NoBoMet

European Coordination Group for Notified Bodies in Legal Metrology

Document 2

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Documentation: Digital Certificate of Conformity for Quality Assurance (D-CoC QA)

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NoBoMet is the European Coordination Group of Bodies notified by the European Commission for the Directives 2014/31/EU and 2014/32/EU.

The group is established by the European Commission based on the decision at the Working Group Measuring Instruments meeting in 2019.

This document is a document of the NoBoMet Project group "Digital certificates of conformity in Metrology" to provide information to notified bodies.

This document is purely informative and does not itself impose any restrictions or additional technical requirements beyond those contained in relevant EU-Directives.

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1. Introduction

Digital Certificate of Conformity for Quality Assurance (D-CoC QA) is a data structure describing the content part of a digital certificate of conformity related to the quality assurance evaluation as part of product certification (cf. EN ISO/IEC 17065:2012). The D-CoC QA is intended to be used for the assessment of:

- conformity to type based on quality assurance of the production process (module D),
- quality assurance of the production process (module D1),
- conformity to EU-type based on the product quality assurance (module E),
- quality assurance of final product inspection and testing (module E1),
- conformity based on full quality assurance (module H), and
- conformity based on full quality assurance plus design examination (module H1).

The D-CoC QA comprises a set of elements, attributes, data types, and constraints for the representation and exchange of conformity-relevant information generated in different systems and by different actors. This document provides an overview of the data structure part which comprises the certificate content specific for a quality assurance.

1.1 Motivation

Legal metrology deals with all measurements in the economic, health, and police monitoring which are regulated by laws and has, therefore, a high significance for the European industry and customer rights. However, in a more and more digital world it is lagging far behind. The development of digital, machine-readable formats for documents such as certificates of conformity is a corner stone for the digitalisation of legal metrology.

Digital certificates of conformity can be used for a harmonised data exchange between conformity assessment bodies, market surveillance, and manufacturers. They also enhance findability and comparability of information. A specific use case is the harmonisation of certificate databases among notified bodies.

1.2 Scope

The D-CoC QA data structure focuses on quality assurance evaluation as part of product certification of legally regulated measuring instruments according to Directive 2014/32/EU (MID) and non-automatic weighing instruments according to Directive 2014/31/EU (NAWID). It can also be used outside of legal metrology as well.

D-CoC document family: This document is part of the D-CoC document family, which comprises the certificate structure of different certification systems and schemas. The following documents contain further separate data structures for the contents of the certificate specific to the respective certification system/schema:

- D-CoC is specific to the part of the certificate with **administrative content**;
- D-CoC M B is specific for the conformity assessment of legally regulated measuring instruments based on **type examination**;
- D-CoC M F is specific for the conformity assessment of legally regulated measuring instruments with the type based on **product verification**.

1.3 Status

In May 2021, a project group “Digital certificates of conformity in Metrology” has been established at Notified Bodies in Legal Metrology NoBoMet to develop data structures for certificates in legal metrology (NAWID and MID) for the conformity assessment module B (type examination), D (quality assurance), and F (product verification). The general certification data has been published already as D-CoC and it was decided during the work to extend the work on all modules related to quality assurance evaluation (D, D1, E, E1, H and H1).

1.4 Funding Note

Part of the work on the digital certificate of conformity has been performed within the project framework QI-Digital in the pilot project “Reliable hydrogen filling stations”.

2. The Principle of Defining the Data Structure

2.1 Prefixes

The prefix is **dcocQA**. Additionally, the following prefix is used for elements imported from the other data structure: **dcoc** from the Digital Certificate of Conformity (D-CoC).

2.2 Modularisation and Data Structure

This document focuses on the content part of certificate of conformity related to quality assurance and must be used in combination with the administrative content part of the D-CoC.

