TECHNICAL SPECIFICATION

# ISO/TS 19157-2

First edition
2016-12-01

# Geographic information — Data quality —

## Part 2: XML schema implementation

*Information geographique — Qualite des donnees —*

*Partie 2: Implémentation de schémas XML*



Reference number
ISO/TS 19157-2:2016(E)



ISO copyright office
Ch. de Blandonnet 8 • CP 401
CH-1214 Vernier, Geneva, Switzerland
Tel. +41 22 749 01 11
Fax +41 22 749 09 47
copyright@iso.org
www.iso.org

 

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# Foreword

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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The committee responsible for this document is ISO/TC 211, *Geographic information/Geomatics*.

A list of all parts in the ISO 19157 series can be found on the ISO website.



 

# Introduction

This document utilizes encoding rules from ISO 19118 and ISO/TS 19139, and the implementation approach from ISO/TS 19115-3 to define an XML schema implementation of ISO 19157:2013, and the data quality related concepts from ISO 19115-2. This schema can be used to validate conformance of XML instance documents with these conceptual models.

# Geographic information — Data quality —

# Part 2:
# XML schema implementation

## 1 Scope

This document defines data quality encoding in XML. It is an XML schema implementation derived from ISO 19157:2013 and the data quality related concepts from ISO 19115-2.

## 2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 19103:2015, *Geographic information — Conceptual schema language*

ISO 19105:2000, *Geographic information — Conformance and testing*

## 3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— IEC Electropedia: available at http://www.electropedia.org/

— ISO Online browsing platform: available at http://www.iso.org/obp/ui/

**3.1**
**document**
<XML> well-formed data object

[SOURCE: W3C XML]

**3.2**
**schema document**
<XML Schema> XML document containing schema component definitions and declarations

Note 1 to entry: The W3C XML Schema provides an XML interchange format for schema information. A single schema document provides descriptions of components associated with a single XML namespace, but several documents may describe components in the same schema, i.e. the same target *namespace* (3.3).

[SOURCE: ISO 19136:2007, 4.1.55]

**3.3**
**namespace**
collection of names, identified by a URI reference, which are used in XML *documents* (3.1) as element names and attribute names

[SOURCE: W3C XML]

**3.4**
**package**
general purpose mechanism for organizing elements into groups

EXAMPLE Identification information, metadata entity set information, constraint information.

[SOURCE: ISO 19103:2015, 4.27, modified – Example has been added.]

# 4 Conformance

## 4.1 General

The framework, concepts, and methodology for testing, and the criteria to be achieved to claim conformance, are specified in ISO 19105. See also Annex A.

## 4.2 Metadata for data quality

XML documents containing XML fragments with elements related to data quality and metaquality reports described in ISO 19157 or XML fragments related to data quality elements described in ISO 19115-2 shall pass the test modules defined in A.2.

## 4.3 Data quality measures

XML documents containing XML fragments with elements related to data quality measures described in ISO 19157 shall pass the test modules defined in A.3.

# 5 Abbreviated terms

## 5.1 Abbreviated terms

UML Unified Modeling Language

URI Unique Resource Identifier

URL Uniform Resource Locator

XML eXtensible Markup Language

XSD XML Schema Definition

## 5.2 Namespaces

XML namespaces defined in this document have URIs that follow the pattern: http://standards.iso.org/iso/19157/-2/xxx/N.M, where xxx is the namespace abbreviation, N is the major version number, and M is the minor version number. The namespace directories include descriptions of the content of the namespace, and links to the base specification it implements and to the normative XML schema location.

The following conventions are used to abbreviate the namespaces used to group XML elements. Definition of namespaces specific to the implementation of ISO 19157 and their rationale are discussed in 6.3. Table 1 includes namespaces that are from schema defined in other specifications and are imported by this implementation. The short string in the left column of Table 1 is used as a prefix to associate an XML element with the namespace. The second column contains an English-language description of the namespace, and the string in the third column is the URI that identifies the namespace. The final column lists the standard from which this namespace is imported. Table 2 lists abbreviations and other information for namespaces used for UML packages defined in ISO 19157:2013 and ISO 19115-2:2009.

