



# SLOVENSKI STANDARD

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**Inteligentni transportni sistemi - Specifikacije za izmenjavo podatkov DATEX II pri upravljanju prometa in informiranju - 1. del: Skladnost in okvir**

Intelligent transport systems - DATEX II data exchange specifications for traffic management and information - Part 1: Context and framework

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Intelligente Verkehrssysteme - DATEX II Datenaustauschspezifikation für Verkehrsmanagement und Verkehrsinformation - Teil 1: Kontext und Rahmenwerk

SIST-TS CEN/TS 16157-1:2011

Systèmes de transport intelligents - Spécifications DATEX II d'échange de données pour la gestion du trafic et l'information routière - Partie 1: Contexte et cadre général

**Ta slovenski standard je istoveten z: CEN/TS 16157-1:2011**

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**ICS:**

35.240.60	Uporabniške rešitve IT v transportu in trgovini	IT applications in transport and trade
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**CEN/TS 16157-1**

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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 1:  
Context and framework**

Systèmes de transport intelligents - Spécifications DATEX  
II d'échange de données pour la gestion du trafic et  
l'information routière - Partie 1: Contexte et cadre général

Intelligente Transportsysteme - DATEX II Datenaustausch  
Spezifikationen für Verkehrsmanagement und  
Informationen - Teil 1: Kontext und Rahmenstruktur

This Technical Specification (CEN/TS) was approved by CEN on 10 April 2011 for provisional application.

The period of validity of this CEN/TS is limited initially to three years. After two years the members of CEN will be requested to submit their comments, particularly on the question whether the CEN/TS can be converted into a European Standard.

CEN members are required to announce the existence of this CEN/TS in the same way as for an EN and to make the CEN/TS available promptly at national level in an appropriate form. It is permissible to keep conflicting national standards in force (in parallel to the CEN/TS) until the final decision about the possible conversion of the CEN/TS into an EN is reached.

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

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**CEN/TS 16157-1:2011 (E)****Foreword**

This document (CEN/TS 16157-1:2011) has been prepared by Technical Committee CEN/TC 278 “Road transport and traffic telematics”, the secretariat of which is held by NEN.

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

This document supersedes ENV 13106:2000, ENV 13777:2000.

As a user of the standard, attention is drawn to the resources of [www.datex2.eu](http://www.datex2.eu). This web site contains related software tools and software resources that aid the implementation of CEN/TS 16157 DATEX II.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to announce this Technical Specification: 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, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

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## Introduction

This Technical Specification 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. Standardisation 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 standardisation of DATEX II there is a real basis for common exchange between the actors of the traffic and travel information sector.

This Technical Specification includes the framework and context for exchanges, the modelling approach, data content, data structure and relationships, communications specification.

This Technical Specification supports a methodology that is extensible.

The European Committee for Standardisation (CEN) draws attention to the fact that it is claimed that compliance with this document may involve the use of a patent concerning procedures, methods and/or formats given in this document.

CEN takes no position concerning the evidence, validity and scope of patent rights.

This document (i.e. CEN/TS 16157-1) is targeted towards all stakeholders that want to understand the modelling methodology applied throughout the DATEX II specifications. While this is potentially a wide range of readers, the document addresses specifically those users that intend to extend the DATEX II data model and therefore need to understand – and comply with – the modelling principles, the use of the “Unified Modeling Language” (UML) and other conventions for DATEX II modelling. The subject matter may be difficult to address without some basic background about the historical evolution and main design decisions taken. Users unfamiliar with this background may find a brief summary in Annex A. Users not (yet) familiar with the UML find a brief introduction in the informative Annex B.

Further to the UML modelling, this Technical Specification also defines the mapping of this model to the “eXtensible Markup Language” (XML), used for formatting data in DATEX II data exchanges. XML is the most widely used method nowadays of formatting data for business-to-business data exchange (i.e. centre-to-centre) over the Internet.

## CEN/TS 16157-1:2011 (E)

### 1 Scope

This Technical Specification (CEN/TS 16157-1) specifies and defines component facets required to support 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, communications specification.

This Technical Specification 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).

This Technical Specification establishes specifications for data exchange between any two instances of the following actors:

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

Use of this Technical Specification may be applicable for use by other actors.

This Technical Specification 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 information and advice relating to use of the road network.

