



# SLOVENSKI STANDARD

## SIST EN 16157-2:2019

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Nadomešča:

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**Inteligentni transportni sistemi - Specifikacije za izmenjavo podatkov DATEX II pri upravljanju prometa in informiranju - 2. del: Navajanje lokacije**

Intelligent transport systems - DATEX II data exchange specifications for traffic management and information - Part 2: Location referencing

Intelligente Verkehrssysteme - DATEX II Datenaustauschspezifikation für Verkehrsmanagement und Verkehrsinformationen - Teil 2: Ortsreferenzierung

Systemes de transport intelligents - Specifications Datex II d'échange de données pour la gestion du trafic et l'information routière - Partie 2: Localisation

**Ta slovenski standard je istoveten z: EN 16157-2:2019**

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**ICS:**

35.240.60      Uporabniške rešitve IT v prometu      IT applications in transport

**SIST EN 16157-2:2019**

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EUROPEAN STANDARD  
NORME EUROPÉENNE  
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**EN 16157-2**

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ICS 35.240.60

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English Version

## Intelligent transport systems - DATEX II data exchange specifications for traffic management and information - Part 2: Location referencing

Systèmes de transport intelligents - Spécifications Datex II d'échange de données pour la gestion du trafic et l'information routière - Partie 2 : Localisation

Intelligente Verkehrssysteme - DATEX II Datenaustauschspezifikation für Verkehrsmanagement und Verkehrsinformationen - Teil 2: Ortsreferenzierung

This European Standard was approved by CEN on 2 December 2018.

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.

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EUROPEAN COMMITTEE FOR STANDARDIZATION  
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EUROPÄISCHES KOMITEE FÜR NORMUNG

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<b>Contents</b>	<b>Page</b>
European foreword .....	4
Introduction .....	5
1 Scope .....	6
2 Normative references.....	7
3 Terms and definitions.....	8
4 Symbols and abbreviations.....	12
5 Conformance .....	12
6 UML notation .....	13
7 The DATEX II location referencing model .....	13
7.1 General .....	13
7.1.1 General .....	13
7.1.2 The package “LocationReference” .....	13
7.1.3 The class “PointLocation” .....	15
7.1.4 The class “LinearLocation” .....	17
7.1.5 The class “AreaLocation” .....	19
7.2 The package “AlertC” .....	20
7.2.1 The package “AlertCArea” .....	20
7.2.2 The package “AlertCLinearByCode” .....	21
7.2.3 The package “AlertCMethod2Linear” .....	22
7.2.4 The package “AlertCMethod2Point” .....	24
7.2.5 The package “AlertCMethod4Linear” .....	25
7.2.6 The package “AlertCMethod4Point” .....	26
7.3 The package “Gml” .....	27
7.3.1 The class model .....	27
7.3.2 Semantics.....	27
7.4 The package “LinearReferencing” .....	28
7.4.1 The package “PointAlongLinearElement” .....	28
7.4.2 The package “LinearWithinLinearElement” .....	31
7.5 The package “PointCoordinates” .....	31
7.5.1 The class model .....	31
7.5.2 Semantics.....	32
7.6 The package “SupplementaryPositionalDescription” .....	33
7.6.1 The class model .....	33
7.6.2 Semantics.....	33
7.7 The package “TpegLoc” .....	34
7.7.1 The package “TpegDescriptor” .....	34
7.7.2 The package “TpegPointLocation” .....	35
7.7.3 The package “TpegLinearLocation” .....	37
7.7.4 The package “TpegAreaLocation” .....	39
7.8 The package “OpenLR” .....	40
7.8.1 The package “OpenlrPoint” .....	40
7.8.2 The package “OpenlrLinear” .....	41
7.8.3 The package “OpenlrArea” .....	42
7.9 The package “NamedArea” .....	43