**Table 1 — External namespace URIs and namespace abbreviation conventions used in this document**

| Namespace abbreviation convention | Namespace name | Namespace URI | Source |
|---|---|---|---|
| gco | Geographic Common | http://standards.iso.org/iso/19139/gco/1.0 | ISO/TS 19115-3 |
| gml | Geography Markup Language | http://schemas.opengis.net/gml/3.2.1/gml.xsd | ISO 19136 |
| xlink | XML linking language | http://www.w3.org/1999/xlink | XML Linking Language (XLink) Version 1.1 |
| xs | W3C XML Schema definition schema | http://www.w3.org/2001/XMLSchema | W3C XML Schema Definition Language (XSD) 1.1 Part 1: Structures<br>W3C XML Schema Definition Language (XSD) 1.1 Part 2: Datatypes |

**Table 2 — Namespace URIs and namespace abbreviation conventions defined and used in this document for packages defined in ISO 19157**

| Namespace abbreviation convention | Namespace name | Scope | Namespace URI | ISO UML Package |
|---|---|---|---|---|
| mdq | Metadata for Data Quality | elements for data quality and metaquality reports | http://standards.iso.org/iso/19157/-2/mdq/1.0 | ISO 19157<br><<Leaf>><br>DQ_DataQuality and<br>ISO 19115-2<br><<Leaf>><br>QE_CoverageResult |
| dqm | Data Quality Measures | elements for data quality measures | http://standards.iso.org/iso/19157/-2/dqm/1.0 | <<Leaf>><br>DQM_Measure |
| dqc | Data Quality Common | abstract classes required for modular implementation | http://standards.iso.org/iso/19157/-2/dqc/1.0 | Implementation Model |



# 6 XML schema and document requirements

## 6.1 General

This XML schema implementation of ISO 19157:2013 and the data quality concepts from ISO 19115-2:2009 follows the encoding rules stated in ISO 19118, ISO/TS 19139:2007, and the implementation approach from ISO/TS 19115-3:2016, Clause 8.

## 6.2 Core requirements

The requirements class described in Table 3 defines requirements that shall be met by any XML instance document based on this document.

**Table 3 — Core requirements for data quality instance**

| Requirements class | |
|---|---|
| http://standards.iso.org/iso/19157/-2/1.0/req/data-quality-core-instance | |
| **Target Type** | XML instance document |
| **Name** | Core requirements for data quality instance |
| **Dependency** | http://standards.iso.org/iso/19157/-2/1.0/req/data-quality-core-encoding |
| **Requirement** | **/req/data-quality-external-instance/property-type-content**<br>A property element instance SHALL have exactly one of 1) inline content (by-value) that is a schema-valid XML class instance, or 2) an xlink:href attribute (by-reference value), or 3) a gco:nilReason attribute (nil value). |
| **Requirement** | **/req/data-quality-external-instance/xml-well-formed**<br>An XML instance document SHALL be well-formed and valid with respect to the schema defined in this document. |

## 6.3 XML namespaces and requirements

Table 4 defines the requirements classes for each namespace module.

**Table 4 — Requirements classes for XML instance documents for each namespace module**

| Requirement class URI[a] | Namespace[b] | Dependencies[a] | Requirements[a] |
|---|---|---|---|
| /req/data-quality-instance | /mdq/1.0 | /req/data-quality-core-instance<br>/req/common-classes-instance | /req/data-quality-instance/scope<br>Any instance of DQ_DataQuality SHALL have a scope property value<br>/req/data-quality-instance/report<br>Any instance of DQ_DataQuality SHALL have a report property value<br>/req/data-quality-instance/result<br>Any concrete instance of DQ_Element SHALL have a result property value<br>/req/data-quality-instance/relatedElement<br>Any concrete instance of DQ_Metaquality SHALL have a relatedElement property value<br>/req/data-quality-instance/quantitative-value<br>Any instance of DQ_QuantitativeResult SHALL have a value property value<br>/req/data-quality-instance/conformance-pass<br>Any instance of DQ_ConformanceResult SHALL have a pass property value<br>/req/data-quality-instance/conformance-specification<br>Any instance of DQ_ConformanceResult SHALL have a specification property value<br>/req/data-quality-instance/descriptive-statement<br>Any instance of DQ_DescriptiveResult SHALL have a statement property value |

[a] The complete URI begins with http://standards.iso.org/iso/19157/-2/1.0/.