This part of CEN/TS 16157 specifies the DATEX II framework of all parts of this Technical Specification, the context of use and the modelling approach taken and used throughout these Technical Specifications. This approach is described using formal methods and provides the mandatory reference framework for all other parts.

### 2 Conformance

This document provides requirements for UML models (as of ISO/IEC 19501:2005) that claim conformance with the DATEX II Technical Specifications. UML models claiming this conformance shall comply with the provisions of the normative clauses and annex of this part. Conformance with metadata constructs is subject to multiplicity requirements stated explicitly in the model or is implicitly defined in provisions of this Technical Specification. Metadata constructs with minimum multiplicity of 1 or more shall be present in any data claiming conformance. Metadata constructs with minimum multiplicity of 0 may be present or may be missing without violating conformance.



### 3 Normative references

The following referenced documents are indispensable for the application 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 639-2:1998, *Codes for the representation of names of languages — Part 2: Alpha-3 code*

ISO 3166-1:2006, *Codes for the representation of names of countries and their subdivisions — Part 1: Country codes*

ISO/IEC 14977:1996, *Information technology — Syntactic metalanguage — Extended BNF*

ISO/IEC 19501:2005, *Information technology — Open Distributed Processing — Unified Modeling Language (UML) Version 1.4.2*

ISO/IEC 19503:2005, *Information technology — XML Metadata Interchange (XMI)*

### 4 Terms and definitions

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

#### 4.1 Terms and definitions adapted from ISO/IEC 19501:2005

NOTE Definitions have been adapted to meet the particular use of UML within this specification.

##### 4.1.1

##### **association**

semantic relationship between classes

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##### 4.1.2

##### **association end**

endpoint of an association, which connects the association to a class

##### 4.1.3

##### **aggregation**

association where the target class is an aggregate; therefore the source class is a part. This characteristic is expressed in UML with an attribute named “aggregation” on the target side Association End being set to “aggregation”

##### 4.1.4

##### **attribute**

named slot within a class that describes a range of values that instances of the class may hold

##### 4.1.5

##### **class**

description of a set of objects that share the same attributes, relationships, and semantics

##### 4.1.6

##### **composition**

association where the target class is a composite; therefore the source class is a part that is strongly owned by the composite and may not be part of any other composite. This characteristic is expressed in UML with an attribute named “aggregation” on the target side Association End being set to “composite”

**CEN/TS 16157-1:2011 (E)****4.1.7****dependency**

dependency states that the implementation or functioning of one or more elements requires the presence of one or more other elements

**4.1.8****enumeration**

data type whose range is a list of predefined values, called enumeration literals

**4.1.9****enumeration Literal**

element of the run-time extension of an Enumeration data type

NOTE It has no relevant substructure, that is, it is atomic. The enumeration literals of a particular Enumeration data type are ordered.

**4.1.10****generalization**

taxonomic relationship between a more general element and a more specific element

NOTE 1 The more specific element is fully consistent with the more general element (it has all of its properties, members, and relationships) and may contain additional information.

NOTE 2 In the metamodel, a Generalization is a directed inheritance relationship, uniting a GeneralizableElement with a more general GeneralizableElement in a hierarchy. Generalization is a subtyping relationship; that is, an Instance of the more general GeneralizableElement may be substituted by an Instance of the more specific GeneralizableElement.

**4.1.11****multiplicity**

in the metamodel a MultiplicityRange defines a range of integers. The upper bound of the range cannot be below the lower bound. The lower bound must be a nonnegative integer. The upper bound must be a nonnegative integer or the special value unlimited which indicates there is no upper bound on the range

**4.1.12****package**

grouping of model elements

**4.1.13****stereotype**

stereotype concept provides a way of branding (classifying) model elements so that they behave in some respects as if they were instances of new virtual metamodel constructs. These model elements have the same structure (attributes, associations, operations) as similar non-stereotyped model elements of the same kind. The stereotype may specify additional constraints and tag definitions that apply to model elements. In addition, a stereotype may be used to indicate a difference in meaning or usage between two model elements with identical structure

**4.1.14****tagged value**

tagged value allows information to be attached to any model element in conformance with its tag definition. Although a tagged value, being an instance of a kind of ModelElement, automatically inherits the name attribute, the name that is actually used in the tagged value is the name of the associated tag definition. The interpretation of tagged values is intentionally beyond the scope of UML semantics. It must be determined by user or tool conventions that may be specified in a profile in which the tagged value is defined