The overview of the elements and their attributes can be represented graphically as follows:

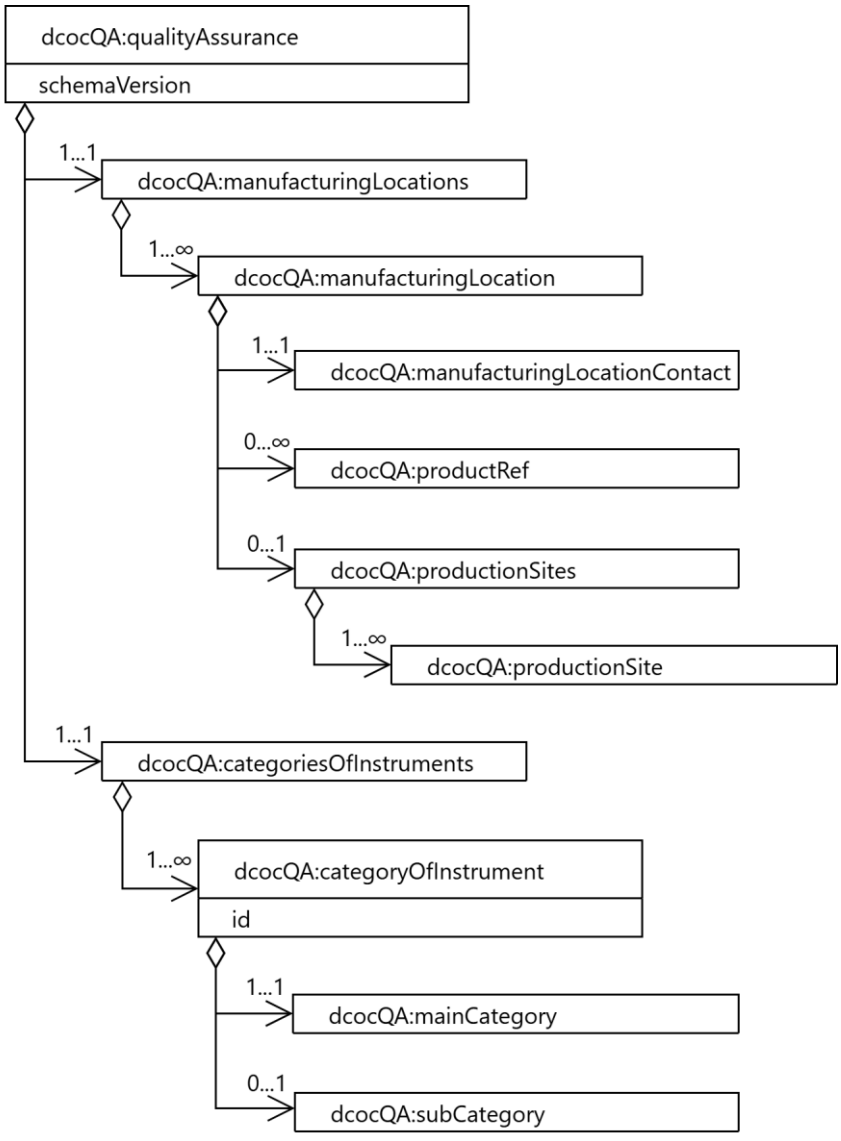

Figure 1 - General overview of the elements describing the certificate content specific to quality assurance

The data structure contains a number of so-called **universal elements**. These belong to several superordinate elements and data types and are therefore defined as generally as possible. The universal elements are as following:

- **dcoc:name**, that occurs with dcocQA:manufacturingLocationContact, dcocQA:productionSite, and dcoc:byteData;
- **dcoc:description**, that occurs with dcoc:descriptionData and dcoc:byteData.