[b] The complete URL begins with http://standards.iso.org/iso/19157/-2/1.0/.

**Table 4** *(continued)*

| Requirement class URI[a] | Namespace[b] | Dependencies[a] | Requirements[a] |
|---|---|---|---|
| | | | /req/data-quality-instance/coverage-spatial-representation-type<br>Any instance of QE_CoverageResult SHALL have a spatialRepresentationType<br>/req/data-quality-instance/coverage-spatial-representation-information<br>Any instance of QE_CoverageResult SHALL have one and only one resultSpatialRepresentation property value<br>/req/data-quality-instance/coverage-spatial-representation-information<br>Any instance of QE_CoverageResult SHALL have one and only one resultContentDescription property value<br>/req/data-quality-instance/coverage-content-description<br>Any instance of QE_CoverageResult SHALL have one and only one resultContentDescription property value<br>/req/data-quality-instance/coverage-result-format<br>Any instance of QE_CoverageResult SHALL have one and only one resultFormat property value<br>/req/data-quality-instance/coverage-result-format<br>Any instance of QE_CoverageResult SHALL have one and only one resultFile property value |
| /req/quality-measure-instance | /dqm/1.0 | /req/data-quality-core-instance<br>/req/common-classes-instance<br>/req/citation-instance | /req/quality-measure-instance/measureIdentifier<br>Any instance of DQM_Measure SHALL have a measureIdentifier property value<br>/req/quality-measure-instance/name<br>Any instance of DQM_Measure SHALL have a name property value |

[a] The complete URI begins with http://standards.iso.org/iso/19157/-2/1.0/.

[b] The complete URL begins with http://standards.iso.org/iso/19157/-2/1.0/.

**Table 4** *(continued)*

| Requirement class URI[a] | Namespace[b] | Dependencies[a] | Requirements[a] |
|---|---|---|---|
| | | | /req/quality-measure-instance/elementName<br>Any instance of DQM_Measure SHALL have a elementName property value<br>/req/quality-measure-instance/valueType<br>Any instance of DQM_Measure SHALL have a valueType property value<br>/req/quality-measure-instance/TypeName<br>Any instance of DQM_Measure.elementName SHALL be the TypeName of a data quality element<br>/req/quality-measure-instance/valueType-dataType<br>Any instance of DQM_Measure.valueType SHALL be one of the data types defined in ISO 19103<br>/req/quality-measure-instance/valueStructure<br>DQM_Measure.valueStructure SHALL be provided if the result includes more than one value |

[a] The complete URI begins with http://standards.iso.org/iso/19157/-2/1.0/.

[b] The complete URL begins with http://standards.iso.org/iso/19157/-2/1.0/.

# Annex A
(normative)

# Abstract test suite

## A.1 Overview

### A.1.1 Conformance test tools

Various conformance tests for this document require that metadata instance (XML) documents can be validated without error against the XML schemas defined in this document. While many tools are available to test validation of XML instance documents against provided XML schemas, it is important to understand that not all validation tools implement the full W3C XML schema recommendation and not all validation tools interpret the W3C XML schema recommendation in the same manner. It is recommended that a tool that implements a strict interpretation of and full support for the W3C XML schema recommendation be used when validating XML instance documents to test conformance.

The normative XML schema and schematron documents are available in a directory at http://standards.iso.org/iso/19157/-2/ with a directory structure described in Annex B. Annex C provides information about including ISO 19115-2:2009 in this document, and Annex D provides example documents conforming to the XML schema.

