link xs:anyURI	[O]	External link to the contact.
dcc:location dcc:locationType	[M]	Information on the address of the legal entity or natural person.
dcc:descriptionData dcc:byteDataType	[O]	Additional information of the legal or natural person.

Attributes

Attribute Attribute type	Use	Description
id xs:ID	[O]	This standard XML data type is used to represent a unique ID. It is used to uniquely identify the object in the DCC. The data type xs:ID is deliberately used here because it enables validation without any add-ons in various tools.
refId xs:IDREFS	[O]	IDREF represents the IDREF attribute type from [XML 1.0 (Second Edition)]. The value space of IDREF is the set of all strings that match the NCName production in [Namespaces in XML]. The lexical space of IDREF is the set of strings that match the NCName production in [Namespaces in XML]. The base type of IDREF is NCName.
refType dcc:refTypesType	[O]	A list of refTypes in XML.

Examples

Example 1

A calibration laboratory at the PTB in Braunschweig with the following (invented) address:

```
Physikalisch-Technische Bundesanstalt
z. H. Mr. Mustermann
Working group 12.24 Sample measurement
Musterbau
Bundesallee 100
38116 Brunswick
```

has the following appearance in the XML file:

```xml
<dcc:calibrationLaboratory>
    <dcc:contact>
        <dcc:name>
            <dcc:content>Physikalisch-Technische Bundesanstalt (PTB)</dcc:content>
        </dcc:name>
        <dcc:eMail>info@ptb.de</dcc:eMail>
        <dcc:location>
            <dcc:further>
                <dcc:content>z. H. Herrn Mustermann</dcc:content>
                <dcc:content>Arbeitsgruppe 12.24 Mustermessung</dcc:content>
                <dcc:content>Musterbau</dcc:content>
            </dcc:further>
            <dcc:street>Bundesallee</dcc:street>
            <dcc:streetNo>100</dcc:streetNo>
            <dcc:postCode>38116</dcc:postCode>
            <dcc:city>Braunschweig</dcc:city>
            <dcc:countryCode>DE</dcc:countryCode>
        </dcc:location>
    </dcc:contact>
</dcc:calibrationLaboratory>
```
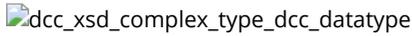
dcc:dataType

With the help of the element type *dcc:dataType*, different data formats are made known.

Tree structure

The tree structure of the element type *dcc:dataType* has the following appearance:

dcc_xsd_complex_type_dcc_datatype

Extract from the XML schema: Type definition "dataType"

Click here to see the snippet in the wiki or have a look at the DCC schema.

Description of the elements

See the list of abbreviations here

The DCC XML file is created using software. The name of this software(s) (one or more) shall be documented.

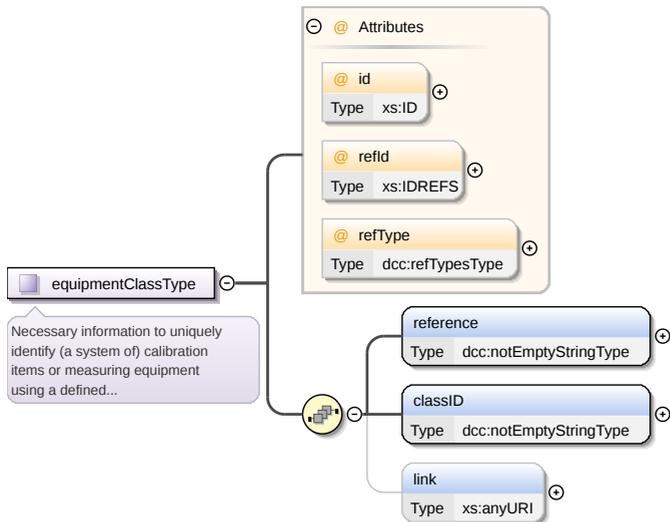| Element Element type	Use	Description
dcc:text dcc:richContentType	[O]	text can be stored in this element.
dcc:formula dcc:formulaType	[O]	Formulas can be stored in this element.
dcc:byteData dcc:byteDataType	[O]	The element type dcc:byteDataType is used to enter any information that is available as electronic data.
dcc:xml dcc:xmlType	[O]	The element type allows formulas and equations to be inserted into the measurement result area of the DCC.
dcc:quantity dcc:quantityType	[O]	The element type allows formulas and equations to be inserted into the measurement result area of the DCC.
dcc:list dcc:listType	[O]	The "list" element allows the definition of a collection of measurement results to which structures with integrity are subject, e.g. vector quantities.

Attributes

Attribute AttributeType	Use	Description
id xs:ID	[O]	This standard DataType of XML is used to represent a unique ID. It is used to uniquely identify the object in the DCC. The data type xs:ID is deliberately used here because it enables validation without any add-ons in various tools.
refId xs:IDREF	[O]	IDREF represents the IDREF attribute type from [XML 1.0 (Second Edition)]. The value space of IDREF is the set of all strings that match the NCName production in [Namespaces in XML]. The lexical space of IDREF is the set of strings that match the NCName production in [Namespaces in XML]. The base type of IDREF is NCName.
refType xs:string	[O]	The string data type represents strings in XML. The value space of string is the set of finite strings (as defined in [XML 1.0 (Second Edition)]) that match the char production of [XML 1.0 (Second Edition)]. A character is an atomic unit of communication; it is not further specified except that each character has a corresponding universal character set code point, which is an integer.

dcc:equipmentClassType

An element of the type *dcc:equipmentClassType* contains all the necessary information to uniquely identify a system of calibration items or a single calibration item using a classification schema e.g., the BIPM service categories.

Tree structure

The tree structure of the element *dcc:equipmentClass* has the following appearance:

Extract from the XML schema: type definition "equipmentClassType"

Click here to see the snippet in the wiki or have a look at the DCC schema.

Description of the elements

See the list of abbreviations here

Element Element type	Use	Description
reference dcc:notEmptyStringType	[M]	Enter here the standard(s) according to which the classification of the calibration items is carried out. more information
classID dcc:notEmptyStringType	[M]	This is where the classification of the calibration goods is entered.
dcc:link xs:anyURI	[O]	External link to the equipment class.

Attributes

Attribute Attribute type	Use	Description
id xs:ID	[O]	This standard XML data type is used to represent a unique ID. It is used to uniquely identify the object in the DCC. The data type xs:ID is deliberately used here because it enables validation without any add-ons in various tools.

Attribute Attribute type	Use	Description
refId xs:IDREFS	[O]	IDREF represents the IDREF attribute type from [XML 1.0 (Second Edition)]. The value space of IDREF is the set of all strings that match the NCName production in [Namespaces in XML]. The lexical space of IDREF is the set of strings that match the NCName production in [Namespaces in XML]. The base type of IDREF is NCName.
refType dcc:refTypesType	[O]	A list of refTypes in XML.

Example

As an example if we would want to classify an item/ equipment in regard to BIPM Classification of services in mass and related quantities
[1] as a force measuring device for tension:

```
<dcc:equipmentClass>
    <dcc:reference>BIPM Classification of services in mass and related quantities</dcc:reference>
    <dcc:classID>4.1.1</dcc:classID>

<dcc:link>https://www.bipm.org/documents/20126/41442309/Classification+of+services+in+Mass+and+related+quantit
ies/3cfc4f69-1770-c1eb-31a5-a23144418a23</dcc:link>
</dcc:equipmentClass>
```

[1] https://www.bipm.org/documents/20126/41442309/Classification+of+services+in+Mass+and+related+quantities/3cfc4f69-1770-c1eb-31a5-a23144418a23
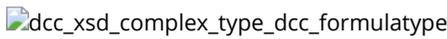
dcc:formulaType

The data block *dcc:formulaType* is used to insert formulas and equations into the measurement result area of the DCC.

Please keep in mind that there are two different types of formula in codes. LaTeX and Presentation MathML is used for formulas in intention of presentation. Content MathML is machine-interpretable. As a good practice it is good to use machine interpretable formulas in data fields of the DCC and presentational formulas in text fields of the DCC. {.is-warning}

Tree structure

The tree structure of the element type *dcc:formulaType* has the following appearance:

dcc_xsd_complex_type_dcc_formulatype

Extract from the XML schema: type definition "formulaType"

Click here to see the snippet in the wiki or have a look at the DCC schema.

Description of the elements

See the list of abbreviations here

Element Element type	Use	Description
dcc:latex xs:string	[O]	This element can be used to store a latex-formatted string.
dcc:mathml dcc:xmlType	[O]	The data block dcc:xmlType is used to insert formulas and equations into the measurement result area of the DCC.

Attribute

Attribute AttributeType	Use	Description
id xs:ID	[O]	This standard DataType of XML is used to represent a unique ID. It is used to uniquely identify the object in the DCC. The data type xs:ID is deliberately used here because it enables validation without any add-ons in various tools.
refId xs:IDREF	[O]	IDREF represents the IDREF attribute type from [XML 1.0 (Second Edition)]. The value space of IDREF is the set of all strings that match the NCName production in [Namespaces in XML]. The lexical space of IDREF is the set of strings that match the NCName production in [Namespaces in XML]. The base type of IDREF is NCName.
refType dcc:refTypesType	[O]	A list of refTypes in XML.

Math ML Formula Example

Formula: $(a+b)^2$

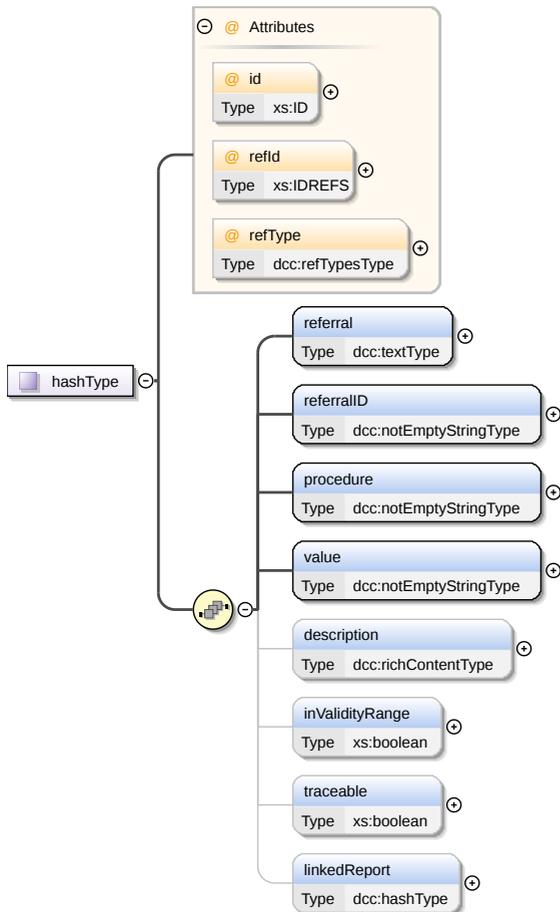Click here to see the snippet in the wiki or have a look at the DCC schema.

Click here to see the snippet in the wiki or have a look at the DCC schema.

dcc:hashType

The element type *dcc:hashType* contains the unique identifier of a referred/referenced certificate and a hash value. In the dcc:description element the certificate can be attached ideally as an XML or a PDF encoded to Base64.

Tree structure

The tree structure of the element type *dcc:hashType* has the following appearance:

Extract from the XML schema: type definition "hashType"

Click here to see the snippet in the wiki or have a look at the DCC schema.

Description of the elements

See the list of abbreviations here

Element Element type	Use	Description
dcc:referral dcc:textType)	[M]	This field contains the referral/ reference name of the certificate, ideally already a digital certificate such as the DCC.
dcc:referralID dcc:notEmptyStringType	[M]	The identifier (e.g. the calibration certificate number or unique identifier of a DCC) of the certificate is entered here.
dcc:procedure dcc:notEmptyStringType	[M]	The certificate is uniquely identified with a hash value algorithm. With the DCC, this is done automatically with the application of a digital signature. This field

Element Element type	Use	Description
		contains the algorithm used to calculate the hash value stored in the element *dcc:value*. If it is an analogue certificate, the word "analogue" is entered in this mandatory element.
dcc:value dcc:notEmptyStringType	[M]	The hash value is stored in this element. It was obtained by applying the hash value algorithm mentioned in the element *dcc:procedure* to the calibration certificate. If it is an analogue certificate, the word "analogue" is entered in this mandatory element.
dcc:description dccrichContentType	[O]	Additional information can be entered here. Rich content Type can contain files and formulas beside the normal text content.
dcc:inValidityRange xs:boolean	[O]	Indicates whether the equipment was found valid (results in validity range) when the the equipment was calibrated.
dcc:traceable xs:boolean	[O]	Indicates that the linked certificate is traceable
dcc:linkedReport dcc:hashType (loop)	[O]	The element *dcc:linkedReport* gives the possibility to refer to another certificate from this certificate. A chain of certificates can be specified. The structure of the element *dcc:linkedReport* also has an element with the element type *dcc:hashType*.

Attributes

Attribute Attribute type	Use	Description
id xs:ID	[O]	This standard XML data type is used to represent a unique ID. It is used to uniquely identify the object in the DCC. The data type xs:ID is deliberately used here because it enables validation without any add-ons in various tools.
refId xs:IDREFS	[O]	IDREF represents the IDREF attribute type from [XML 1.0 (Second Edition)]. The value space of IDREF is the set of all strings that match the NCName production in [Namespaces in XML]. The lexical space of IDREF is the set of strings that match the NCName production in [Namespaces in XML]. The base type of IDREF is NCName.
refType dcc:refTypesType	[O]	A list of refTypes in XML.

Examples

Example 1

If the previous calibration certificate was a digital calibration certificate with
dcc:uniqueIdentifier4914246</dcc:uniqueIdentifier>. It has been hashed with the hash value algorithm *SHA256*. The hash value is *e14f080fcc4a8b2ut879add657d9e66f7896a*.

```
<dcc:previousReport>
    <dcc:referral>
        <dcc:content lang="en">The predecessor calibration certificate is a DCC.</dcc:content>
    </dcc:referral>
    <dcc:referralID>4914246</dcc:referralID>
    <dcc:procedure>SHA256</dcc:procedure>
    <dcc:value>e14f080fcc4a8b2ut879add657d9e66f7896a</dcc:value>
</dcc:previousReport>
```

Example 2

If instead of dcc:uniqueIdentifier another dcc:identification of the previous certificate has to be referenced, than refTypes have to be used.

```
<dcc:identification refType="basic_orderNumber">
    <dcc:issuer>calibrationLaboratory</dcc:issuer>
    <dcc:value>abc123</dcc:value>
    <dcc:name>
        <dcc:content lang="de">Geschäftszeichen</dcc:content>
        <dcc:content lang="en">Reference No.</dcc:content>
    </dcc:name>
</dcc:identification>
```

It has been hashed with the hash value algorithm *SHA256*. The hash value is *e14f080fcc4a8b2ut879add657d9e66f7896a*.

```
<dcc:previousReport refType="basic_orderNumber">
    <dcc:referral>
        <dcc:content lang="en">The predecessor calibration certificate is a DCC.</dcc:content>
    </dcc:referral>
    <dcc:referralID>abc123</dcc:referralID>
    <dcc:procedure>SHA256</dcc:procedure>
    <dcc:value>e14f080fcc4a8b2ut879add657d9e66f7896a</dcc:value>
</dcc:previousReport>
```

Example 3

Same as example 1, with an additional previous analogue calibration certificate with certificate number *5678*.

```
<dcc:previousReport>
    <dcc:referral>
     <dcc:content lang="en">The predecessor calibration certificate is a DCC.</dcc:content>
    </dcc:referral>
    <dcc:referralID>4914246</dcc:referralID>
    <dcc:procedure>SHA256</dcc:procedure>
    <dcc:value>e14f080fcc4a8b2ut879add657d9e66f7896a</dcc:value>
    <dcc:linkedReport>
        <dcc:referral>
            <dcc:content lang="en">The predecessor calibration certificate is an analogous Calibration
Certificate.</dcc:content>
        </dcc:referral>
        </dcc:referralID>5678</dcc:referralID>
        <dcc:procedure>analogue</dcc:procedure>
        <dcc:value>analogue</dcc:value>
    </dcc:linkedReport>
</dcc:previousReport>
```

[1] DIN EN ISO/IEC 17025:2018-03 General requirements for the competence of testing and calibration laboratories
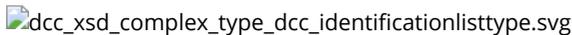
dcc:identification

The element *dcc:identification* is of type *dcc:identificationType* and is called from a *dcc:identificationListType*. *dcc:identification* gives the possibility to identify the calibration certificate (*dcc:corData*), a calibration system (*dcc:items*) or a calibration object (*dcc:item*) with several identifiers.

In some cases it may happen that there is no identifier on the calibration material. This may occur when the calibration material has very small geometric dimensions. For example, microelectromechanical systems (MEMS) typically have dimensions in the range of a few micrometres (µm). Therefore, it is often not possible to attach this identifying feature directly to the object (calibration item). This also applies, for example, to the smallest mass pieces whose representation consists of a very thin wire (e.g., bonding wire with a diameter of 30 µm) made of precious metal (typically: gold) and short length in the range of single-digit millimetres. Therefore, the entry in the DCC is not mandatory for this identifying characteristic of the calibrated material. However, it is recommended that the calibration laboratory or the manufacturer of the calibration material finds another way to remedy this deficiency. A typical method is to mount the calibration material on a more convenient slide or to give the calibration material a unique shape that does not affect the feature to be calibrated. For this purpose, the already mentioned micro-measurement pieces are bent into a triangular or square shape and can thus be distinguished by their geometry alone. Another possibility is to uniquely label or mark the packaging and thus make it unique in that only one object with the geometry of the calibrated item can be accommodated.

Tree structure

The tree structure of the element type *dcc:identificationListType* has the following appearance:

dcc_xsd_complex_type_dcc_identificationlisttype.svg

The tree structure of the element type *dcc:identificationType* has the following appearance:
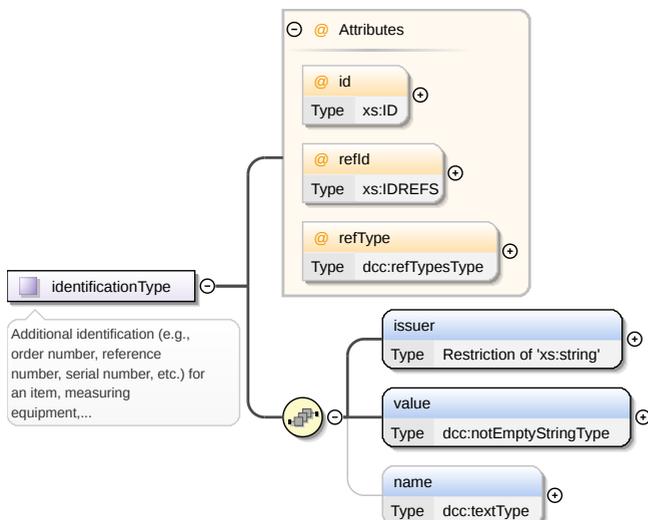
Extract from the XML schema: type definition "identificationType"

Click here to see the snippet in the wiki or have a look at the DCC schema.