2.3 Characterisation of the Elements and Attributes

2.3.1 Structure of the Specification

The D-CoC QA elements, data types and attributes presented here are documented using the following approach:

MACHINE INTERPRETABLE DESIGNATION: prefix:nameElement or prefix:nameDataType or prefix:nameAttribute;

DEFINITION: The representation of the scope of meaning of the D-CoC QA element, data type, and attribute in natural language;

LABEL	This is a human-readable label that can be displayed to the user, e.g. when visualising the digital certificate.
EXAMPLE	This is an example of element content.
NOTE	A note contains additional information regarding the use of the D-CoC QA element, data type and attribute.
CARDINALITY	Cardinality characterises elements and data types in terms of two properties: (1) the degree of mandatory use and (2) the number of occurrences in the digital certificate. (See here in 2.3.2 Cardinality).
DATA TYPE	In the data structure, two main categories of data types are distinguished: simple and complex. Simple data types are expressed by their common names. The following simple data types are used: **string** as a set of any characters composed, **ID** as a unique identifier, **IDREF** as a reference to a unique identifier, **date** as a Gregorian calendar date, and **binary** as a binary content. In use, these can be adopted in most languages, e.g. in XML as xs:string, xs:ID, xs:IDREF, xs:date, and xs:hexBinary. Complex data types are internally developed data types that cover the requirements of digital certification, e.g. in the representation of the contact data of relevant persons and organisations, of the text-based certification-relevant content, of the encoded files, and of the language-related information.
ATTRIBUTE	See here in 2.3.3 Attribution.
FIGURE	This is a graphic representation of elements, their subelements and mandatory attributes. Figures do not claim to be exhaustive.

2.3.2 Cardinality

The cardinality is expressed in the data structure as follows:

- The cardinality value **1 … ∞** stands for a mandatory element and data type that can be entered more than once;

- The cardinality value **1 … 1** stands for a mandatory element and data type that can be entered exactly once in the certificate;
- The cardinality value **0 … 1** represents an optional element and data type that can be entered at most once;
- The cardinality value **0 … ∞** represents an optional element and data type that can be entered more than once.

2.3.3 Attribution

In the data structure, attributes are divided into mandatory attributes and optional attributes.

2.4 Overview of Elements, Attributes and Data Types

2.4.1 Elements

dcocQA:categoryOfInstrument
dcocQA:categoriesOfInstruments
dcocQA:mainCategory
dcocQA:manufacturingLocation
dcocQA:manufacturingLocationContact
dcocQA:manufacturingLocations
dcocQA:productionSite
dcocQA:productionSites
dcocQA:productRef
dcocQA:qualityAssurance
dcocQA:subCategory

2.4.2 Attributes

dcoc:id dcoc:lang dcoc:schemaVersion

2.4.3 Simple Data Types

binary ID IDREF string

2.4.4 Complex Data Types

dcoc:byteData dcoc:contact dcoc:text

2.4.5 Subelements of Complex Data Types

dcoc:city
dcoc:content
dcoc:countryCode
dcoc:data
dcoc:description
dcoc:descriptionData
dcoc:eMail
dcoc:fileName
dcoc:further
dcoc:location
dcoc:mimeType
dcoc:name
dcoc:name
dcoc:phone
dcoc:postCode
dcoc:postOfficeBox
dcoc:state
dcoc:street
dcoc:streetNo

3 Specification of the Data Structure

3.1 dcocQA:qualityAssurance

content part of the certificate specific to the quality assurance evaluation

LABEL	quality assurance
CARDINALITY	1 … 1
MANDATORY ATTRIBUTE	schemaVersion

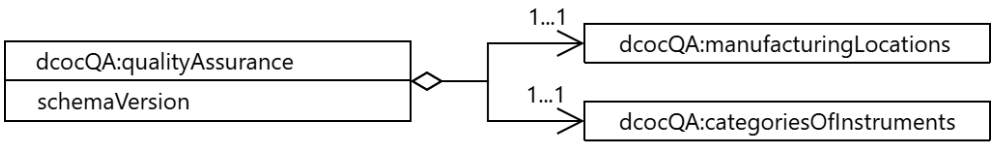

*Figure 2 - The subdivision of the element **dcocQA:qualityAssurance** into the individual subelements*

3.1.1 dcocQA:manufacturingLocations

facilities that carry out manufacturing, handling, storage, and/or other activities (for example, routine tests), up to and including releasing to the market the product bearing the CE mark

[SOURCE: IECEx 02, modified - The original term and the definition are used in the plural to describe more than one manufacturing location. The expression “IECEx number” is exchanged by “CE mark”. Note 1 is not considered.]