### A.1.2 Conformance requirements — Limits of XML schema validation

Because XML schema validation is insufficient to test all of the constraints declared in ISO 19157, some conformance tests require other validation procedures. For instance, as stated in ISO/TS 19139:2007, 8.4, a property element following the default XML Class Property Type (XCPT) pattern may have exactly one of 1) inline content (by-value) that is an XML class, or 2) an xlink:href attribute (by-reference value), or 3) a gco:nilReason attribute (nil value). Because XML schema cannot constrain the co-occurrence of content or attributes, some mechanism in addition to XML schema validation shall be used to restrict a property to be exclusively by-value or by-reference or a nil value.

Rules implementing these constraints are included in the appropriate requirements class for the XML document instances. The ISO/TS 19157-2 package includes a schematron rule set for testing conformance with these requirements. If a tool for schematron validation is not available, conformance to these requirements may need to be tested by inspection.

## A.2 Metadata for data quality (mdq) namespace

Table A.1 describes the conformance class for namespace mdq.

**Table A.1 — Conformance class: Valid XML instance of metadata for data quality (mdq) namespace**

| Conformance class: Valid XML instance of metadata for data quality (mdq) namespace | | |
|---|---|---|
| http://standards.iso.org/iso/19157/-2/mdq/1.0/conf/data_quality-xml | | |
| Requirements | http://standards.iso.org/iso/19157/-2/mdq/1.0/req/data-quality-instance | |
| Dependency | http://standards.iso.org/iso/19115-3/1.0/conf/citation-xml | |
| Dependency | http://standards.iso.org/iso/19115/-3/1.0/conf/common-classes-xml | |
| Test | /conf/data-quality-xml/schema-valid | |
| | Requirement | /req/data-quality-instance/validation |
| | Test purpose | Verify that instances of XML elements from the namespace http://standards.iso.org/iso/19157/-2/mdq/1.0 are well-formed and valid. |
| | Test method | Use XML validation tools to determine if XML validates using the XML schema http://standards.iso.org/iso/19157/-2/mdq/1.0/mdq.xsd. See A.1.1. |
| | Test type | Validation |
| Test | /conf/data-quality-xml/schematron-rules | |
| | Requirement | /req/data-quality-instance/scope<br>/req/data-quality-instance/report<br>/req/data-quality-instance/result<br>/req/data-quality-instance/relatedElement<br>/req/data-quality-instance/quantitative-value<br>/req/data-quality-instance/conformance-pass<br>/req/data-quality-instance/conformance-specification<br>/req/data-quality-instance/descriptive-statement |
| | Test purpose | Verify that XML instance is conformant with additional data-quality that cannot be tested by XML schema. |
| | Test method | Verify that document validates with schematron rule set http://standards.iso.org/iso/19157/-2/mdq/1.0/mdq.sch. |
| | Test type | Validation |

## A.3 Data quality measures (dqm) namespace

Table A.2 describes the conformance class for namespace dqm.

**Table A.2 — Conformance class: Valid XML instance of metadata for data quality measure (dqm) namespace**

| Conformance class: Valid XML instance of data quality measure (dqm) namespace | | |
|---|---|---|
| http://standards.iso.org/iso/19157/-2/dqm/1.0/conf/quality-measure-xml | | |
| Requirements | http://standards.iso.org/iso/19157/-2/dqm/1.0/req/quality-measure-instance | |
| Dependency | http://standards.iso.org/iso/19115/-3/1.0/conf/citation-xml | |
| Dependency | http://standards.iso.org/iso/19115/-3/1.0/conf/common-classes-xml | |
| Test | /conf/data-quality-xml/schema-valid | |
| | Requirement | /req/quality-measure-instance/validation |
| | Test purpose | Verify that instances of XML elements from the namespace http://standards.iso.org/iso/19157/-2/dqm/1.0 are well-formed and valid. |
| | Test method | Use XML validation tools to determine if XML validates using the XML schema http://standards.iso.org/iso/19157/-2/dqm/1.0/dqm.xsd. |
| | Test type | Validation |
| Test | /conf/data-quality-xml/schematron-rules | |
| | Requirement | /req/quality-measure-instance/measureIdentifier<br>/req/quality-measure-instance/name<br>/req/quality-measure-instance/elementName<br>/req/quality-measure-instance/valueType<br>/req/quality-measure-instance/TypeName<br>/req/quality-measure-instance/valueType-dataType<br>/req/quality-measure-instance/valueStructure |
| | Test purpose | Verify that XML instance is conformant with additional data-quality that cannot be tested by XML schema. |
| | Test method | Verify that document validates with schematron rule set http://standards.iso.org/iso/19157/-2/dqm/1.0/dqm.sch. |
| | Test type | Validation |