7.9.1	The class model.....	43
7.9.2	Semantics.....	44
8	The predefined locations publication.....	44
8.1	General.....	44
8.2	The package “PredefinedLocationsPublication”.....	44
8.2.1	The class model.....	44
8.2.2	Semantics.....	45
Annex A (normative) Data dictionary .....		47
Annex B (normative) Referenced XML schemas.....		133
Annex C (informative) Locations referencing methods.....		200
Bibliography .....		222

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[SIST EN 16157-2:2019](https://standards.iteh.ai/catalog/standards/sist/d99c7d61-df70-4727-9378-084d70b3c857/sist-en-16157-2-2019)

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**EN 16157-2:2019 (E)****European foreword**

This document (EN 16157-2:2019) has been prepared by Technical Committee CEN/TC 278 “Intelligent transport systems”, the secretariat of which is held by NEN.

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 September 2019, and conflicting national standards shall be withdrawn at the latest by September 2019.

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 CEN/TS 16157-2:2011.

The major differences introduced in the new edition of this part are the following:

- introduction of a new location referencing system based on ISO/TS 21219-22 “OpenLR™”;
- introduction of a new location referencing system for linear features based on GML LineString;
- introduction of features to deal with 3D coordinates and accuracy assessment;
- flexibility when using linear referencing systems;
- remodelling of the “PredefinedLocationsPublication”;
- correction of different bugs.

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EN 16157-2 is the second part of the EN 16157 series, *Intelligent transport systems — DATEX II data exchange specifications for traffic management and information*”; the other parts are:

- *Part 1: Context and framework*;
- *Part 3: Situation Publication*;
- *Part 4: Variable Message Sign (VMS) Publications* [Technical Specification];
- *Part 5: Measured and elaborated data publications* [Technical Specification];
- *Part 6: Parking Publications* [Technical Specification];
- *Part 7: Common data elements*.

Other parts will be developed in the future.

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

## Introduction

This European Standard defines a common set of data exchange specifications to support the vision of a seamless interoperable exchange of traffic and travel information across boundaries, including national, urban, interurban, road administrations, infrastructure providers and service providers. Standardization in this context is a vital constituent to ensure interoperability, reduction of risk, reduction of the cost base, promotion of open marketplaces and many social, economic and community benefits to be gained from more informed travellers, network managers and transport operators.

Delivering European Transport Policy in line with the White Paper issued by the European Commission requires co-ordination of traffic management and development of seamless pan European services. With the aim to support sustainable mobility in Europe, the European Commission has been supporting the development of information exchange mainly between the actors of the road traffic management domain for a number of years. In the road sector, DATEX II has been long in fruition, with the European Commission being fundamental to its development through an initial contract and subsequent co-funding through the Euro-Regional projects. With this standardization of DATEX II, there is a real basis for common exchange between the actors of the traffic and travel information sector.

This European Standard includes the framework and context for exchanges, the modelling approach, data content, data structure and relationships.

This European Standard supports a methodology that is extensible.

This part of EN 16157 deals with DATEX II location referencing. It references existing location referencing Standards or European Standards.

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## EN 16157-2:2019 (E)

## 1 Scope

This European Standard series (EN 16157) specifies and defines component facets supporting the exchange and shared use of data and information in the field of traffic and travel.

The component facets include the framework and context for exchanges, the modelling approach, data content, data structure and relationships.

This European Standard series is applicable to:

- traffic and travel information which is of relevance to road networks (non-urban and urban),
- public transport information that is of direct relevance to the use of a road network (e.g. road link via train or ferry service),
- traffic and travel information in the case of Cooperative intelligent transport systems (C-ITS).

This European Standard series establishes specifications for data exchange between any two instances of the following actors:

- Traffic Information Centres (TICs),
- Traffic Control Centres (TCCs),
- Service Providers (SPs).

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Use of this European Standard series may be applicable for use by other actors.

This European Standard series covers, at least, the following types of informational content:

- road traffic event information – planned and unplanned occurrences both on the road network and in the surrounding environment,
- operator initiated actions,
- road traffic measurement data, status data, and travel time data,
- travel information relevant to road users, including weather and environmental information,
- road traffic management information and instructions relating to use of the road network.