Description of the elements

See the list of abbreviations here [This element is the root element for the input of identifiers. It contains the child element *dcc:identification*, in which the respective identifier is to be entered. At least the mandatory elements of *dcc:identification* must

be completed.]::

Element Element type	Use	Description
dcc:issuer xs:string	[M]	Only one of the following words can be entered in the element *issuer*. - manufacturer - calibrationLaboratory - customer - owner - other If the element is filled with another content, an error occurs during the check against the XML schema.
dcc:value dcc:notEmptyStringType	[M]	The identifier is entered here.
dcc:name dcc:textType	[O]	Other information about the identifier.

Attributes

Attribute Attribute type	Use	Description
id xs:ID	[O]	This standard XML data type is used to represent a unique ID. It is used to uniquely identify the object in the DCC. The data type xs:ID is deliberately used here because it enables validation without any add-ons in various tools.
refId xs:IDREFS	[O]	IDREF represents the IDREF attribute type from [XML 1.0 (Second Edition)]. The value space of IDREF is the set of all strings that match the NCName production in [Namespaces in XML]. The lexical space of IDREF is the set of strings that match the NCName production in [Namespaces in XML]. The base type of IDREF is NCName.
refType dcc:refTypesType	[O]	A list of refTypes in XML.

Examples

Example 1

The manufacturer has specified the identification number 1040917:

```xml
<dcc:identifications>
    <dcc:identification>
        <dcc:issuer>manufacturer</dcc:issuer>
        <dcc:value>1040917</dcc:value>
    </dcc:identification>
</dcc:identifications>
```

Example 2

The manufacturer has indicated the identification number 1040917 as well as the batch A3/19 and also clearly distinguished between the identification number and the batch:

```xml
<dcc:identifications>
    <dcc:identification>
        <dcc:issuer>manufacturer</dcc:issuer>
        <dcc:value>1040917</dcc:value>
    </dcc:identification>
        <dcc:description>
            <dcc:content lang="en">code number</dcc:content>
            <dcc:content lang="en">Serial No.</dcc:content>
        </dcc:description>
    <dcc:identification>
        <dcc:issuer>manufacturer</dcc:issuer>
        <dcc:value>A3/19</dcc:value>
    </dcc:identification>
        <dcc:description>
            <dcc:content lang="en">Charge</dcc:content>
            <dcc:content lang="en">Charge</dcc:content>
        </dcc:description>
</dcc:identifications>
```

Example 3

Manufacturer, calibration laboratory and customer have each given an identification number:

```xml
<dcc:identifications>
    <dcc:identification>
        <dcc:issuer>manufacturer</dcc:issuer>
        <dcc:value>1040917</dcc:value>
        <dcc:description>
            <dcc:content lang="en">code number</dcc:content>
            <dcc:content lang="en">Serial No.</dcc:content>
        </dcc:description>
    </dcc:identification>
    <dcc:identification>
        <dcc:issuer>calibrationLaboratory</dcc:issuer>
        <dcc:value>PTB4711</dcc:value>
        <dcc:description>
            <dcc:content lang="en">Number</dcc:content>
            <dcc:content lang="en">Serial No.</dcc:content>
        </dcc:description>
    </dcc:identification>
    <dcc:identification>
        <dcc:issuer>customer</dcc:issuer>
        <dcc:value>0815</dcc:value>
        <dcc:description>
            <dcc:content lang="en">code number</dcc:content>
            <dcc:content lang="en">Serial No.</dcc:content>
        </dcc:description>
    </dcc:identification>
</dcc:identifications>
```
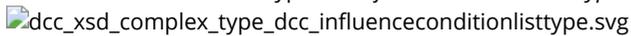
dcc:influenceConditionType

The *dcc:influenceConditionListType* offers the possibility to specify several elements of the type *dcc:influenceConditionType*. This type can be called in the element dcc:measurementResult, dcc:list and dcc:quantity. Thus, the element has a validity for a whole dcc:measurementResult, a whole dcc:list or a single dcc:quantity, respectively.
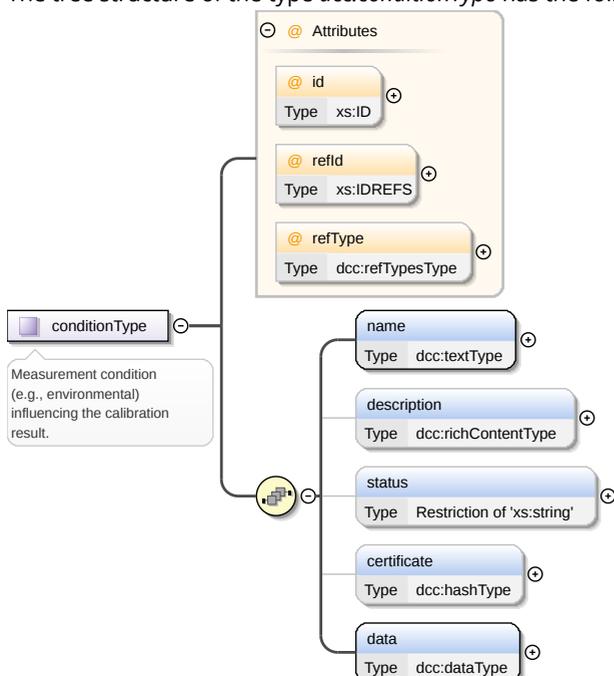
In *dcc:influenceConditionType* conditions are described which have influence on the calibration results. In this type, it is also possible to store the measurement values that are no longer current if a repair or adjustment was carried out on the calibration item.

Tree structure

The tree structure of the type *dcc:influenceConditionListType* has the following appearance:
dcc_xsd_complex_type_dcc_influenceconditionlisttype.svg

The tree structure of the type *dcc:conditionType* has the following appearance:

Extract from the XML schema: type definition "influenceConditionListType"

Click here to see the snippet in the wiki or have a look at the DCC schema.

Extract from the XML schema: type definition "conditionType"

Conditions (e.g. environmental conditions) under which the calibrations were performed and which have an influence on the measurement results.

Click here to see the snippet in the wiki or have a look at the DCC schema.

Description of the elements

See the list of abbreviations here

Element Element type	Use	Description
dcc:name dcc:textType	[M]	In this element, the name of the condition (e.g. environmental condition) under which the calibrations were performed and which has an influence on the measurement result is entered.
dcc:description dcc:richContentType	[O]	The element type *dcc:richContentType* is used to enter any information. With it, it is possible to accommodate text as well as images and formulas in one element.
dcc:status xs:string	[O]	The status can be: - beforeAdjustment, - afterAdjustment, - beforeRepair, - afterRepair. It indicates a change due to a repair or adjustment of the unit, making the information in dcc:data history data.
dcc:certificate dcc:hashType	[O]	Reference to another certificate as the source of the values.
dcc:data dcc:dataType	[M]	without dcc:status: The element dcc:data contains the data of the influence conditions. with dcc:status: The element contains the history data before a change was made to the device.

Attributes

Attribute Attribute type	Use	Description
id xs:ID	[O]	This standard XML data type is used to represent a unique ID. It is used to uniquely identify the object in the DCC. The data type xs:ID is deliberately used here because it enables validation without any add-ons in various tools.
refId xs:IDREFS	[O]	IDREF represents the IDREF attribute type from [XML 1.0 (Second Edition)]. The value space of IDREF is the set of all strings that match the NCName production in [Namespaces in XML]. The lexical space of IDREF is the set of strings that match the NCName production in [Namespaces in XML]. The base type of IDREF is NCName.
refType dcc:refTypesType	[O]	A list of refTypes in XML.

dcc:locationType

The element type *dcc:locationType* is used to enter the address.

Tree structure

The rough tree structure of the element type *dcc:locationType* has the following appearance:

dcc_xsd_complex_type_dcc_locationtype.svg

Extract from the XML schema: type definition "locationType"

Click here to see the snippet in the wiki or have a look at the DCC schema.

Remarks

If an element of type *dcc:location* is used, it contains mandatory fields which are marked as follows.

The child elements of the element *location* can be entered in any order as often as any number of times in any order. The motivation for this lies in the variety of possibilities of providing addresses in the various countries of the world.

The check for logical rictness cannot be done by the XML schema.

Description of the elements

See the list of abbreviations here

Element Element type	Use	Description
city dcc:notEmptyStringType	[O|M]	The name of the city.
countryCode dcc:stringISO3166Type	[O|M]	The country code, consisting of two capital letters.
postCode dcc:notEmptyStringType	[O|M]	The postcode.
postOfficeBox dcc:notEmptyStringType	[O|M]	The postbox.
state dcc:notEmptyStringType	[O|M]	The State.
street dcc:notEmptyStringType	[O|M]	The street name.
streetNo dcc:notEmptyStringType	[O|M]	The house number.
further dcc:richContentType	[O|M]	Provide additional information useful for an accurate postal address.
positionCoordinates dcc:positionCoordinatesType	[O|M]	Provision of additional information for the exact determination of the position when carrying out the calibration procedures (e.B. in the case of wind turbines) if it is not possible to provide a postal address.

dcc:performanceLocationType

The *dcc:performanceLocationType* is containing one out of a set of predefined strings. Its contents are described later in the *dcc:stringPerformanceLocationType* section.

Tree structure

The tree structure of the element type *dcc:performanceLocationType* has the following appearance:

dcc_xsd_complex_type_dcc_performancelocationtype.svg

Extract from the XML schema: type definition "performanceLocationType"

Click here to see the snippet in the wiki or have a look at the DCC schema.

The tree structure of the element type *dcc:stringPerformanceLocationType* has the following appearance:

dcc_xsd_simple_type_dcc_stringperformancelocationtype.svg

Extract from the XML schema: type definition "stringPerformanceLocationType"

Click here to see the snippet in the wiki or have a look at the DCC schema.