# Annex B
(informative)

# XML resources related to data quality

## B.1 XML schema documents defined in this document

This document defines the content of three XML namespaces commonly identified using the prefixes mdq, dqm, and dqc. Each namespace prefix is inserted to http://standards.iso.org/iso/19157/-2/xxx/1.0 (where xxx is the namespace abbreviation) to make a complete namespace identifier. In addition to schema documents, the namespace directories include schematron rules (*.sch) that implement validation rules that are not tested by the schemas, documents that describe the namespaces (*.html) and provide links to the normative schema, and sample xml instance documents.

## B.2 XML schema documents defined in ISO/TS 19115-3

This document is based on the XML schema implementation provided in ISO/TS 19139:2007 and implementation approach described in ISO/TS 19115-3. To locate these XML schema documents, please refer to ISO/TS 19115-3:2016, Annex B.

## B.3 XML schema documents defined outside this document

In addition to the namespace listed in B.1, this document makes use of the Geography Markup Language or http://schemas.opengis.net/gml/3.2.1/gml.xsd namespace. To locate the authoritative XML schema documents associated with this namespace, refer to ISO 19136.

## B.4 Additional resources

To ease the use of this document, several XML files are available for download in the "resources" directory of http://standards.iso.org/iso/19157/-2/resources.

Similar additional resources are provided along with ISO/TS 19139 XML schema documents. Please refer to ISO/TS 19139:2007, Annex C.

# Annex C
(informative)

# How ISO 19115-2:2009 is included in this document

## C.1 General

ISO 19115-2:2009 includes important extensions to metadata and data quality. The conceptual UML-model in ISO 19115-2:2009 is defined as an extension to corresponding UML-model in ISO 19115:2005. To fit the data quality concepts from ISO 19115-2 into ISO 19157:2013 requires a formal revision of ISO 19115-2:2009. An intermediate-term approach was required in order to support current usage of ISO 19115-2 quality concepts. To merge these two standards, an "ad-hoc"-revision of selected parts of ISO 19115-2:2009 was done, and the result is included in the ISO 19157-2-XML-schemas.

## C.2 How ISO 19115-2:2009 is included

The selection from ISO 19115-2:2009 and inclusion of the selected parts is shown in Figure C.1. The ISO 19115-2-class QE_CoverageResult together with its substructure is attached as a subtype of the existing DQ_Result. Then this new subtype becomes the fourth subtype of DQ_Result, in addition to the existing DQ_ConformanceResult, DQ_QuantitativeResult and DQ_DescriptiveResult.

The QE_CoverageResult is modified from the original in ISO 19115-2:2009 as shown in Figure C.1, to fit the ISO/TS 19157-2 XML implementation.