This part of the EN 16157 series specifies the informational structures, relationships, roles, attributes and associated data types, for the implementation of the location referencing systems used in association with the different publications defined in the Datex II framework. It also defines a DATEX II publication for exchanging predefined locations. This is part of the DATEX II platform independent data model.



## 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.

EN 16157-1:2018, *Intelligent transport systems – DATEX II data exchange specifications for traffic management and information – Part 1: Context and Framework*

EN 16157-7, *Intelligent transport systems – DATEX II data exchange specifications for traffic management and information – Part 7: Common data elements*

EN 16803-1, *Space – Use of GNSS-based positioning for road Intelligent Transport Systems (ITS) – Part 1: Definitions and system engineering procedures for the establishment and assessment of performances*

EN ISO 3166-1, *Codes for the representation of names of countries and their subdivisions – Part 1: Country codes (ISO 3166-1)*

EN ISO 14819-1, *Intelligent transport systems – Traffic and travel information messages via traffic message coding – Part 1: Coding protocol for Radio Data System – Traffic Message Channel (RDS-TMC) using ALERT-C (ISO 14819-1)*

EN ISO 14819-3:2013, *Intelligent transport systems – Traffic and travel information messages via traffic message coding – Part 3: Location referencing for Radio Data System – Traffic Message Channel (RDS-TMC) using ALERT-C (ISO 14819-3:2013)*

EN ISO 14825:2011, *Intelligent transport systems – Geographic Data Files (GDF) – GDF5.0 (ISO 14825:2011)*

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CEN ISO/TS 18234-6, *Traffic and Travel Information (TTI) – TTI via Transport Protocol Expert Group (TPEG) data-streams – Part 6: Location referencing applications (ISO/TS 18234-6)*

EN ISO 19136:2009, *Geographic information – Geography Markup Language (GML) (ISO 19136:2007)*

EN ISO 19148:2012, *Geographic information Linear referencing (ISO 19148:2012)*

CEN ISO/TS 24530-2, *Traffic and Travel Information (TTI) – TTI via Transport Protocol Experts Group (TPEG) Extensible Markup Language (XML) – Part 2: tpeg-locML (ISO/TS 24530-2)*

ISO 3166-2, *Codes for the representation of names of countries and their subdivisions – Part 2: Country subdivision code*

ISO/IEC 19505-1, *Information technology – Object Management Group Unified Modeling Language (OMG UML) – Part 1: Infrastructure*

ISO/TS 21219-22, *Intelligent transport systems – Traffic and travel information (TTI) via transport protocol experts group, generation 2 (TPEG2) – Part 22: OpenLR location referencing (TPEG2-OLR)*

## EN 16157-2:2019 (E)

### 3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 16157-1, EN 16157-7 and the following 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>

#### 3.1

##### area

two-dimensional, geographical region on the surface of the Earth

[SOURCE: ISO 17572-1:2015 [5], 2.1.2, modified – The original Note 1 to entry was not reproduced here.]

#### 3.2

##### confidence ellipse

horizontal position accuracy in a shape of ellipse with a predefined confidence level (e.g. 95 %), the centre of which corresponds to the reference position point for which the position accuracy is evaluated

[SOURCE: ETSI/TS 102 894-2 V1.2.1 (2014-09), A.67, modified – The wording of the present definition was altered.]

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#### 3.3

##### descriptor

characteristic of a geographic object, usually stored in an attribute

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EXAMPLE Road names or ~~road numbers~~ [standards.iteh.ai/catalog/standards/sist/d99c7d61-df70-4727-9378-084d70b3c857/sist-en-16157-2-2019](http://standards.iteh.ai/catalog/standards/sist/d99c7d61-df70-4727-9378-084d70b3c857/sist-en-16157-2-2019)

#### 3.4

##### destination

specification of the end point of a defined route or itinerary

Note 1 to entry: This may be either a location on a network or an area location.