Content	Description
laboratory	Choose this value, if the calibration took place at the postal address of the calibration laboratory.
customer	Choose this value, if the calibration took place at the postal address of the customer.
laboratoryBranch	Choose this value, if the calibration took place at a branch of the laboratory. In addition, an ID for the *dcc:performanceLocationType* has to be set e.g., to id="performanceLocation". Additionally an exact address has to be provided in a dcc:statement in the DCC with the same text used for the ID e.g., refID="performanceLocation".
customerBranch	Choose this value, if the calibration took place at a branch of the customer. In addition, an ID for the *dcc:performanceLocationType* has to be set e.g., to id="performanceLocation". Additionally an exact address has to be provided in a dcc:statement in the DCC with the same text as used for the ID e.g. refID="performanceLocation".
other	Choose this value, if the calibration took place at a location without a postal address, e.g. at a point in the area that can only be identified by providing geoposition data (e.g. wind turbines, offshore structures). In addition, an ID for the *dcc:performanceLocationType* has to be set e.g., to id="performanceLocation". Additionally an exact address has to be provided in a dcc:statement in the DCC with the same text used for the ID e.g., refID="id_ performanceLocation". It is possible here to specify coordinates such as GPS.

The id text "performanceLocation" in the table is an example only, the id text is only limited by the xml type restrictions (i.e. xs:id).

dcc:primitiveQuantityType

This type contains measurable value(s).

Tree structure

The tree structure of the element type *dcc:primitiveQuantityType* has the following appearance:
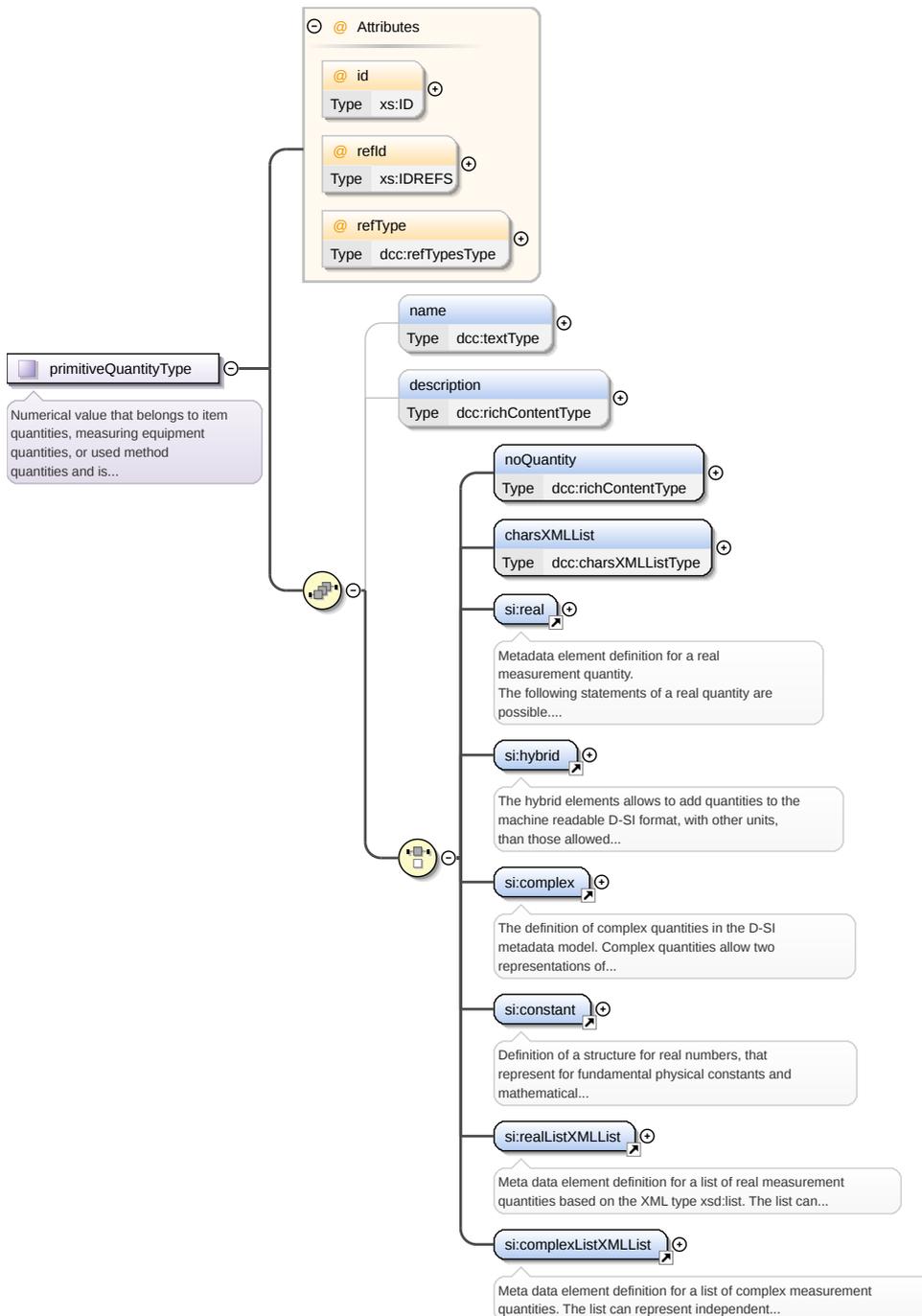
Extract from the XML schema: type definition "primitiveQuantityType"

Click here to see the snippet in the wiki or have a look at the DCC schema.

Description of the elements

See the list of abbreviations here

Element Element type	Use	Description
dcc:name dcc:textType	[O]	This element can be used to store text specifying the language used.
dcc:description dcc:richContentType	[O]	The element type dcc:richContentType is used to enter any information. With it, it is possible to accommodate text as well as images and formulas in one element.
dcc:noQuantity dcc:richContentType	[O|M]	The element type dcc:richContentType is used to enter any information. With it, it is possible to accommodate text as well as images and formulas in one element.
dcc:charsXMLList dcc:charsXMLListType	[O|M]	The element type dcc:charsXMLListType is used to enter characters.
si:real and other si:Types DSI Wiki (external)	[O|M]	At this point, the D-SI is integrated into the DCC to ensure that each value to be processed is specified with the corresponding metadata.

Attribute

Attribute Attribute type	Use	Description
id xs:ID	[O]	This standard XML data type is used to represent a unique ID. It is used to uniquely identify the object in the DCC. The data type xs:ID is deliberately used here because it enables validation without any add-ons in various tools.
refId xs:IDREFS	[O]	IDREFS represents the IDREFS attribute type from [XML 1.0 (Second Edition)]. The ·value space· of IDREFS is the set of finite, non-zero-length sequences of IDREFs. The ·lexical space· of IDREFS is the set of space-separated lists of tokens, of which each token is in the ·lexical space· of IDREF. The ·itemType· of IDREFS is IDREF.
refType dcc:refTypesType	[O]	This attribute allows a list of refTypes.

dcc:listType

The *dcc:listType* element allows you to define a collection of measurement results whose structures are subject to integrity checks. Basic structures are vector sizes. Recursive use of *dcc:listType* allows the creation of matrix and tensor structures as well as higher dimension structures. The *dcc:listType* can also be used to provide measurement results in combination with certain environmental conditions during measurement.

Tree structure

The tree structure of the element type *dcc:listType* has the following appearance: dcc_xsd_complex_type_dcc_listtype.svg
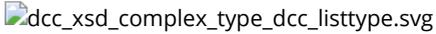
Extract from the XML schema: type definition "listType"

Click here to see the snippet in the wiki or have a look at the DCC schema.

Description of the elements

See the list of abbreviations here

Element Element type	Use	Description
dcc:name dcc:textType	[O]	text can be stored in this element.
dcc:description dcc:richContentType	[O]	Other information not specified in the elements dcc:name is specified here to describe the element.
dcc:dateTime xs:dateTime	[O]	This element can be used to specify a common measurement time for the child elements of this list. Definition: dateTime values can be considered as objects with integer year, month, day, hour and minute properties, a decimal-valued seconds property and a boolean timezoned property.
dcc:dateTimeXMLList dcc:dateTimeXMLListType	[O]	Space separated list of dateTimes
dcc:list dcc:listType	[O]	In a dcc:list element, another dcc:list element can be called. (Recursive call)
dcc:quantity dcc:quantityType	[O]	The dcc:quantity describes a single measurand used by the D-SI. Additional information can be specified in the same way as in the dcc:list.
dcc:usedMethods dcc:usedMethodType	[O]	In this element, the method used for calibration can be entered.
dcc:usedSoftware dcc:softwareListType	[O]	In this element the used software can be entered, which contributed to the generation of the measurement results.
dcc:measuringEquipments dcc:measuringEquipmentType	[O]	In this element, the equipment used can be entered.
dcc:influenceConditions dcc:influenceConditionType	[O]	In this element the influences (e.g. environmental parameters) on the measurement can be entered.
dcc:measurementMetaData dcc:measurementMetaDataListType	[O]	In this element all further additional information can be entered.

Attribute

Attribute Attribute type	Use	Description
id xs:ID	[O]	This standard DataType of XML is used to represent a unique ID. It is used to uniquely identify the object in the DCC. The data type xs:ID is deliberately used here because it enables validation without any add-ons in various tools.
refId xs:IDREFS	[O]	IDREF represents the IDREF attribute type from [XML 1.0 (Second Edition)]. The value space of IDREF is the set of all strings that match the NCName production in [Namespaces in XML]. The lexical space of IDREF is the set of strings that match the NCName production in [Namespaces in XML]. The base type of IDREF is NCName.
refType dcc:refTypesType	[O]	A list of refTypes in XML.

dcc:quantityType

A single measurand that may contain a D-SI element or text. Each value describing a physical quantity is placed in a *dcc:quantity*. The DCC uses the XML schema of the D-SI, which ensures that each numerical value is also specified with its corresponding metadata. In addition, methods used, software used and influence conditions that only affect this quantity can be added. Metadata can also be added, such as a conformity assessment.