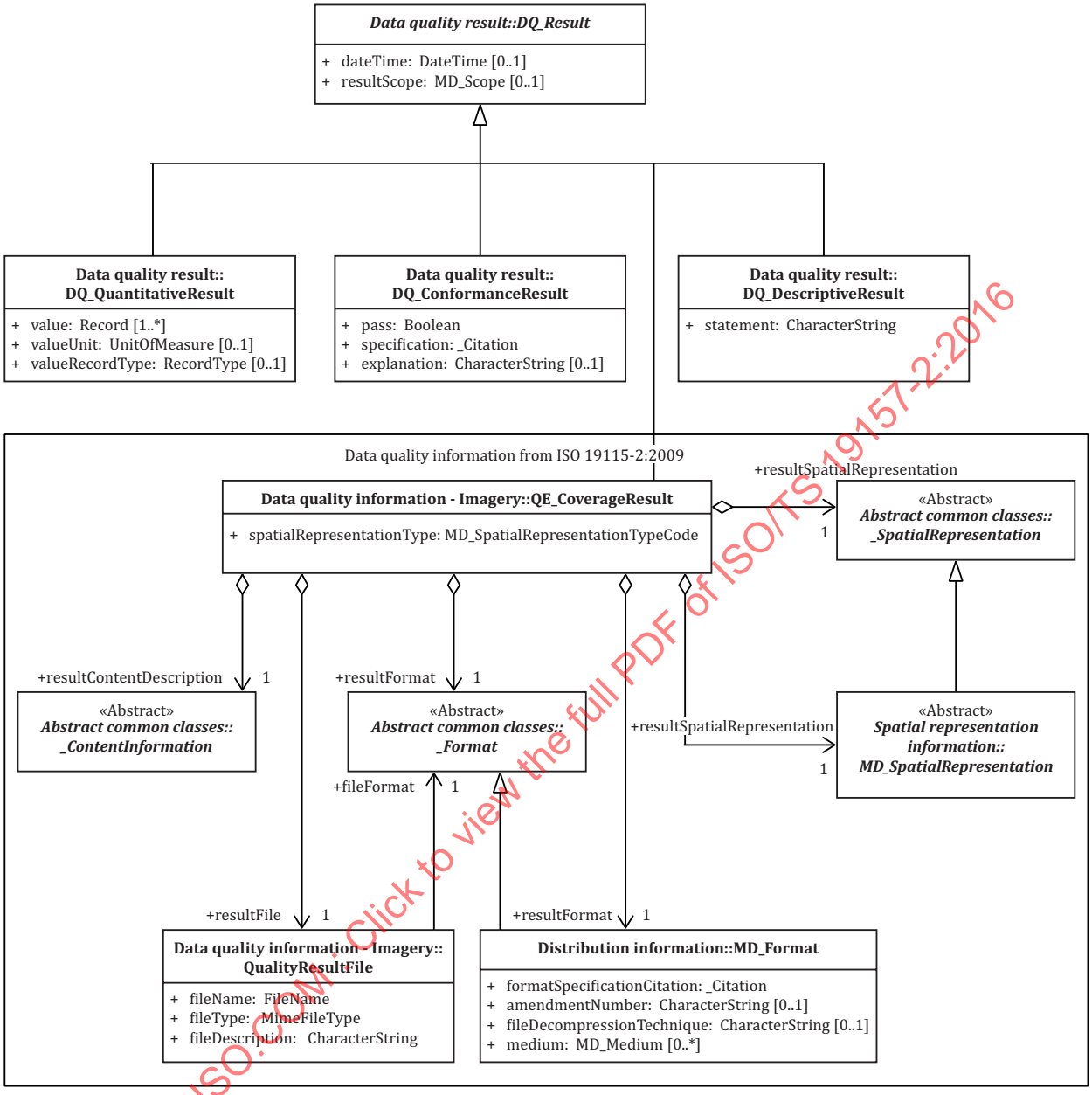


**Figure C.1 — ISO 19115-2:2009-parts in DQ_Result (UML class diagram)**

# Annex D
(informative)

# Implementation examples

## D.1 General

The following XML documents illustrate some aspects of the XML schema encoding of ISO 19157. The values provided for the different elements are intended to be realistic, but they should not serve as a reference to determine the proper way of using ISO 19157 conceptual schemas.

## D.2 Example of data quality

```
<?xml version="1.0" encoding="UTF-8"?>
<mdb:MD_Metadata xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
 xsi:schemaLocation="http://standards.iso.org/iso/19115/-3/mdb/1.0 http://standards.iso.
org/iso/19115/-3/mds/1.0/mds.xsd"
 xmlns:mdq="http://standards.iso.org/iso/19157/-2/mdq/1.0"
 xmlns:mdb="http://standards.iso.org/iso/19115/-3/mdb/1.0"
 xmlns:gco="http://standards.iso.org/iso/19139/gco/1.0"
 xmlns:mcc="http://standards.iso.org/iso/19115/-3/mcc/1.0"
 xmlns:mri="http://standards.iso.org/iso/19115/-3/mri/1.0"
 xmlns:lan="http://standards.iso.org/iso/19115/-3/lan/1.0"
 xmlns:cit="http://standards.iso.org/iso/19115/-3/cit/1.0">
   <!--
   This is a sample metadata record for minimal metadata with data quality.
   It contains required elements from the mdb, mcc (cit, gco), lan, and mri
   namespaces and sample data quality metadata with concepts from ISO 19157:2013
   -->
   <mdb:contact>
     <cit:CI_Responsibility>
       <cit:role>
        <cit:CI_RoleCode codeList="codeListLocation#CI_RoleCode"
          codeListValue="anyValidURI">pointOfContact</cit:CI_RoleCode>
       </cit:role>
        <cit:party>
          <cit:CI_Organisation>
            <cit:name>
             <gco:CharacterString>Organisation Name</gco:CharacterString>
             </cit:name>
          </cit:CI_Organisation>
       </cit:party>
     </cit:CI_Responsibility>
   </mdb:contact>
   <mdb:dateInfo>
     <cit:CI_Date>
        <cit:date>
          <gco:DateTime>2015-04-03T16:00:00</gco:DateTime>
       </cit:date>
       <cit:dateType>
        <cit:CI_DateTypeCode codeList="codeListLocation#CI_DateTypeCode"
          codeListValue="anyValidURI">creation</cit:CI_DateTypeCode>
        </cit:dateType>
      </cit:CI_Date>
   </mdb:dateInfo>
   <mdb:identificationInfo>
      <mri:MD_DataIdentification>
         <mri:citation>
            <cit:CI_Citation>
              <cit:title>
               <gco:CharacterString>Sample Metadata for Minimal Conformance Class</
gco:CharacterString>
```

```
               </cit:title>
            </cit:CI_Citation>
         </mri:citation>
         <mri:abstract>
            <gco:CharacterString>This sample record has all required elements for minimal
ISO 19115:2013
               metadata</gco:CharacterString>
         </mri:abstract>
      </mri:MD_DataIdentification>
   </mdb:identificationInfo>
   <mdb:dataQualityInfo>
      <mdq:DQ_DataQuality>
         <mdq:scope>
            <mcc:MD_Scope>
               <!-- This is a quality report for metadata -->
               <mcc:level>
                 <mcc:MD_ScopeCode codeList=" codeListLocation#MD_ScopeCode"
                           codeListValue="">metadata</mcc:MD_ScopeCode>
               </mcc:level>
               <mcc:levelDescription>
                  <mcc:MD_ScopeDescription>
                     <mcc:other>
                        <gco:CharacterString>Data Quality Metadata</gco:CharacterString>
                     </mcc:other>
                  </mcc:MD_ScopeDescription>
               </mcc:levelDescription>
            </mcc:MD_Scope>
         </mdq:scope>
         <mdq:standaloneQualityReport>
            <mdq:DQ_StandaloneQualityReportInformation>
               <mdq:reportReference>
                  <cit:CI_Citation>
                     <cit:title>
                        <gco:CharacterString>A report on the validation of a metadata
record</gco:CharacterString>
                     </cit:title>
                  </cit:CI_Citation>
               </mdq:reportReference>
               <mdq:abstract>
                  <gco:CharacterString>The metadata were tested for validity</
gco:CharacterString>
               </mdq:abstract>
            </mdq:DQ_StandaloneQualityReportInformation>
         </mdq:standaloneQualityReport>
         <mdq:report>
            <mdq:DQ_ConceptualConsistency>
               <mdq:measure>
                  <mdq:DQ_MeasureReference>
                     <mdq:measureIdentification>
                        <mcc:MD_Identifier>
                           <mcc:code>
                              <gco:CharacterString>http://standards.iso.
org/iso/19157/-2/mdq/1.0/conf/data-quality-xml/
                                 schema-valid
                              </gco:CharacterString>
                           </mcc:code>
                        </mcc:MD_Identifier>
                     </mdq:measureIdentification>
                     <mdq:measureDescription>
                        <gco:CharacterString>Use ISO 19157-2 to verify that instances of
XML elements from the namespace
                           http://standards.iso.org/iso/19157/-2/mdq/1.0 are well-formed
and valid.
                       </gco:CharacterString>
                     </mdq:measureDescription>
                  </mdq:DQ_MeasureReference>
               </mdq:measure>
               <mdq:result>
                  <mdq:DQ_ConformanceResult>
                     <mdq:specification>
                        <cit:CI_Citation>
```

```
                        <cit:title>
                           <gco:CharacterString>Geographic Information - Data Quality
</gco:CharacterString>
                        </cit:title>
                        <cit:alternateTitle>
                          <gco:CharacterString>ISO 19157:2013</gco:CharacterString>
                        </cit:alternateTitle>
                        <cit:onlineResource>
                          <cit:CI_OnlineResource>
                           <cit:linkage>
                            <gco:CharacterString>
                              http://www.iso.org/iso/home/store/
                              catalogue_tc/catalogue_detail.htm?
                              csnumber=32575</gco:CharacterString>
                              </cit:linkage>
                           </cit:CI_OnlineResource>
                        </cit:onlineResource>
                     </cit:CI_Citation>
                  </mdq:specification>
                  <mdq:pass>
                     <gco:Boolean>true</gco:Boolean>
                  </mdq:pass>
               </mdq:DQ_ConformanceResult>
            </mdq:result>
         </mdq:DQ_ConceptualConsistency>
      </mdq:report>
   </mdq:DQ_DataQuality>
</mdb:dataQualityInfo>
</mdb:MD_Metadata>
```