LABEL	manufacturing locations
CARDINALITY	1 … 1

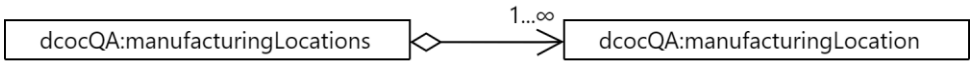

*Figure 3 - The subdivision of the element **dcocQA:manufacturingLocations** into the individual subelements*

3.1.1.1 dcocQA:manufacturingLocation

a facility that carries out manufacturing, handling, storage, and/or other activities (for example, routine tests), up to and including releasing to the market the product bearing the CE mark

[SOURCE: IECEx 02, 3.18, modified - The expression “IECEx number” is exchanged by “CE mark”. Note 1 is not considered.]

LABEL	manufacturing location
CARDINALITY	1 … ∞

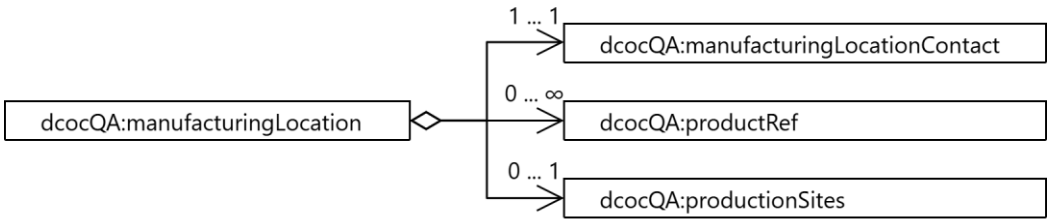

*Figure 4 - The subdivision of the element **dcocQA:manufacturingLocation** into the individual subelements*

3.1.1.1.1 dcocQA:manufacturingLocationContact

contact data of the manufacturing location

LABEL	manufacturing location contact
CARDINALITY	1 … 1
DATA TYPE	contact

3.1.1.1.2 dcocQA:productRef

reference to the certified product

LABEL	product reference
CARDINALITY	0 … ∞
DATA TYPE	IDREF

3.1.1.1.3 dcocQA:productionSites

facilities that carry out manufacturing, handling, storage, and/or storage of the product, in part, under the control of a manufacturing location

[SOURCE: IECEx 02, modified - The original term and the definition are used in the plural to describe more than one production site. Notes 1 - 2 are not considered.]

LABEL	production sites
CARDINALITY	0 … 1

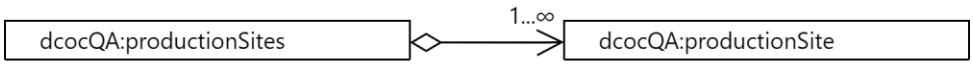

*Figure 5 - The subdivision of the element **dcocQA:productionSites** into the individual subelements*

3.1.1.1.3.1 dcocQA:productionSite

a facility that carries out manufacturing, handling, storage, and/or storage of the product, in part, under the control of a manufacturing location

[SOURCE: IECEx 02, 3.19, modified - Notes 1 - 2 are not considered.]