Tree structure

The tree structure of the element type *dcc:quantityType* has the following appearance:

Attributes

@ id
Type   xs:ID

@ refId
Type   xs:IDREFS

@ refType
Type   dcc:refTypesType

quantityType

Single measurement
quantity containing a
name, description, a D-SI
element (numerical value),
and text. Additionally,...

name
Type   dcc:textType

description
Type   dcc:richContentType

noQuantity
Type   dcc:richContentType

charsXMLList
Type   dcc:charsXMLListType

si:real

Metadata element definition for a real
measurement quantity.
The following statements of a real quantity are
possible....

si:list

Meta data element definition for a list of basic
measurement quantities. The list can represent
independent measurement...

si:hybrid

The hybrid elements allows to add quantities to the
machine readable D-SI format, with other units,
than those allowed...

si:complex

The definition of complex quantities in the D-SI
metadata model. Complex quantities allow two
representations of...

si:constant

Definition of a structure for real numbers, that
represent for fundamental physical constants and
mathematical...

si:realListXMLList

Meta data element definition for a list of real measurement
quantities based on the XML type xsd:list. The list can...

si:complexListXMLList

Meta data element definition for a list of complex measurement
quantities. The list can represent independent...

relativeUncertainty
Type   dcc:relativeUncertaintyType

usedMethods
Type   dcc:usedMethodListType

usedSoftware
Type   dcc:softwareListType

measuringEquipments
Type   dcc:measuringEquipmentListType

influenceConditions
Type   dcc:influenceConditionListType

measurementMetaData
Type   dcc:measurementMetaDataListType

Extract from the XML schema: type definition "quantityType"

Click here to see the snippet in the wiki or have a look at the DCC schema.

Description of the elements

See the list of abbreviations here

Element Element type	Use	Description
dcc:name dcc:textType	[O]	This element can be used to store text specifying the language used.
dcc:description dcc:richContentType	[O]	Description of the Quantity. The element type dcc:richContentType is used to enter any information. With it, it is possible to accommodate text as well as images and formulas in one element.
dcc:noQuantity dcc:richContentType	[O|M]	The element type dcc:richContentType is used to enter any information. With it, it is possible to accommodate text as well as images and formulas in one element.
dcc:charsXMLList dcc:charsXMLListType	[O|M]	The element type dcc:charsXMLListType is used to enter characters.
si:real and other si:Types DSI Wiki (external)	[O|M]	At this point, the D-SI is integrated into the DCC to ensure that each value to be processed is specified with the corresponding metadata.
dcc:relativeUncertainty dcc:relativeUncertaintyType	[O]	Relative Uncertainty of the D-SI according to GUM is implemented here.
dcc:usedMethods dcc:usedMethodListType	[O]	List of methods used during calibration. It is possible that a method has already been named in a parent element, which is also valid for this dcc:quantity.
dcc:usedSoftware dcc:softwareListType	[O]	List of software used to create and edit the quantity are stored here. It is possible that software has already been named in a parent element, which is also valid for this dcc:quantity.
dcc:measuringEquipments dcc:measuringEquipmentListType	[O]	Measuring equipments can be specified here. It is possible that a piece of equipment has already been named in a higher-level element, which is also valid for this dcc:quantity.
dcc:influenceConditions dcc:influenceConditionListType	[O]	Conditions which have influence on the calibration results in this quantity. It is possible that a condition has already been named in a higher-level element, which is also valid for this dcc:quantity.
dcc:measurementMetaData dcc:measurementMetaDataListType	[O]	A list of meta data regarding the quantity it is located in.

Attributes

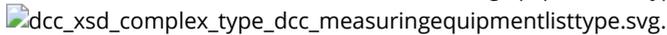| Attribute Attribute type	Use	Description
id xs:ID	[O]	This standard XML data type is used to represent a unique ID. It is used to uniquely identify the object in the DCC. The data type xs:ID is deliberately used here because it enables validation without any add-ons in various tools.
refId xs:IDREFS	[O]	IDREF represents the IDREF attribute type from [XML 1.0 (Second Edition)]. The value space of IDREF is the set of all strings that match the NCName production in [Namespaces in XML]. The lexical space of IDREF is the set of strings that match the NCName production in [Namespaces in XML]. The base type of IDREF is NCName.
refType dcc:refTypesType	[O]	This attribute allows a list of refTypes.

dcc:measuringEquipmentType

The *dcc:measuringEquipmentListType* provides the ability to specify multiple elements of type *dcc:measuringEquipmentType*. This type can be called in the element *dcc:measurementResult, dcc:list*, and *dcc:quantityType*. This element is therefore valid for an entire element *dcc:measurementResult*, for an entire list *dcc:list* or for a single *dcc:quantityType*.

In *dcc:measuringEquipmentType*, information about the equipment used during calibration is documented.

Tree structure

The tree structure of the element *dcc:measuringEquipmentListType* has the following appearance:
dcc_xsd_complex_type_dcc_measuringequipmentlisttype.svg.

The tree structure of the element *dcc:measuringEquipmentType* has the following appearance:
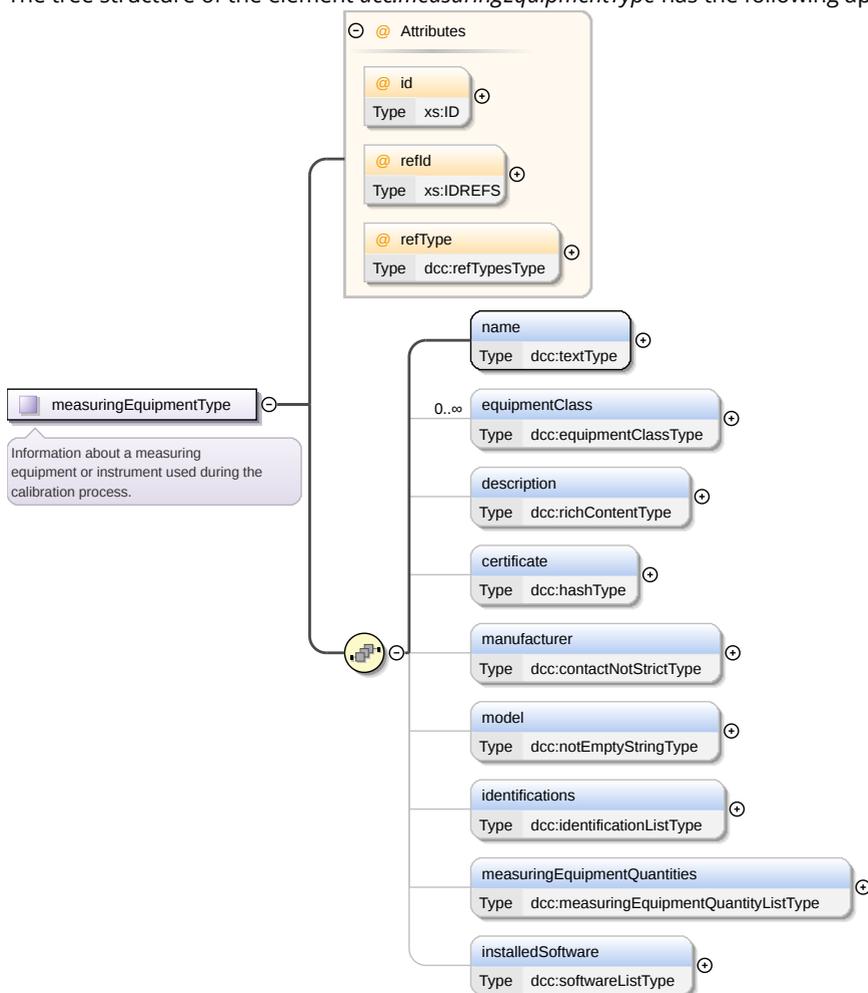
Extract from the XML schema: type definition "measuringEquipmentListType"

Click here to see the snippet in the wiki or have a look at the DCC schema.

Extract from XML schema: type definition "measuringEquipmentType"

Click here to see the snippet in the wiki or have a look at the DCC schema.

Description of the elements

See the list of abbreviations here

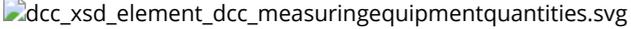| Element Element type	Use	Description
dcc:name dcc:textType	[M]	This element shall specify the name of the equipment.
dcc:equipmentClass dcc:equipmentClassType	[O]	An element of type dcc:equipmentClassType contains all the information necessary to uniquely identify a system of calibration items or a single calibration item by means of a classification scheme.
dcc:description dcc:richContentType	[O]	Other information not given in the elements *dcc:name* is given here to describe the calibration item.
dcc:certificate dcc:hashType	[O]	In this element the certificate for the equipment can be specified.
dcc:manufacturer dcc:contactNotStrictType	[O]	In this element the manufacturer of the equipment can be entered.
dcc:model dcc:notEmptyStringType	[O]	This string can contain a model name of the equipment.
dcc:identifications dcc:identificationType	[O]	In order to be able to identify the equipment in different databases, it is possible to enter identifiers of different participants. For example, the name of the manufacturer and the inventory number of the owner.
dcc:measuringEquipmentQuantities	[O]	The element dcc:measuringEquipmentQuantities contains a list of measurable value(s) which belongs to the measurement equipment.
dcc:installedSoftware dcc:softwareListType	[O]	The installed software on the measuring equipment.