#### 3.5

##### ellipsoidal height

distance of a point from the ellipsoid measured along the perpendicular from the ellipsoid to point positive if upwards or outside of the ellipsoid

[SOURCE: EN ISO 19111:2007, 4.19, modified – The original Note 1 to entry was not reproduced here.]

#### 3.6

##### European terrestrial reference system 89

##### ETRS89

recommended terrestrial reference system for Europe and coincident with *ITRS* at the epoch 1989.0

Note 1 to entry: Unlike *ITRS*, ETRS is centred on the stable part of the European plate and not subject to change due to continental drift in most of Europe.

**3.7****geodetic coordinate**

one of the sequences of two (or three) numbers designating the position of a point, expressed in *geodetic latitude*, *geodetic longitude* and (in the three-dimensional case) *ellipsoidal* or *gravity-related height*

Note 1 to entry: Adapted from EN ISO 19111:2007.

**3.8****gravity-related height**

height dependent on the Earth's gravity field

[SOURCE: EN ISO 19111:2007, 4.28, modified – The original Note 1 to entry was not reproduced here.]

**3.9****grid**

special instance of rectangle location given by a base rectangular shape that is its lower left cell multiplied to the North (by defining the number of rows) and to the East (by defining the number of columns)

**3.10****ILOC descriptor**

one of the three *descriptors* associated to an *ILOC* reference

**3.11****international terrestrial reference system****ITRS**

reference system for the Earth derived from precise and accurate space geodesy measurements, not restricted to GPS Doppler measurements, which is periodically tracked and revised by the International Earth Rotation Service (IERS). <https://www.itsr.iteh.ai/catalog/standards/sist/d99c7d61-df70-4727-9378-084d70b3c857/sist-en-16157-2-2019>

[SOURCE: ISO 17572-1:2015, 2.1.16]

**3.12****itinerary**

group of one or more physically separate locations arranged as an ordered set that defines a route

**3.13****latitude****geodetic latitude**

angle from the equatorial plane to the perpendicular to the Earth through a given point, northwards treated as positive

Note 1 to entry: Adapted from EN ISO 19111:2007.

**3.14****line string**

curve composed of straight-line segments

[SOURCE: EN ISO 19136:2009]

**EN 16157-2:2019 (E)****3.15****linear**

having a one-dimensional character

Note 1 to entry: Adapted from ISO 17572-1:2015.

**3.16****linear referencing**

specification of a *location* relative to a *linear* element as a measurement along that element

Note 1 to entry: Adapted from EN ISO 19148:2012.

**3.17****location**

identifiable geographic place

[SOURCE: EN ISO 19112:2005, 4.4, modified – The original example was not reproduced here.]

Note 1 to entry: It is either on a network (as a point or a linear location) or an area. This may be provided in one or more *referencing systems*.

**3.18****location code**

tabular address of the pre-stored *location* details in the *location* table used by the information provider

Note 1 to entry: Adapted from EN ISO 14819-3:2013 as it is mainly associated to ALERT-C.

**3.19****location reference****reference**

data set assigned to a *location*

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Note 1 to entry: A reference unambiguously defines one location in the location referencing system. The reference is the set of data which is passed between different implementations using the same location referencing system to identify the location.

**3.20****location referencing system****LRS**

referencing system

complete system by which location references are generated, according to a location referencing method, and communicated, including standards, definitions, software, hardware, and databases

[SOURCE: ISO 17572-1:2015, 2.1.27]

**3.21****longitude****geodetic longitude**

angle from the prime meridian plane to the meridian plane of a given point, eastward treated as positive

Note 1 to entry: Adapted from EN ISO 19111:2007.

**3.22****point**

zero-dimensional element that specifies a geometric location

[SOURCE: ISO 17572-1:2015, 2.1.32]

**3.23****point of interest****POI**

specific point location that is thought useful or interesting

**EXAMPLE** A point on the Earth's representing the location of a monument or of hotels, campsites, fuel stations or any other categories often used in navigation systems.

