

STN	Geografické informácie Pozorovania, merania a vzorkovania (ISO 19156: 2023)	STN EN ISO 19156 01 9359
------------	--	--

Geographic information - Observations, measurements and samples (ISO 19156:2023)

Táto norma obsahuje anglickú verziu európskej normy.
This standard includes the English version of the European Standard.

Táto norma bola oznámená vo Vestníku ÚNMS SR č. 07/23

Obsahuje: EN ISO 19156:2023, ISO 19156:2023

Oznámením tejto normy sa ruší
STN EN ISO 19156 (01 9359) z februára 2014

EUROPEAN STANDARD

EN ISO 19156

NORME EUROPÉENNE

EUROPÄISCHE NORM

May 2023

ICS 35.240.70

Supersedes EN ISO 19156:2013

English Version

Geographic information - Observations, measurements and samples (ISO 19156:2023)

Information géographique - Observations, mesures et
échantillons (ISO 19156:2023)

Geoinformation - Erdbeobachtung und Erdmessung
(ISO 19156:2023)

This European Standard was approved by CEN on 22 August 2022.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Türkiye and United Kingdom.



EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

EN ISO 19156:2023 (E)

Contents	Page
European foreword.....	3

European foreword

This document (EN ISO 19156:2023) has been prepared by Technical Committee ISO/TC 211 "Geographic information/Geomatics" in collaboration with Technical Committee CEN/TC 287 "Geographic Information" the secretariat of which is held by BSI.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by November 2023, and conflicting national standards shall be withdrawn at the latest by November 2023.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN ISO 19156:2013.

Any feedback and questions on this document should be directed to the users' national standards body/national committee. A complete listing of these bodies can be found on the CEN website.

According to the CEN-CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Türkiye and the United Kingdom.

Endorsement notice

The text of ISO 19156:2023 has been approved by CEN as EN ISO 19156:2023 without any modification.

INTERNATIONAL STANDARD

ISO 19156

Second edition
2023-04

Geographic information — Observations, measurements and samples

Information géographique — Observations, mesures et échantillons



Reference number
ISO 19156:2023(E)

© ISO 2023

ISO 19156:2023(E)**COPYRIGHT PROTECTED DOCUMENT**

© ISO 2023

All rights reserved. Unless otherwise specified, or required in the context of its implementation, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

Contents

Page

Foreword	ix
Introduction	x
1 Scope	1
2 Normative references	1
3 Terms and definitions	1
4 Document conventions	5
4.1 Abbreviated terms and acronyms.....	5
4.2 Schema language.....	5
4.3 Model element names.....	6
4.4 Requirements and recommendations.....	6
4.5 Requirements classes.....	7
4.6 Conformance classes.....	7
4.7 Identifiers.....	8
4.8 Associations in UML context diagrams.....	8
5 Conformance	8
5.1 Overview.....	8
5.2 Conformance classes.....	9
6 Packaging, requirements and dependencies	11
6.1 Requirements.....	11
6.2 UML.....	12
6.2.1 UML package structure.....	12
6.2.2 UML package dependencies.....	12
6.3 Note on the use of "Any".....	14
7 Fundamental characteristics of observations and samples (informative)	14
7.1 Observation schema.....	14
7.1.1 Property evaluation.....	14
7.1.2 Observation.....	15
7.1.3 Properties of an Observation.....	15
7.1.4 Observation location.....	16
7.1.5 Result types.....	16
7.1.6 Use of the observation model.....	16
7.2 Sample schema.....	17
7.2.1 Role of sample features.....	17
7.2.2 Proximate vs. ultimate feature-of-interest.....	17
7.2.3 Role of samples.....	18
7.2.4 Sampling process.....	18
7.2.5 Classification of samples.....	19
7.3 Alignment between Observation, Sample and domain models.....	19
7.3.1 Model consistency.....	19
7.3.2 Relationship between Sample and domain features.....	22
8 Conceptual Observation schema	25
8.1 General.....	25
8.1.1 Conceptual Observation model.....	25
8.1.2 Conceptual Observation schema package Requirements Class.....	26
8.1.3 Association relatedObservation.....	26
8.2 Observation.....	27
8.2.1 Observation Requirements Class.....	27
8.2.2 Interface Observation.....	27
8.2.3 Attribute phenomenonTime.....	28
8.2.4 Attribute resultTime.....	28
8.2.5 Attribute validTime.....	28

ISO 19156:2023(E)