LABEL production site
CARDINALITY 1 … ∞
DATA TYPE contact

3.1.2 dcocQA:categoriesOfInstruments

categories of the certified instruments

LABEL categories of instruments
CARDINALITY 1 … 1

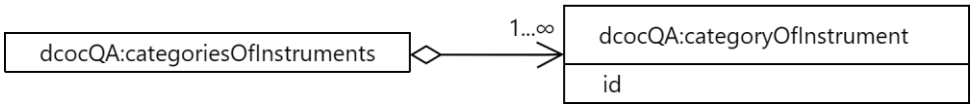

*Figure 6 - The subdivision of the element **dcocQA:categoriesOfInstruments** into the individual subelements*

3.1.2.1 dcocQA:categoryOfInstrument

category of one certified instrument

LABEL category of instrument
CARDINALITY 1 … ∞
MANDATORY ATTRIBUTE id

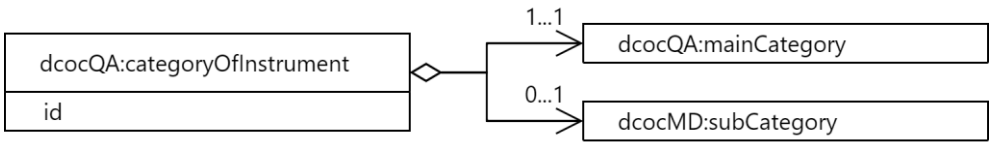

*Figure 7 - The subdivision of the element **dcocQA:categoryOfInstrument** into the individual subelements*

3.1.2.1.1 dcocQA:mainCategory

main category of the certified instrument

LABEL main category of instrument
CARDINALITY 1 … 1
DATA TYPE text

3.1.2.1.2 dcocQA:subCategory

sub category of the certified instrument

LABEL	sub category of instrument
CARDINALITY	0 … 1
DATA TYPE	text

3.2 Attributes

3.2.1 dcoc:schemaVersion

Version of the schema

LABEL	schema version
EXAMPLE	*0.4.0*
DATA TYPE	string
RESTRICTION ON VALUE	The value is expressed as digit.digit.digit.

3.2.2 dcoc:id

identification number

LABEL	ID
EXAMPLE	*software1*
DATA TYPE	ID

3.2.3 dcoc:lang

language used

LABEL	language
DATA TYPE	string
RESTRICTION ON VALUE	code according to ISO 639

3.3 Complex Data Types

3.3.1 dcoc:text

indication of any content in text form including used language

NOTE	The element name and cardinality are given at the point where it is used.
OPTIONAL ATTRIBUTE	id

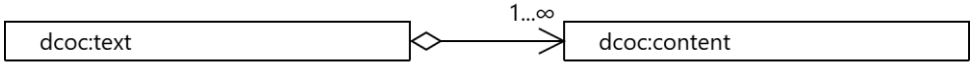

*Figure 8 - The subdivision of the data type **dcoc:text** into the individual subelements*

3.3.1.1 dcoc:content

text content based on language indication

LABEL	content
CARDINALITY	1 … ∞
DATA TYPE	string
OPTIONAL ATTRIBUTE 1	id
OPTIONAL ATTRIBUTE 2	lang

3.3.2 dcoc:contact

contact data on a person or organisation

NOTE	The element name and cardinality are determined at the place of use of the data structure.
OPTIONAL ATTRIBUTE	id

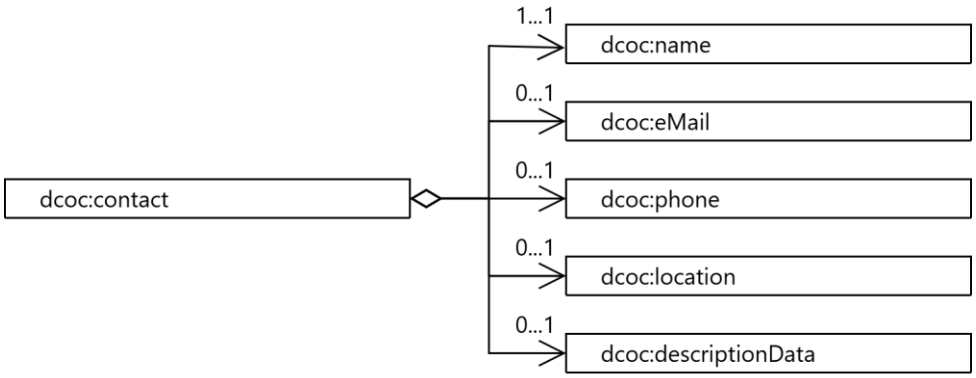

*Figure 9 - The subdivision of the data type **dcoc:contact** into the individual subelements*

3.3.2.1 dcoc:name

name of the contact person or organization

LABEL	name
EXAMPLE 1	*P. Sherman Meter GmbH*
EXAMPLE 2	*ਪੀ ਸ਼ਰਮਨ ਮੀਟਰ ਲਿਮਿਟੇਡ*
EXAMPLE 3	*Peter Hase*
CARDINALITY	1 … 1
DATA TYPE	text

3.3.2.2 dcoc:eMail

email address of the contact person or organization

LABEL email
CARDINALITY 0 … 1
DATA TYPE string

3.3.2.3 dcoc:phone

phone number of the contact person or organization

LABEL phone number
CARDINALITY 0 … 1
DATA TYPE string

3.3.2.4 dcoc:location

location data of the contact person or organization

LABEL location
CARDINALITY 0 … 1

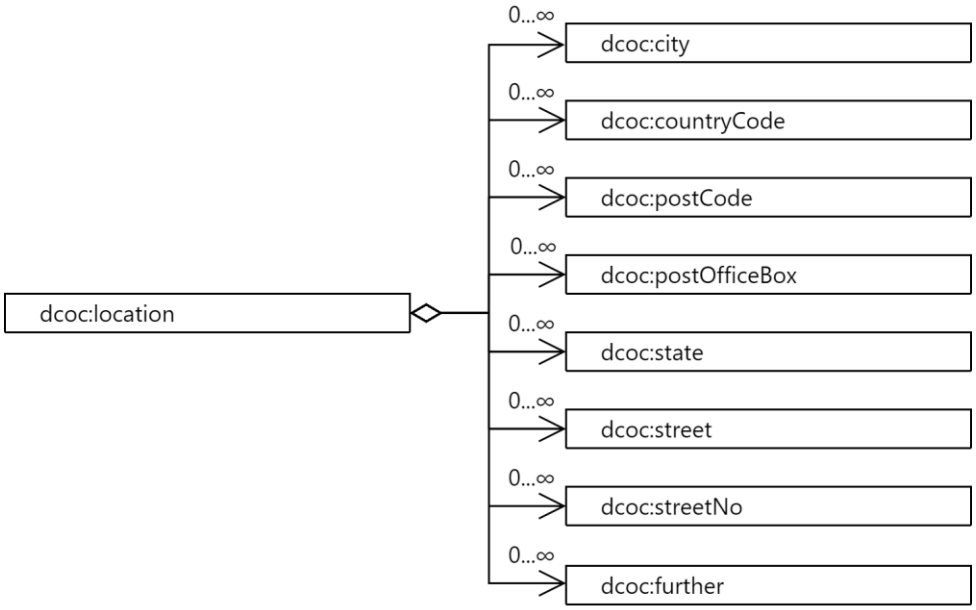

*Figure 10 - The subdivision of the data type **dcoc:location** into the individual subelements*

3.3.2.4.1 dcoc:city

city name

LABEL city
EXAMPLE *Sydney*
CARDINALITY 0 … ∞
DATA TYPE string

3.3.2.4.2 dcoc:countryCode

country code

LABEL	country
EXAMPLE	*AUS*
CARDINALITY	0 … ∞
DATA TYPE	string
RESTRICTION ON VALUE	The entry is made using the country codes according to ISO 3166-1.

3.3.2.4.3 dcoc:postCode

post code

LABEL	postcode
EXAMPLE	*2124*
CARDINALITY	0 … ∞
DATA TYPE	string

3.3.2.4.4 dcoc:postOfficeBox

post office box number of the contact person or organisation

LABEL	P.O. box
EXAMPLE	*P.O. Box 1234*
CARDINALITY	0 … ∞
DATA TYPE	string

3.3.2.4.5 dcoc:state

name of the federal state, region, or substate

LABEL	state
EXAMPLE	*Queensland*
CARDINALITY	0 … ∞
DATA TYPE	string

3.3.2.4.6 dcoc:street

street name of the contact person or organisation

LABEL	street
EXAMPLE	*Wallaby Way*
CARDINALITY	0 … ∞
DATA TYPE	string

3.3.2.4.7 dcoc:streetNo

street number of the contact person or organisation

LABEL	street number
EXAMPLE	*42a*
CARDINALITY	0 … ∞
DATA TYPE	string

3.3.2.4.8 dcoc:further

additional information on the location

LABEL	further
EXAMPLE	*o.V.i.A*
CARDINALITY	0 … ∞
DATA TYPE	string

3.3.2.5 dcoc:descriptionData

additional files on the contact person or organisation

LABEL	additional file
EXAMPLE	*Logo*
CARDINALITY	0 … 1
DATA TYPE	byteData

3.3.3 dcoc:byteData

encoded file

NOTE	The element name and cardinality are given at the point where it is used.
OPTIONAL ATTRIBUTE	id

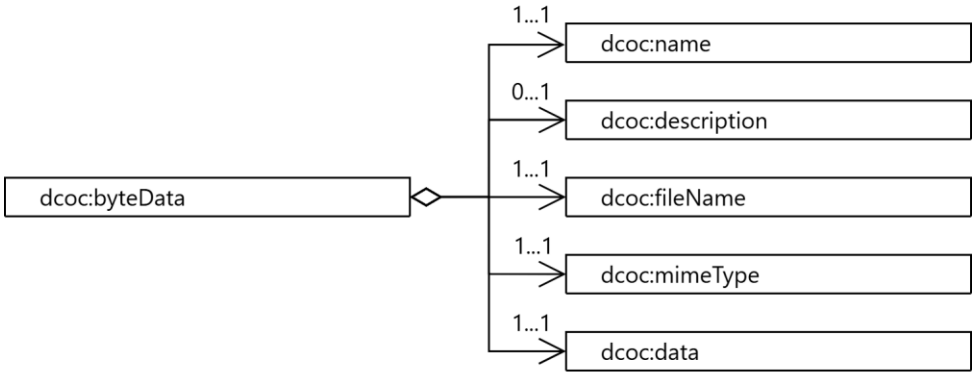

*Figure 11 - The subdivision of the data type **dcoc:byteData** into the individual subelements*

3.3.3.1 dcoc:name

designation or proper name of the corresponding content element

LABEL	name
EXAMPLE	*seal plan*
CARDINALITY	1 … 1
DATA TYPE	text

3.3.3.2 dcoc:description

textual representation of the corresponding content element

LABEL	description
CARDINALITY	0 … 1
DATA TYPE	text

3.3.3.3 dcoc:fileName

designation of the encoded file

LABEL	file name
EXAMPLE	*picture.jpg*
CARDINALITY	1 … 1
DATA TYPE	string

3.3.3.4 dcoc:mimeType

underlying file type

LABEL	mime type
NOTE	Mime type is according to specification *Multipurpose Internet Mail Extensions*.
EXAMPLE	*base64*
CARDINALITY	1 … 1
DATA TYPE	string

3.3.3.5 dcoc:data

encoded data

LABEL	file
CARDINALITY	1 … 1
DATA TYPE	binary

4. References

1. International Electrotechnical Commission (IEC) (2022): IECEx 02: IEC System for Certification to Standards Relating to Equipment for Use in Explosive Atmospheres (IECEx System). Edition 8.1.
2. ISO 3166-1:2020: Codes for the representation of names of countries and their subdivisions — Part 1: Country code.
3. ISO 639-1:2002: Codes for the representation of names of languages — Part 1: Alpha-2 code.

5. Version control

Issue Year	Significant changes
2025	Document first issued