Note 1 to entry: A POI may lie outside the road network. An access point is a point on the road network in order to access this POI.

**3.24****polygon**

planar surface defined by one exterior boundary and zero or more interior boundaries

[SOURCE: EN ISO 19136:2009]

**3.25****predefined location**

*location* using a unique identifier (reference) that is agreed upon in both sender and receiver system to select a location from a set of locations already exchanged

Note 1 to entry: Adapted from ISO 17572-1:2015.  
<https://standards.iteh.ai/catalog/standards/sist/d99c7d61-df70-4727-9378-084d70b3c857/sist-en-16157-2-2019>

**3.26****primary point**

*point* met last when a linear road section is travelled according to the location direction

Note 1 to entry: In case of an affected linear with an event it generally pinpoints the origin of the event (EN ISO 14819-3).

**3.27****referent**

known *location* from which relative measurement is made along a linear element

Note 1 to entry: Adapted from EN ISO 19148:2012.

**3.28****secondary point**

*point* met first when a linear road section is travelled according to the location direction

**3.29****tuple**

ordered list of values

[SOURCE: EN ISO 19136:2009]

Note 1 to entry: Considered values are here geodetic coordinates.

## EN 16157-2:2019 (E)

## 4 Symbols and abbreviations

For the purpose of this document, the following abbreviations apply throughout the document unless otherwise specified.

ALERT-C Alert and problem location for European road traffic, version C

C-ITS Cooperative intelligent transport systems

DNP Distance to next point

FOW Form of way

FRC Functional road class

GIS Geographic information system

GML Geographic markup language

GPS Global positioning system

ILOC Intersection location

NOTE 1 It is the basis of a dynamic referencing system named "ILOC referencing system", subsequently adopted by TPEG as "TPEG-Loc".

LR Linear referencing

LRM Linear referencing method

LRP Location reference point

OpenLR Open location referencing

NOTE 2 It is a trade mark of the TomTom BV company (see <http://www.openlr.org>).

TPEG Transport protocol expert group

TPEG2 Transport protocol expert group, generation 2

## 5 Conformance

The DATEX II platform independent data model of which the location referencing packages as well as Predefined Locations Publication sub-model are parts, corresponds to the Level A model as defined in EN 16157-1.

Conformance with this Part shall require platform independent models from which platform specific models are generated to comply with the UML modelling rules defined in EN 16157-1 and with the following requirements of this sub-model which are expressed in this Part:

- comply with all stipulated minimum and maximum multiplicity requirements for UML elements and relationships;
- comply with all definitions, types and ordering;
- employ optional elements as specified;
- comply with all expressed constraints.

It should be noted that conformance of a publication service with all the structural requirements stated above does not necessarily ensure that the informational content of that service will be semantically comprehensible.

## 6 UML notation

The UML notation used in this European Standard shall be as described in ISO/IEC 19505-1.

NOTE Some introduction guides to UML 2 are provided in the Bibliography of EN 16157-1:2018.

## 7 The DATEX II location referencing model

### 7.1 General

#### 7.1.1 General

The normative Annex A provides the data dictionary i.e. a comprehensive view of the different classes, attributes and associations for each package. Each subclause corresponds to a package.

The types of attribute and the enumerations specific to this part are defined in the normative Annex A.

The XML subschema corresponding to this part of EN 16157 is provided in the normative Annex B.

The informative Annex C provides some explanations about the location referencing methods that are relevant for this part of EN 16157, some of them being drawn from approved standards like those on linear referencing or on ALERT-C.

#### 7.1.2 The package “LocationReference”

##### 7.1.2.1 The overall model

The package “LocationReference” supplies classes and attributes to the definition of a *location* locating a traffic object e.g. a situation record in a situation publication. It is pictured including the relationships between the classes in Figure 1.

This contributes important information in the different publications derived from the “PayloadPublication” defined in EN 16157-7, bringing information on “where” in each case.

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