Attribute

Attribute Attribute type	Use	Description
id xs:ID	[O]	This standard XML data type is used to represent a unique ID. It is used to uniquely identify the object in the DCC. The data type xs:ID is deliberately used here because it enables validation without any add-ons in various tools.
refId xs:IDREFS	[O]	IDREF represents the IDREF attribute type from [XML 1.0 (Second Edition)]. The value space of IDREF is the set of all strings that match the NCName production in [Namespaces in XML]. The lexical space of IDREF is the set of strings that match the NCName production in [Namespaces in XML]. The base type of IDREF is NCName.
refType dcc:refTypesType	[O]	This attribute allows a list of refTypes.

dcc:measuringEquipmentQuantities

The element *dcc:measuringEquipmentQuantities* contains a list of measurable value(s) which belongs to the measurement equipment.

Tree structure

The tree structure of the element *dcc:measuringEquipmentQuantities* has the following appearance:

dcc_xsd_element_dcc_measuringequipmentquantities.svg

Extract from the XML schema: type definition "measuringEquipmentQuantityListType"

Click here to see the snippet in the wiki or have a look at the DCC schema.

Description of the elements

See the list of abbreviations here

Element Element type	Use	Description
dcc:measuringEquipmentQuantity dcc:primitiveQuantityType	[M]	This item contains measurable value(s).

dcc:richContentType

The element type *dcc:richContentType* is used to enter any information. It may contain text, images and/or formulas.

Tree structure

The rough tree structure of the element type *dcc:richContentType* has the following appearance:

dcc_xsd_complex_type_dcc_richcontenttype.svg

Extract from the XML schema: type definition "richContentType"

Click here to see the snippet in the wiki or have a look at the DCC schema.

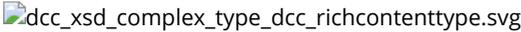## Description of the elements

See the list of abbreviations here

Element Element type	Use	Description
dcc:name dcc:textType	[M]	Name of the element using the *dcc:textType*.
dcc:content dcc:stringWithLangType	[O]	The element is used to enter any text. For more information on the attribute "lang", go to the multilingualism page.
dcc:file dcc:byteDataType	[O]	The element type *dcc:byteDataType* is used for entering any information that is available as electronic data.
dcc:formular dcc:formulaType	[O]	Formulas can be specified in the element *dcc:formula*.

dcc:stringISO639Type

The abbreviation of the official language is entered in this element. The basis is ISO 639-1 for the language identifier with two lower case letters
[1]. For more details on its usage, see the page on handling multiple languages.

Structure in the XML schema

Click here to see the snippet in the wiki or have a look at the DCC schema.

Data types

xs:string

Note

Allowed values

The element of type stringISO639Type is configured in such a way that it can hold exactly two lowercase letters.

[1] https://www.bib-bvb.de/web/kkb-online/rda-sprachencode-nach-iso-639

dcc:stringISO3166Type

The abbreviation of a state is entered in this element. The basis is ISO 3166-1 for the assignment of two capital letters [1] to a state.

Extract from the XML schema: type definition "stringISO3166Type"

Click here to see the snippet in the wiki or have a look at the DCC schema.

Data types

xs:string

Note

Allowed values

The element StringISO3166 is configured to hold exactly two uppercase letters.
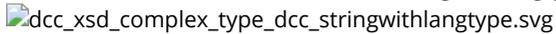
[1] https://www.iso.org/obp/ui/#search/code

dcc:stringWithLangType

A string with an additional attribute for the national language.

Tree structure

The tree structure of the element *dcc:stringWithLangType* has the following appearance:

dcc_xsd_complex_type_dcc_stringwithlangtype.svg

Extract from the XML schema: type definition "stringWithLangType"

Click here to see the snippet in the wiki or have a look at the DCC schema.

Description of the elements

See the list of abbreviations here

Attributes

Attribute Attribute type	Use	Description
lang dcc:stringISO639Type	[O]	The abbreviation of the official language shall be entered in this element. Basis is the ISO 639-1 for the language identifier with two lower case letters. [1] [2] More information can be found on the page on multilingualism.
id xs:ID	[O]	This standard DataType of XML is used to represent a unique ID. It is used to uniquely identify the object in the DCC. The data type xs:ID is deliberately used here because it enables validation without any AddOns in various tools.
refId xs:IDREFS	[O]	IDREF represents the IDREF attribute type from [XML 1.0 (Second Edition)]. The value space of IDREF is the set of all strings that match the NCName production in [Namespaces in XML]. The lexical space of IDREF is the set of strings that match the NCName production in [Namespaces in XML]. The base type of IDREF is NCName.
refType dcc:refTypesType	[O]	A list of refTypes in XML.

[1] https://www.bib-bvb.de/web/kkb-online/rda-sprachencode-nach-iso-639

[2] https://de.wikipedia.org/wiki/Liste_der_ISO-639-1-Codes

dcc:notEmptyStringType

This type is included in DCC version 3.2 and above. {.is-info}

A string type which doesn't allow entries with blank spaces only and doesn't allow a blank space before and in the end of the value.

Excerpt from the XML schema: type definition "notEmptyStringType"

Click here to see the snippet in the wiki or have a look at the DCC schema.

Description

Regex: `[^\s]+(\s+[^\s]+)*`

- `[^\s]+` : Allow a non-whitespace character one or more times.
- `(\s+[^\s]+)*` : Is a group which can be repeated and is optional.
  - `\s+` : Allow a whitespace character one or more times.
  - `[^s]+` : Allow a non-whitespace character one or more times.

Explanation Characters which aren't whitespaces are allowed in general. If we got one or more whitespaces then we need a following non-whitespace character and a non-whitespace character before it.

dcc:textType

This complexType can be used to represent any text. In the element content contains the multilingualism.

Tree structure
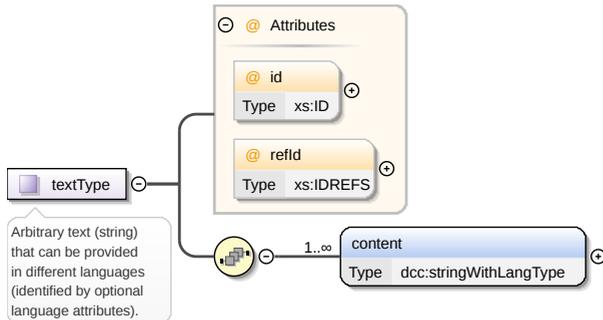
Extract from the XML schema: type definition "textType"

Click here to see the snippet in the wiki or have a look at the DCC schema.

Description of the elements

See the list of abbreviations here

Element Element type	Use	Description
dcc:content	[O]	The element is used to enter any text. The attribute "lang" is implemented for multilingualism via the data type.

Attributes

Attribute Attribute type	Use	Description
id xs:ID	[O]	This standard dataType of XML is used to represent a unique ID. It is used to uniquely identify the object in the DCC. The data type xs:ID is deliberately used here because it enables validation without any add-ons in various tools.
refId xs:IDREFS	[O]	IDREF represents the IDREF attribute type from [XML 1.0 (Second Edition)]. The value space of IDREF is the set of all strings that match the NCName production in [Namespaces in XML]. The lexical space of IDREF is the set of strings that match the NCName production in [Namespaces in XML]. The base type of IDREF is NCName.

Examples

The examples are excerpts from DCC's.

Example 1

Here is a simple example without multilingualism:

```
<dcc:textBlock>
    <dcc:content>This is an example of the element textBlock.</dcc:content>
</dcc:textBlock>
```

Example 2

Example 1 in the multilingual variant:

```
<dcc:textBlock>
    <dcc:content lang="en">This is an example of the textBlock element.</dcc:content>
    <dcc:content lang="en">This is an example of the textBlock element.</dcc:content>
</dcc:textBlock>
```
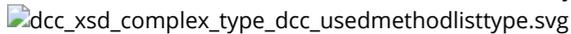
Note

The multilingualism of text input is not handled in this element but in the child element *content* of type *dcc:stringWithLangType*.

```
<dcc:textBlock>
    <dcc:content>This is an example of the element textBlock.</dcc:content>
</dcc:textBlock>
```
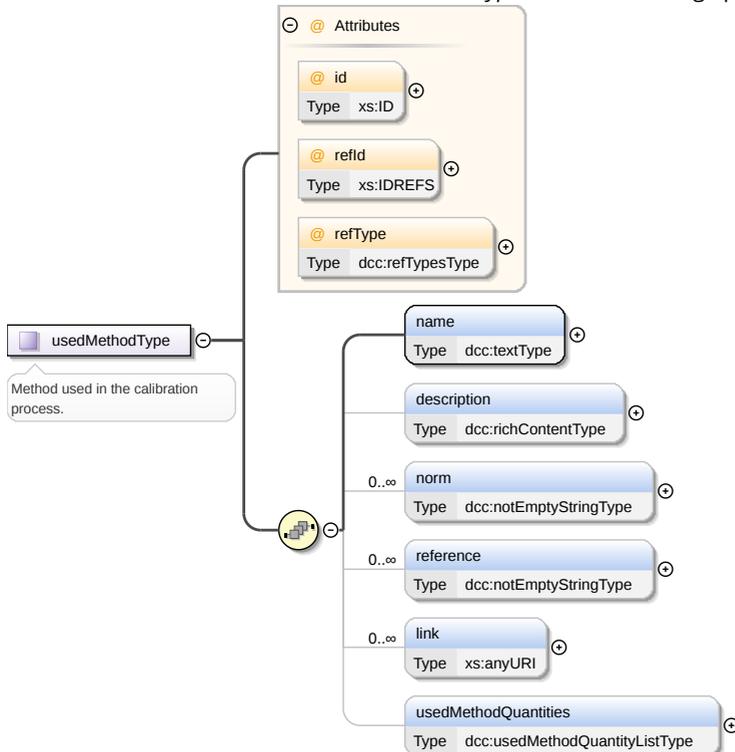
dcc:usedMethodType

The element *dcc:usedMethodListType* contains a list of methods used during calibration. The element *dcc:usedMethodType* describes the method actually used during calibration.