8.2.6	Association featureOfInterest.....	29
8.2.7	Association observedProperty.....	29
8.2.8	Association result.....	29
8.2.9	Association observingProcedure.....	30
8.2.10	Association observer.....	30
8.2.11	Association host.....	30
8.2.12	Constraint Observer or Host.....	30
8.2.13	Constraint ObservableProperty characteristic associated with featureOfInterest.....	30
8.2.14	Constraint suitable ObservableProperty.....	30
8.2.15	Constraint suitable result type.....	30
8.2.16	Constraint unit of measure.....	31
8.3	ObservableProperty.....	31
8.3.1	ObservableProperty Requirements Class.....	31
8.3.2	Interface ObservableProperty.....	31
8.3.3	Association observer.....	32
8.4	Procedure.....	32
8.4.1	Procedure Requirements Class.....	32
8.4.2	Interface Procedure.....	32
8.5	ObservingProcedure.....	32
8.5.1	ObservingProcedure Requirements Class.....	32
8.5.2	Interface ObservingProcedure.....	32
8.5.3	Association observer.....	33
8.6	Observer.....	33
8.6.1	Observer Requirements Class.....	33
8.6.2	Interface Observer.....	33
8.6.3	Association observableProperty.....	34
8.6.4	Association observingProcedure.....	34
8.6.5	Association deployment.....	34
8.7	Host.....	34
8.7.1	Host Requirements Class.....	34
8.7.2	Interface Host.....	34
8.7.3	Association deployment.....	35
8.7.4	Association relatedHost.....	35
8.8	Deployment.....	35
8.8.1	Deployment Requirements Class.....	35
8.8.2	Interface Deployment.....	35
8.8.3	Association observer.....	35
8.8.4	Association host.....	35
9	Abstract Observation Core.....	36
9.1	General.....	36
9.1.1	Abstract Observation Core Package Requirements Class.....	36
9.1.2	Association metadata.....	36
9.2	AbstractObservationCharacteristics.....	36
9.2.1	AbstractObservationCharacteristics Requirements Class.....	36
9.2.2	Feature type AbstractObservationCharacteristics.....	38
9.2.3	Attribute observationType.....	39
9.2.4	Attribute parameter.....	39
9.2.5	Attribute resultQuality.....	39
9.2.6	Association proximateFeatureOfInterest.....	40
9.2.7	Association ultimateFeatureOfInterest.....	40
9.2.8	Association collection.....	41
9.3	AbstractObservation.....	41
9.3.1	AbstractObservation Requirements Class.....	41
9.3.2	Constraint observationType.....	42
9.3.3	Constraint resultTime instant.....	42
9.3.4	Constraint parameter unique name.....	42
9.3.5	Constraint proximate or ultimate featureOfInterest.....	42

9.3.6	Constraint Observer or Host.....	42
9.3.7	Constraint ObservableProperty characteristic associated with featureOfInterest.....	42
9.3.8	Constraint suitable ObservableProperty	42
9.3.9	Constraint suitable result type.....	42
9.4	AbstractObservableProperty	42
9.4.1	AbstractObservableProperty Requirements Class	42
9.5	AbstractObservingProcedure	43
9.5.1	AbstractObservingProcedure Requirements Class	43
9.6	AbstractObserver.....	45
9.6.1	AbstractObserver Requirements Class	45
9.7	AbstractHost	46
9.7.1	AbstractHost Requirements Class	46
9.8	AbstractDeployment	47
9.8.1	AbstractDeployment Requirements Class	47
9.8.2	Attribute deploymentReason	48
9.8.3	Attribute deploymentTime	49
9.9	AbstractObservationCollection	49
9.9.1	AbstractObservationCollection Requirements Class	49
9.9.2	Feature type AbstractObservationCollection	50
9.9.3	Attribute collectionType.....	50
9.9.4	Association member	51
9.9.5	Association memberCharacteristics	51
9.9.6	Association relatedCollection	51
9.10	NamedValue	51
9.10.1	NamedValue Requirements Class	51
9.10.2	Data type NamedValue	51
9.10.3	Attribute name	51
9.10.4	Attribute value	52
9.11	Codelists	52
9.11.1	AbstractObservationType.....	52
9.11.2	AbstractObservationCollectionType	52
10	Basic Observations	52
10.1	General.....	52
10.1.1	Basic Observations Package Requirements Class.....	52
10.1.2	Attribute link.....	53
10.1.3	Attribute location	53
10.2	Observation	53
10.2.1	Observation Requirements Class	53
10.3	ObservationCharacteristics	55
10.3.1	ObservationCharacteristics Requirements Class	55
10.4	ObservationCollection	55
10.4.1	ObservationCollection Requirements Class.....	55
10.5	ObservingCapability	55
10.5.1	ObservingCapability Requirements Class	55
10.5.2	Feature type ObservingCapability	57
10.6	ObservableProperty	58
10.6.1	ObservableProperty Requirements Class.....	58
10.7	ObservingProcedure	59
10.7.1	ObservingProcedure Requirements Class	59
10.8	Observer.....	61
10.8.1	Observer Requirements Class	61
10.9	Host.....	62
10.9.1	Host Requirements Class	62
10.10	Deployment.....	65
10.10.1	Deployment Requirements Class.....	65
10.11	GenericDomainFeature.....	66
10.11.1	GenericDomainFeature Requirements Class.....	66

ISO 19156:2023(E)

10.11.2	Feature type GenericDomainFeature.....	69
10.12	Codelists.....	69
10.12.1	ObservationCollectionType.....	69
10.12.2	ObservationTypeByResultType.....	71
11	Conceptual Sample schema.....	72
11.1	General.....	72
11.1.1	Conceptual Sample schema model.....	72
11.1.2	Conceptual Sample Schema package Requirements Class.....	73
11.2	Sample.....	74
11.2.1	Sample Requirements Class.....	74
11.2.2	Interface Sample.....	74
11.2.3	Association sampling.....	74
11.2.4	Association preparationStep.....	75
11.2.5	Association sampledFeature.....	75
11.2.6	Association relatedSample.....	75
11.3	Sampling.....	75
11.3.1	Sampling Requirements Class.....	75
11.3.2	Interface Sampling.....	76
11.3.3	Association sample.....	76
11.3.4	Association featureOfInterest.....	76
11.3.5	Association sampler.....	76
11.3.6	Association samplingProcedure.....	77
11.3.7	Association relatedSampling.....	77
11.4	Sampler.....	77
11.4.1	Sampler Requirements Class.....	77
11.4.2	Interface Sampler.....	77
11.4.3	Association sampling.....	77
11.4.4	Association implementedProcedure.....	78
11.5	PreparationStep.....	78
11.5.1	PreparationStep Requirements Class.....	78
11.5.2	Interface PreparationStep.....	78
11.5.3	Association processingDetails.....	78
11.5.4	Association preparedSample.....	78
11.6	PreparationProcedure.....	78
11.6.1	PreparationProcedure Requirements Class.....	78
11.6.2	Interface PreparationProcedure.....	79
11.6.3	Association samplePreparationStep.....	79
11.7	SamplingProcedure.....	79
11.7.1	SamplingProcedure Requirements Class.....	79
11.7.2	Interface SamplingProcedure.....	79
11.7.3	Association sampling.....	79
11.7.4	Association sampler.....	80
12	Abstract Sample Core.....	80
12.1	General.....	80
12.1.1	Abstract Sample Core Package Requirements.....	80
12.2	AbstractSample.....	80
12.2.1	AbstractSample Requirements Class.....	80
12.2.2	Attribute sampleType.....	82
12.2.3	Attribute parameter.....	82
12.3	AbstractSampling.....	82
12.3.1	AbstractSampling Requirements Class.....	82
12.3.2	Attribute samplingLocation.....	83
12.3.3	Attribute time.....	83
12.3.4	Attribute parameter.....	83
12.4	AbstractSampler.....	84
12.4.1	AbstractSampler Requirements Class.....	84
12.4.2	Attribute samplerType.....	85

12.5	AbstractSamplingProcedure	86
12.5.1	AbstractSamplingProcedure Requirements Class	86
12.6	AbstractPreparationProcedure	87
12.6.1	AbstractPreparationProcedure Requirements Class	87
12.7	AbstractPreparationStep	88
12.7.1	AbstractPreparationStep Requirements Class	88
12.7.2	Attribute description	89
12.7.3	Attribute time	89
12.8	Codelists	89
12.8.1	AbstractSampleType	89
12.8.2	AbstractSamplerType	89
13	Basic Samples	90
13.1	General	90
13.1.1	Basic Samples Package Requirements Class	90
13.2	Sample	90
13.2.1	Sample Requirements Class	90
13.3	SpatialSample	92
13.3.1	SpatialSample Requirements Class	92
13.3.2	Feature type SpatialSample	92
13.3.3	Attribute shape	92
13.3.4	Attribute horizontalPositionalAccuracy	93
13.3.5	Attribute verticalPositionalAccuracy	93
13.4	MaterialSample	93
13.4.1	MaterialSample Requirements Class	93
13.4.2	Feature type MaterialSample	93
13.4.3	Attribute size	94
13.4.4	Attribute storageLocation	94
13.4.5	Attribute sourceLocation	94
13.5	StatisticalSample	94
13.5.1	StatisticalSample Requirements Class	94
13.5.2	Feature type StatisticalSample	95
13.5.3	Attribute classification	95
13.6	Sampling	95
13.6.1	Sampling Requirements Class	95
13.7	Sampler	96
13.7.1	Sampler Requirements Class	96
13.8	SamplingProcedure	97
13.8.1	SamplingProcedure Requirements Class	97
13.9	PreparationProcedure	99
13.9.1	PreparationProcedure Requirements Class	99
13.10	PreparationStep	100
13.10.1	PreparationStep Requirements Class	100
13.11	SampleCollection	102
13.11.1	SampleCollection Requirements Class	102
13.11.2	Feature type SampleCollection	102
13.11.3	Association member	103
13.11.4	Association relatedCollection	103
13.12	PhysicalDimension	103
13.12.1	PhysicalDimension Requirements Class	103
13.12.2	Data type PhysicalDimension	103
13.12.3	Attribute dimension	103
13.12.4	Attribute value	103
13.13	NamedLocation	104
13.13.1	NamedLocation Requirements Class	104
13.13.2	Data type NamedLocation	104
13.13.3	Attribute address	104
13.13.4	Attribute name	104
13.13.5	Attribute representativeGeometry	104

ISO 19156:2023(E)

13.14	StatisticalClassification	104
13.14.1	StatisticalClassification Requirements Class	104
13.14.2	Data type StatisticalClassification	105
13.14.3	Attribute concept	105
13.14.4	Attribute classification	105
13.15	Codelists	105
13.15.1	SampleTypeByGeometryType	105
Annex A	(normative) Abstract test suite	107
Annex B	(informative) Common usage of OMS concepts	117
Annex C	(informative) Changes in the Observation and Sample modelsbetween ISO 19156:2011 and ISO 19156:2023 (this document)	121
Annex D	(informative) Best practices in use of the Observation and Sampling models	139
Annex E	(informative) Detailed package overview diagrams	147
Bibliography		150

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

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).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 211, *Geographic information/Geomatics*, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 287, *Geographic Information*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement), and in collaboration with the Open Geospatial Consortium (OGC).

This second edition cancels and replaces the first edition (ISO 19156:2011), which has been technically revised.

The main changes are as follows:

- the UML model and the requirements/conformance class structure has been completely redesigned to address the contemporary modelling and observation data provision use cases;
- the fundamental Observation model has remained largely the same as in ISO 19156:2011, but certain carefully designed improvements and clarifications for the intended use have been included;
- the Sample model has been refined: given the integral nature of the Sample model, it has been decided to include that term in the name of the document;
- [Annex C](#) has been added listing the changes between ISO 19156:2011 and this document.

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

ISO 19156:2023(E)

Introduction

This document arises from work originally undertaken through the Open Geospatial Consortium's Sensor Web Enablement (SWE) activity. A set of interfaces and protocols was standardized through which applications and services are able to access sensors of all types, and observations generated by them, over the Web.

A new generation of geospatial standards is now emerging, based on general Web standards, architecture and current practice, as described in W3C Spatial Data on the Web Best Practices.^[31] This includes several new standards for describing and publishing sensors and observations, such as the OGC SensorThings API^[22] and the W3C/OGC Semantic Sensor Network Ontology.^[28] This second edition of ISO 19156 (now named "Observations, Measurements and Samples", or abbreviated to "OMS") is informed by these recent developments. The focus of revising ISO 19156:2011 is aimed at enabling the publication of observation data as part of the Web of data, while also supporting other means of data exchange.

The content presented in this document is derived from the previous edition published by Open Geospatial Consortium as OGC 10-004r3, and also ISO 19156:2011. A technical note describing the changes in comparison to ISO 19156:2011 is provided in [Annex C](#).

The name and contact information of the maintenance agency for this document can be found at www.iso.org/maintenance_agencies.

Geographic information — Observations, measurements and samples

1 Scope

This document defines a conceptual schema for observations, for features involved in the observation process, and for features involved in sampling when making observations. These provide models for the exchange of information describing observation acts and their results, both within and between different scientific and technical communities.

Observations commonly involve sampling of an ultimate feature-of-interest. This document defines a common set of sample types according to their spatial, material (for ex situ observations) or statistical nature. The schema includes relationships between sample features (sub-sampling, derived samples).

This document concerns only externally visible interfaces and places no restriction on the underlying implementations other than what is needed to satisfy the interface specifications in the actual situation.

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, *Geographic information — Conceptual schema language*

ISO 19107, *Geographic information — Spatial schema*

ISO 19108, *Geographic information — Temporal schema*

koniec náhľadu – text ďalej pokračuje v platenej verzii STN