



SLOVENSKI STANDARD SIST EN ISO 19148:2021

01-julij-2021

Nadomešča:
SIST EN ISO 19148:2012

Geografske informacije - Linearno georeferenciranje (ISO 19148:2021)

Geographic information - Linear referencing (ISO 19148:2021)

Geoinformation - Lineares Bezugssystem (ISO 19148:2021)

Information géographique - Référencement linéaire (ISO 19148:2021)

iTeh STANDARD PREVIEW
(standards.iteh.ai)

Ta slovenski standard je istoveten z: EN ISO 19148:2021

<https://standards.iteh.ai/catalog/standards/sist/d455dfcb-0713-4efd-a043-7e4580bd21f/sist-en-iso-19148-2021>

ICS:

07.040	Astronomija. Geodezija. Geografija	Astronomy. Geodesy. Geography
35.240.70	Uporabniške rešitve IT v znanosti	IT applications in science

SIST EN ISO 19148:2021

en,fr,de

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[SIST EN ISO 19148:2021](#)

<https://standards.iteh.ai/catalog/standards/sist/d455dfcb-0713-4efd-a043-7c45ff0bd21f/sist-en-iso-19148-2021>

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN ISO 19148

April 2021

ICS 35.240.70

Supersedes EN ISO 19148:2012

English Version

Geographic information - Linear referencing (ISO 19148:2021)

Information géographique - Référencement linéaire
(ISO 19148:2021)

Geoinformation - Lineares Bezugssystem (ISO 19148:2021)

This European Standard was approved by CEN on 10 March 2021.

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, Turkey and United Kingdom.

<https://standards.iteh.ai/catalog/standards/sist/d455dfcb-0713-4efd-a043-7c45ff0bd21f/sist-en-iso-19148-2021>



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

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

Contents	Page
European foreword.....	3

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[SIST EN ISO 19148:2021](https://standards.iteh.ai/catalog/standards/sist/d455dfcb-0713-4efd-a043-7c45ff0bd21f/sist-en-iso-19148-2021)
<https://standards.iteh.ai/catalog/standards/sist/d455dfcb-0713-4efd-a043-7c45ff0bd21f/sist-en-iso-19148-2021>

European foreword

This document (EN ISO 19148:2021) 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 October 2021, and conflicting national standards shall be withdrawn at the latest by October 2021.

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 19148:2012.

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, Turkey and the United Kingdom.

iTeh STANDARD PREVIEW
Endorsement notice
(standards.iteh.ai)

The text of ISO 19148:2021 has been approved by CEN as EN ISO 19148:2021 without any modification.

<https://standards.iteh.ai/catalog/standards/sist/d455dfcb-0713-4efd-a043-7c45ff0bd21f/sist-en-iso-19148-2021>

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[SIST EN ISO 19148:2021](#)

<https://standards.iteh.ai/catalog/standards/sist/d455dfcb-0713-4efd-a043-7c45ff0bd21f/sist-en-iso-19148-2021>

INTERNATIONAL
STANDARD

ISO
19148

Second edition
2021-04

**Geographic information — Linear
referencing**

Information géographique — Référencement linéaire

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[SIST EN ISO 19148:2021](https://standards.iteh.ai/catalog/standards/sist/d455dfcb-0713-4efd-a043-7c45ff0bd21f/sist-en-iso-19148-2021)

<https://standards.iteh.ai/catalog/standards/sist/d455dfcb-0713-4efd-a043-7c45ff0bd21f/sist-en-iso-19148-2021>



Reference number
ISO 19148:2021(E)

© ISO 2021

iTeh STANDARD PREVIEW (standards.iteh.ai)

[SIST EN ISO 19148:2021](https://standards.iteh.ai/catalog/standards/sist/d455dfcb-0713-4efd-a043-7c45ff0bd21f/sist-en-iso-19148-2021)

<https://standards.iteh.ai/catalog/standards/sist/d455dfcb-0713-4efd-a043-7c45ff0bd21f/sist-en-iso-19148-2021>