Tree structure

The tree structure of the element *dcc:usedMethodListType* has the following appearance:
dcc_xsd_complex_type_dcc_usedmethodlisttype.svg

The element *dcc:usedMethodListType* has only one sub-element *dcc:usedMethodType*, which can occur any number of times. The tree structure of the element *dcc:usedMethodType* has the following appearance:

Extract from the XML schema: type definition "usedMethodListType"

Click here to see the snippet in the wiki or have a look at the DCC schema.

Extract from XML schema: type definition "usedMethodType"

Click here to see the snippet in the wiki or have a look at the DCC schema.

Description of the elements

See the list of abbreviations here

Element Element type	Use	Description
dcc:name dcc:textType	[M]	This element shall specify the name of the calibration method.

Element Element type	Use	Description
dcc:description dcc:richContentType	[O]	Other information not given in the elements *dcc:name* is given here, thus describing the element.
dcc:norm dcc:notEmptyStringType	[O]	The name of the underlying norm.
dcc:reference dcc:notEmptyStringType	[O]	The reference. more information
dcc:link xs:anyURI	[O]	External link(s) to the calibration method.
dcc:usedMethodQuantities dcc:usedMethodQuantityListType	[O]	List of numerical values that belong to the used calibration method and are relevant to the calibration process.

Attributes

Attribute Attribute type	Use	Description
xs:ID xs:ID	[O]	This standard XML data type is used to represent a unique ID. It is used to uniquely identify the object in the DCC. The data type xs:ID is deliberately used here because it enables validation without any add-ons in various tools.
refId xs:IDREFS	[O]	IDREF represents the IDREF attribute type from [XML 1.0 (Second Edition)]. The value space of IDREF is the set of all strings that match the NCName production in [Namespaces in XML]. The lexical space of IDREF is the set of strings that match the NCName production in [Namespaces in XML]. The base type of IDREF is NCName.
refType dcc:refTypesType	[O]	This attribute allows a list of refTypes.

dcc:stringConformityStatementStatusType

The element type *dcc:stringConformityStatementStatusType* is used to enter compliance statements.

Tree structure

Because it is a simple enumeration type, it has no tree structure.

Extract from the XML schema: type definition "dcc:stringConformityStatementStatusType"

Click here to see the snippet in the wiki or have a look at the DCC schema.

Description of the elements

See the list of abbreviations here

Item Item type	Minimum details	Remark
dcc:stringConformityStatementStatusType xs:string	[O]	Only one of the following values can be entered in the element *stringConformityStatementStatusType*. - 'pass' - 'fail' - 'conditionalPass' - 'conditionalFail' - 'noPass' - 'noFail ' If the element is filled with a different content, the check will result in an error against the XML schema.

dcc:xxxListType

All dcc:xxx**listType** are used to collect the main types, these often have the same name only without "List". The content of these types is only linked on this page.

dcc:measurementResultListType

May contain multiple dcc:measurementResult elements of type *dcc:measurementResultType*.

dcc:softwareListType

Can contain several elements of the type *dcc:softwareType*. This list type occurs twice. Once it describes the software used to create the DCC.

- dcc:dccSoftware The second time the software used to record the calibration data.
- dccquantityType

dcc:respPersonListType

May contain multiple dcc:respPerson elements of type *dcc:respPersonType*.

dcc:identificationListType

May contain multiple elements of type dcc:identificationType. This list type is used several times in the DCC.

- dcc:coredata for the identification of the DCC.
- dcc:items for the identification of the system to be calibrated.
- dcc:item to identify an item or component of the system to be calibrated.
- dcc:measuringEquipmentType to identify the measuring equipment used.

dcc:usedMethodListType

Can contain several *dcc:usedMethod* elements of the type dcc:usedMethodType. This list type can be called on in three elements in the DCC. The method is then valid for the calling element and the corresponding child elements.

- dcc:measurementResult
- dcc:listType
- dcc:quantityType

dcc:measuringEquipmentListType

Can contain multiple *dcc:measuringEquipment* elements of type dcc:measuringEquipmentType. This list type can be called on in three elements in the DCC. The equipment is then valid for the calling element and the corresponding child elements.

- dcc:measurementResult
- dcc:listType
- dcc:quantityType

dcc:influenceConditionListType

Can contain multiple *dcc:influenceCondition* elements of type dcc:influenceConditionType. This list type can be called on in three elements in the DCC. The condition is then valid for the calling element and the corresponding child elements.

- dcc:measurementResult
- dcc:listType
- dcc:quantityType

dcc:resultListType

Can contain multiple *dcc:result* elements of type dcc:resultType.

dcc:statementListType

Can contain multiple dcc:statement elements of type *dcc:statementMetaDataType*.

dcc:measurementMetaDataListType

Can contain several *dcc:metaData* elements of the type *dcc:statementMetaDataType*. This list type can be called on in three elements in the DCC. The information is then valid for the calling element and the corresponding child elements.

- dcc:measurementResult
- dcc:listType
- dcc:quantityType

dcc:itemListType

Special role The dcc:itemListType (dcc:items) has a special role because, in addition to the list of dcc:item elements, it has several different child elements to describe the calibration system.

dcc:validXMLList

The element type *dcc:validXMLList* is used to specify foot notes for si:realListXMLList elements in a DCC. You can specify a list of boolean valuesa separated by a space to specify where the data from the meta data belongs to (see the XML example below).

Extract from the XML schema.

Click here to see the snippet in the wiki or have a look at the DCC schema.

Filling-in example

If you would want to display following table with the following foot note.

Transmission coefficient phase shift in \degree
-0,02
-0.03
-0.02[1]
-0.02
-0.01

[1] This comment is only valid for the third element of the realListXMLList.

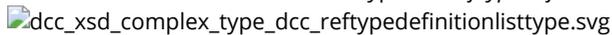You have to have the following structure in your DCC with version greater or equal to 3.2.0.

Click here to see the snippet in the wiki or have a look at the DCC schema.

dcc:refTypeDefinitionListType

The element "refTypeDefinitionListType" allows the specification of refTypes.

Tree structure

The tree structure of the element type *dcc:refTypeDefinitionListType* has the following appearance:
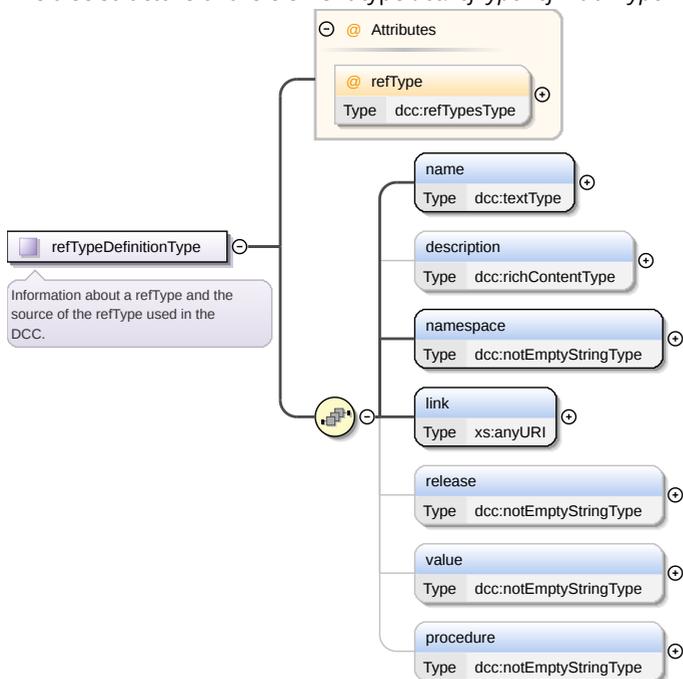dcc_xsd_complex_type_dcc_reftypedefinitionlisttype.svg

Extract from the XML schema: type definition "refTypeDefinitionListType"

Click here to see the snippet in the wiki or have a look at the DCC schema.

Extract from the XML schema: type definition "refTypeDefinitionType"

The tree structure of the element type *dcc:refTypeDefinitionType* has the following appearance:

Click here to see the snippet in the wiki or have a look at the DCC schema.

Description of the elements

See the list of abbreviations here

Element Element type	Use	Description
dcc:name dcc:textType	[M]	Text can be saved in this element.
dcc:description dcc:richContentType	[O]	Description of the refType-Definition. The element type dcc:richContentType is used to enter any information, with it it is possible to place text, images and formulas in one element.

Element Element type	Use	Description
dcc:namespace dcc:notEmptyStringType	[M]	A string type which doesn't allow entries with blank spaces only and doesn't allow a blank space before and in the end of the value.
dcc:link xs:anyURI	[M]	External link to the refTypeDefinition.
dcc:release dcc:value dcc:procedure dcc:notEmptyStringType	[O]	A string type which doesn't allow entries with blank spaces only and doesn't allow a blank space before and in the end of the value.

Attributes

Attribute Attribute type	Use	Description
refType dcc:refTypesType	[O]	This list allows a list of reference types in string representation.

Example how to reference refType definitions from within a DCC

```
<dcc:refTypeDefinitions>
    <dcc:refTypeDefinition>
        <dcc:name>
            <dcc:content lang="en">Cross-Community refType definition</dcc:content>
        </dcc:name>
        <dcc:description>
      <dcc:content lang="en">Description content...</dcc:content>
    </dcc:description>
    <dcc:namespace>basic</dcc:namespace>
    <dcc:link>[Link to the location where the refTypes are defined]</dcc:link>
    <dcc:release>0.1</dcc:release>
    <dcc:value>Value ...</dcc:value>
    <dcc:procedure>Procedure ...</dcc:procedure>
    </dcc:refTypeDefinition>
</dcc:refTypeDefinitions>
```

Example the GP temperature of BAM with a reference to DKD TemaTres instances [1]

```xml
<dcc:refTypeDefinitions>
    <dcc:refTypeDefinition>
        <dcc:name>
            <dcc:content lang="en">Namespace for Cross-Community RefTypes</dcc:content>
      <dcc:content lang="de">Namensraum für Querschnitts-RefTypes</dcc:content>
        </dcc:name>
    <dcc:description>
        <dcc:content lang="en">The 'basic' namespace contains RefTypes common for multiple communities.
</dcc:content>
        <dcc:content lang="de">Der Namensraum 'basic' beinhaltet allgemeine RefTypes die messgrößenübergreifend
genutzt werden.</dcc:content>
    </dcc:description>
    <dcc:namespace>basic</dcc:namespace>
    <dcc:link>https://digilab.ptb.de/dkd/refType/vocab/index.php?tema=2</dcc:link>
    </dcc:refTypeDefinition>
    <dcc:refTypeDefinition>
        <dcc:name>
            <dcc:content lang="en">Namespace for RefTypes of the Temperature community</dcc:content>
      <dcc:content lang="de">Namensraum für RefTypes der Temperaturmessgrößen</dcc:content>
        </dcc:name>
        <dcc:description>
            <dcc:content lang="de">Der Namensraum 'temperature' beinhaltet spezifische RefTypes die für
Temperaturmessgrößen genutzt werden.</dcc:content>
            <dcc:content lang="en">The 'temperature' namespace contains RefTypes for temperature quantities.
</dcc:content>
        </dcc:description>
        <dcc:namespace>temperature</dcc:namespace>
        <dcc:link>https://digilab.ptb.de/dkd/refType/vocab/index.php?tema=117</dcc:link>
    </dcc:refTypeDefinition>
</dcc:refTypeDefinitions>
```

[1] https://netzwerke.bam.de/Netzwerke/Content/DE/Standardartikel/Netzwerke/QI-Digital/dcc.html

XMLListType

XMLListTypes are used in the DCC and in the SI scheme. They exist for the reason to collect datas in one field. The benefit of this is that we can reduce code duplication and get a better overview in the DCC. Furthermore a reduction of datas speeds up the reading process of the DCC for machines.

More about lists in XML can be found here: https://www.w3.org/TR/xmlschema-2/#list-datatypes

Restrictions

An XMLList is blank spaced seperated. This means that every element in the list is separated by a whitespace. It is impossible to insert sentences for example.

XMLListTypes in DCC

XMLListType	Based Type	Description
dcc:booleanXMLListType *Included with Version 3.2*	xs:boolean	This list is based on booleans and allows True or false only. Example: true false false
dcc:charsXMLListType *Included with Version 3.2*	xs:string	This list is based on strings and allows every kind of character except whitespaces. Example: alpha omega gamma
dcc:dateTimeXMLListType	xs:dateTime	This list allows a list of dateTimes. Example: 2022-09-24T06:00 2022-09-25T08:00
dcc:stringConformity StatementStatusXMLListType	dcc:stringConformity StatementStatusType	This list allows a list of statement satus. Example: pass pass fail
dcc:refTypesType *Included with Version 3.2*	xs:string	This list allows a list of reference types in string representation.

XMLListTypes in D-SI

XMLListType	Based Type	Description
si:dateTimeXMLListType	xs:dateTime	Like dcc:dateTimeXMLListType in DCC.
si:stringXMLListType	xs:string	Like dcc:charsXMLListType in DCC.
si:decimalXMLListType	si:decimal	This list allow a list of decimal values according to the si type of decimal. Example: 5 22 2.03
si:unitXMLListType	si:unitType	This list allows a list of units according to SI. Example: \kilogram \gram
si:unitPhaseXMLListType	si:unitPhaseType	Type providing listing of phase angle units
si:uncertaintyValueXMLListType	si:uncertaintyValueType	Type providing listing of uncertainty values.
si:kValueXMLListType	si:kValueType	Type providing listing of coverage probability values.

For more details on D-SI, please have a look at the D-SI Wiki.

ds:Signature

The XML signature is implemented by the W3C schema xmldsig. Unfortunally the W3C Schema has the use of DTD inside. DTD can result into security issues because of the XML External Entity (XXE) attack
[1]. The DTD isn't needed, because the DCC doesn't use CDATA and xmldsig uses DTD to sign CDATA in a XML document.

This is why the PTB hosted the schema without the part of the DTD itself. It can be found here: https://ptb.de/dcc/d-sig/xmldsig-core-schema.xsd

The schema is added with the W3C namespace into the DCC:

Click here to see the snippet in the wiki or have a look at the DCC schema.

The namespace of xmldsig remains at the url of W3C and only the source of import is changed to the PTB. The xmldsig namespace is assigned to the prefix ds.

Signature Example

Normally, the signatures are generated with the help of an application. But for a better understanding a minimal example is described here:

Click here to see the snippet in the wiki or have a look at the DCC schema.

Algorithm	Value
Canonicalization Method	c14n
Signature Method	RSA-SHA1
Transform	Enveloped Signature
Digest Method	SHA1
Digest Value	Enter the digest here.
Signature Value	Enter the signature here.

More information about w3c XML Signatures can be found in this url: https://www.w3.org/TR/xmldsig-core1/

[1] https://owasp.org/www-community/vulnerabilities/XML_External_Entity_(XXE)_Processing

RefTypes in the DCC

RefTypes are attributes that can be used to identify nodes in a DCC. When nodes appear more than once in the DCC at the same level, refTypes can be used to uniquely identify certain nodes. For example, a DCC may contain multiple influence conditions that a machine should be able to distinguish within the DCC. This allows machines to retrieve specific information and interpret the content.

The Structure of refTypes

A refType consists of two parts that are separated by an underscore: `basic_temperature` `basic` indicates the namespace of the refType while `temperature` is the actual name of the refType. For this reason only one '_' is allowed in a reftype.

The Namespace

There are different types of refTypes that can be used in a DCC with their specific namespace, i.e. there is a `basic` namespace that contains a set of refTypes that are useful in DCCs of any kind. There are also community-specific namespaces, i.e. `mass`, which contain refTypes specific to mass calibration.

Example: the use of RefTypes within a DCC

For elements of the DCC that have the attribute 'refType', refTypes can be specified. For example the DCC element dcc:usedMethod has the attribute 'refType':

```xml
<xs:complexType name="usedMethodType">
    <xs:annotation>
        <xs:documentation>
                Method used in the calibration process.
            </xs:documentation>
    </xs:annotation>
    <xs:sequence>
        <xs:element name="name" type="dcc:textType"/>
        <xs:element name="description" type="dcc:richContentType" minOccurs="0"/>
        <xs:element name="norm" type="dcc:notEmptyStringType" minOccurs="0" maxOccurs="unbounded"/>
        <xs:element name="reference" type="dcc:notEmptyStringType" minOccurs="0" maxOccurs="unbounded"/>
        <xs:element name="link" type="xs:anyURI" minOccurs="0" maxOccurs="unbounded"/>
        <xs:element name="usedMethodQuantities" type="dcc:usedMethodQuantityListType" minOccurs="0"/>
    </xs:sequence>
    <xs:attribute name="id" type="xs:ID" use="optional"/>
    <xs:attribute name="refId" type="xs:IDREFS" use="optional"/>
    <xs:attribute name="refType" type="dcc:refTypesType" use="optional"/>
</xs:complexType>
```

So a dcc:usedMethod could look like this with a reftype:

```xml
<dcc:usedMethod refType="basic_calibrationMethod">
    <dcc:name>
        <dcc:content lang="de">Kalibrierverfahren</dcc:content>
        <dcc:content lang="en">Calibration procedure</dcc:content>
    </dcc:name>
    <dcc:description>
        <dcc:content lang="de">Die Kalibrierung erfolgte gemäß DKD-R 5-1: 2023-11 im Vergleichsverfahren.
</dcc:content>
        <dcc:content lang="en">According to DKD-R 5-1: 2023-11, the object was calibrated comparing the
 indicated values of the calibration object and the values from the reference thermometer.</dcc:content>
    </dcc:description>
    <dcc:norm>DKD-R 5-1:2023-11</dcc:norm>
    <dcc:reference>https://doi.org/10.7795/550.20231207</dcc:reference>
</dcc:usedMethod>
```

It is possible to enter multiple space separated refTypes, if necessary:

```
<dcc:usedMethod refType="example_refTypeA example_refTypeB">
   ...
</dcc:usedMethod>
```

The process of definition of refTypes

RefTypes are being discussed in peer groups of the DKD on GitLab, if the peer groups agree on certain refTypes the refTypes will be transferred to a DKD TemaTres instance, where they are publicly available.

TemaTres for refTypes

RefTypes of common namespaces are stored in this TemaTres Instance of the DKD: DKD TemaTres for refTypes.

What is TemaTres?

TemaTres is a kind of knowledge data base. It consists of a web front end and a DBMS. For more in information on TemaTres you can have a look at the following links:

- Overview of TemaTres
- TemaTres-Gitlab

Abbreviations

Description of elements

These are the abbreviations used for the description of elements.

Abbreviation	Meaning of the abbreviation
[M]	Mandatory: This is a mandatory element.
[O]	Optional: This is an optional element.
[M / O]	Mandatory / Optional: This element can be mandatory depending on the context.

Example

Element	Use	Description
dcc:abcDef	[M]	This element is mandatory. Further description of the element...
xs:example	[O]	This element is optional. Further description of the element...