## D.3 Example of data quality catalogue and measure

```
<?xml version="1.0" encoding="UTF-8"?>
<dqm:DQM_MeasureCatalogue xmlns:cit="http://standards.iso.org/iso/19115/-3/cit/1.0"
   xmlns:cat="http://standards.iso.org/iso/19115/-3/cat/1.0"
   xmlns:dqm="http://standards.iso.org/iso/19157/-2/dqm/1.0"
   xmlns:gco="http://standards.iso.org/iso/19139/gco/1.0"
   xmlns:mcc="http://standards.iso.org/iso/19115/-3/mcc/1.0"
   xmlns:pre="http://standards.iso.org/iso/19135/-2/pre/1.0"
   xmlns:lan="http://standards.iso.org/iso/19115/-3/lan/1.0" xmlns:xlink="http://www.
w3.org/1999/xlink"
   xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
   xsi:schemaLocation="http://standards.iso.org/iso/19157/-2/dqm/1.0 http://standards.iso.
org/iso/19157/-2/dqm/1.0/dqm.xsd">
   <cat:name>
      <gco:CharacterString>Data Quality Measure Catalog</gco:CharacterString>
   </cat:name>
   <cat:scope>
      <gco:CharacterString>Data quality measures</gco:CharacterString>
   </cat:scope>
   <cat:fieldOfApplication>
      <gco:CharacterString>Data quality measure descriptions</gco:CharacterString>
   </cat:fieldOfApplication>
   <cat:versionNumber>
      <gco:CharacterString>2015-04-04</gco:CharacterString>
   </cat:versionNumber>
   <cat:versionDate>
      <gco:Date>2015-04-04</gco:Date>
   </cat:versionDate>
   <dqm:definitionSource>
      <dqm:DQM_SourceReference>
         <dqm:citation>
            <cit:CI_Citation id="ISO19157">
               <cit:title>
                  <gco:CharacterString>ISO 19157: Geographic Information - Data quality
                  </gco:CharacterString>
               </cit:title>
               <cit:alternateTitle>
                 <gco:CharacterString>ISO-19157:2013</gco:CharacterString>
               </cit:alternateTitle>
               <cit:onlineResource>
```