COPYRIGHT PROTECTED DOCUMENT

© ISO 2021

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	v
Introduction	vii
1 Scope	1
2 Normative references	1
3 Terms and definitions	1
4 Abbreviated terms and UML notation	5
4.1 Abbreviated terms.....	5
4.2 UML notation.....	5
5 Conformance	5
5.1 Conformance overview.....	5
5.2 Conformance classes.....	6
5.2.1 General.....	6
5.2.2 Data type conformance.....	6
5.2.3 Operation conformance.....	6
6 Linear referencing	7
6.1 Background.....	7
6.1.1 Linear referencing concepts.....	7
6.1.2 Linear referencing packages.....	17
6.2 Package: Linear Referencing System.....	18
6.2.1 Semantics.....	18
6.2.2 PositionExpression.....	19
6.2.3 LinearElement.....	20
6.2.4 LinearElementType.....	21
6.2.5 ILinearElement.....	21
6.2.6 IFeature.....	22
6.2.7 ISpatial.....	23
6.2.8 LinearReferencingMethod.....	24
6.2.9 DistanceAlongDirection.....	25
6.2.10 LRMTType.....	25
6.2.11 DistanceExpression.....	26
6.2.12 Referent.....	27
6.2.13 ReferentType.....	28
6.2.14 ValueExpression.....	29
6.3 Package: Linear Referencing Towards Referent.....	30
6.3.1 Semantics.....	30
6.3.2 LRMWithTowardsReferent.....	30
6.3.3 DistanceExpression.....	31
6.4 Package: Linear Referencing Offset.....	31
6.4.1 Semantics.....	31
6.4.2 LRMWithOffset.....	33
6.4.3 LateralOffsetDirection.....	34
6.4.4 VerticalOffsetDirection.....	34
6.4.5 LateralOffsetDistanceExpression.....	34
6.4.6 LateralOffsetExpression.....	35
6.4.7 LateralOffsetReferent.....	36
6.4.8 VerticalOffsetExpression.....	37
6.4.9 VerticalOffsetReferent.....	38
6.4.10 ICrossSectionalConvention.....	38
6.4.11 ICrossSectionalConventionPart.....	39
6.5 Package: Linear Referencing Offset Vector.....	40
6.5.1 Semantics.....	40
6.5.2 VectorOffsetDistanceExpression.....	40

ISO 19148:2021(E)

6.5.3	VectorOffsetExpression.....	41
6.6	Package: Linearly Located Event.....	42
6.6.1	Semantics.....	42
6.6.2	Linearly located event.....	43
6.6.3	Event.....	44
6.6.4	AttributeEvent.....	45
6.6.5	FeatureEvent.....	46
6.6.6	EventLocation.....	47
6.6.7	AtLocation.....	47
6.6.8	FromToLocation.....	47
6.6.9	EventTime.....	48
6.6.10	EventInstant.....	49
6.6.11	EventPeriod.....	49
6.7	Package: Linear Segmentation.....	49
6.7.1	Semantics.....	49
6.7.2	SegmentableFeature.....	50
6.7.3	LinearSegmentSet.....	51
6.7.4	LinearSegment.....	52
Annex A (normative) Abstract test suite.....		54
Annex B (informative) Generalized Model for Linear Referencing.....		58
Annex C (informative) Commonly used linear referencing methods and models.....		61
Annex D (informative) Application Schema example.....		84
Annex E (informative) Event and segmentation examples.....		87
Annex F (informative) Backwards compatibility with ISO 19148:2012.....		96
Bibliography.....		98

SIST EN ISO 19148:2021

<https://standards.iteh.ai/catalog/standards/sist/d455dfcb-0713-4efd-a043-7c45ff0bd21f/sist-en-iso-19148-2021>

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).

This second edition cancels and replaces the first edition (ISO 19148:2012), which has been technically revised.

The main changes compared to the previous edition are as follows:

- revision of the definition of the term linear element, removing a circular reference with the definition for the term linear referencing;
- introduction of the definition of the term referent;
- revision of the conceptual schema to meet current standards and harmonize with other ISO/TC 211 International Standards;
- refactoring of the core Linear Referencing System package, abstracting implementation classes into a new Application Schema package which is now presented as an example in [Annex D](#);
- introduction of an approach addressing broken-chainage;
- introduction of an enumeration addressing directionality of measurements;
- introduction of an approach addressing Cross-Sectional Positioning (XSP) conventions;
- introduction of an approach addressing Measures with Uneven Distribution;
- refactoring of the Linearly Located Event package dropping the previous assumption that the Linear Element was always of a Feature type;
- introduction of simplifications of the conceptual schema;

ISO 19148:2021(E)

- additional example illustrating Measures with Uneven Distribution in [Annex C](#);
- introduction of information about some standards implementing the conceptual schema described in this document in [Annex C](#);
- additional example illustrating Secondary Linear Referencing Systems in [Annex E](#);
- the correction of minor errors;
- introduction of a detailed overview regarding changes and backwards compatibility in [Annex F](#).

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.

iTeh STANDARD PREVIEW (standards.iteh.ai)

[SIST EN ISO 19148:2021](#)

<https://standards.iteh.ai/catalog/standards/sist/d455dfcb-0713-4efd-a043-7c45ff0bd21f/sist-en-iso-19148-2021>

Introduction

This document is a description of the data and operations required to support linear referencing. This includes Linear Referencing Systems, linearly located events and linear segments.

Linear Referencing Systems enable the specification of positions along linear objects. The approach is based upon the Generalized Model for Linear Referencing^[12] first standardized within ISO 19133:2005. This document extends that which was included in ISO 19133, both in functionality and explanation.

ISO 19109 supports features representing discrete objects with attributes with values which apply to the entire feature. ISO 19123 allows the attribute value to vary, depending upon the location within a feature, but does not support the assignment of attribute values to a single point or length along a linear feature. Linearly located events provide the mechanism for specifying attribution of linear objects when the attribute value varies along the length of a linear feature. A Linear Referencing System is used to specify where along the linear object each attribute value applies. The same mechanism can be used to specify where along a linear object another object is located, such as guardrail or a traffic accident.

It is common practice to segment a linear object with linearly located events, based upon one or more of its attributes. The resultant linear segments are attributed with just the attributes used in the segmentation process, ensuring that the linear segments are homogeneous in value for these segmenting attributes.

In accordance with the ISO/IEC Directives, Part 2, 2018, Rules for the structure and drafting of International Standards, in International Standards the decimal sign is a comma on the line. However, the General Conference on Weights and Measures (Conférence Générale des Poids et Mesures) at its meeting in 2003 passed unanimously the following resolution:

“The decimal marker shall be either a point on the line or a comma on the line.” In practice, the choice between these alternatives depends on customary use in the language concerned. In the technical areas of geodesy and geographic information it is customary for the decimal point always to be used, for all languages. That practice is used throughout this document.

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[SIST EN ISO 19148:2021](#)

<https://standards.iteh.ai/catalog/standards/sist/d455dfcb-0713-4efd-a043-7c45ff0bd21f/sist-en-iso-19148-2021>

Geographic information — Linear referencing

1 Scope

This document specifies a conceptual schema for locations relative to a one-dimensional object as measurement along (and optionally offset from) that object. It defines a description of the data and operations required to use and support linear referencing.

This document is applicable to transportation, utilities, environmental protection, location-based services and other applications which define locations relative to linear objects. For ease of reading, most examples discussed in this document come from the transportation domain.

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*

ISO 19111, *Geographic information — Referencing by coordinates*

SIST EN ISO 19148:2021

<https://standards.iteh.ai/catalog/standards/sist/d455dfcb-0713-4efd-a043-7c45ff0bd21f/sist-en-iso-19148-2021>

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:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <http://www.electropedia.org/>

3.1

attribute event

value of an attribute of a *feature* (3.4) that can apply to only part of the feature

Note 1 to entry: An attribute event includes the *linearly referenced location* (3.16) where the attribute value applies along the *attributed feature* (3.2).

Note 2 to entry: An attribute event can be qualified by the *instant* (3.8) in which, or *period* (3.20) during which, the attribute value applied.

3.2

attributed feature

feature (3.4) along which an *attribute event* (3.1) applies

3.3

direct position

position (3.21) described by a single set of coordinates within a coordinate reference system

[SOURCE: ISO 19136-1:2020, 3.1.20]