**4.2 Other terms and definitions****4.2.1****binary (association)**

association that connects exactly two classes

**4.2.2****globally unique identifier****GUID**

Globally Unique Identifier that is unique in space and time, i.e. no other object will ever have the same identifier at any other place and at any time

**4.2.3****lower camel case****LCC**

Camel Case describes the practice of concatenating compound phrases without whitespace in between where phrases are delimited by upper case letters. Lower Camel Case describes the case where the initial letter is lower case, e.g. as in lowerCamelCase

**4.2.4****model element**

generic term for any construct of metadata used within a model to specify a particular aspect or element of this model

**4.2.5****Platform Independent Model****PIM**

model of aspects of an information system (e.g. the data model) that is independent of any technical platform used to implement the model. Concrete implementations can be derived from the platform independent model by platform specific models or mappings

**4.2.6****platform specific model****PSM**

model of aspects of an information system (e.g. the data model) that is linked to a specific technological platform (e.g. a specific programming language or data transfer syntax)

**4.2.7****upper camel case****UCC**

Camel Case describes the practice of concatenating compound phrases without whitespace in between where phrases are delimited by upper case letters. Lower Camel Case describes the case where the initial letter is upper case, e.g. as in UpperCamelCase

**4.2.8****unique resource identifier / locator****URI / URL**

character string of well defined structure used to uniquely identify a resource. If that string is actually pointing at a resource accessible via the Internet, it is called a Unique Resource Locator

**4.2.9****extensible markup language****XML**

set of rules for encoding electronic documents define by the World Wide Web Consortium W3C. Although developed for documents, it is today widely used for data exchange in general, usually in conjunction with an XML Schema Definition

**4.2.10****XML metadata interchange****XMI**

XML based specification for the interoperable exchange of metadata. It is today most commonly used to exchange UML models between UML tools. XMI is specified in ISO/IEC 19503:2005

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### 4.2.11

#### XML schema definition

##### XSD

XML Schema Definition is a formal description of the allowed content of an XML document that claims compliance to the schema. XML Schema Definitions allow for formal validation of syntactical compliance of instance documents

## 5 Symbols and abbreviated terms

GUID Globally Unique identifier

LCC Lower Camel Case

PIM Platform Independent Model

PSM Platform Specific Model

UCC Upper Camel Case

UML Unified Modeling Language

URI Universal Resource Identifier

URL Universal Resource Locator

W3C World Wide Web Consortium

XMI XML Metadata Interchange

XML eXtensible Markup Language

XSD XML Schema Definition

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## 6 General conventions and requirements

### 6.1 Metamodelling

The DATEX II modelling methodology (see Annex C) uses the Unified Modeling Language (UML), version 1.4.2 as specified in UML ISO/IEC 19501:2005. UML provides a vast set of modelling elements that are not all used for DATEX II data modelling. Further to the **selection** of UML modelling elements, this clause also provides requirements for DATEX II modelling regarding the **use** of these elements. Models that claim to comply with this specification may use these UML elements but shall comply with all provisions regarding the use of these elements. Annex B provides a brief introduction into the UML constructs used for DATEX II, although the authors recognise that there is plenty – presumably better – introductory material available to learn about UML in general and would like to refer the reader to these resources for further study.

Note that this clause no provisions are made regarding the existence and use of other UML elements. Thus, compliant models may use these other elements, but they have no defined semantics in the framework of this Technical Specification.

DATEX II compliant models may use the following metaclasses and metaattributes from the UML "Core" package:

— Class

- Class.name
- Class.isAbstract
- Class.feature
- Class.association
- Association
  - Association.connection
- AssociationEnd
  - AssociationEnd.name
  - AssociationEnd.aggregation
  - AssociationEnd.multiplicity
  - AssociationEnd.qualifier
  - AssociationEnd.participant

- Attribute
  - Attribute.name
  - Attribute.multiplicity
  - Attribute.type

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- Enumeration
  - Enumeration.name
- EnumerationLiteral
  - EnumerationLiteral.name
- Generalization

DATEX II compliant models may use the following metaclasses and metaattributes from the UML "Extension Mechanisms" package:

- Tagged Value
  - TaggedValue.name
  - TaggedValue.dataValue
- Stereotype
  - Stereotype.name

DATEX II compliant models may use the following metaclasses and metaattributes from the UML "Data Types" package: