

ILNAS

Institut luxembourgeois de la normalisation
de l'accréditation, de la sécurité et qualité
des produits et services

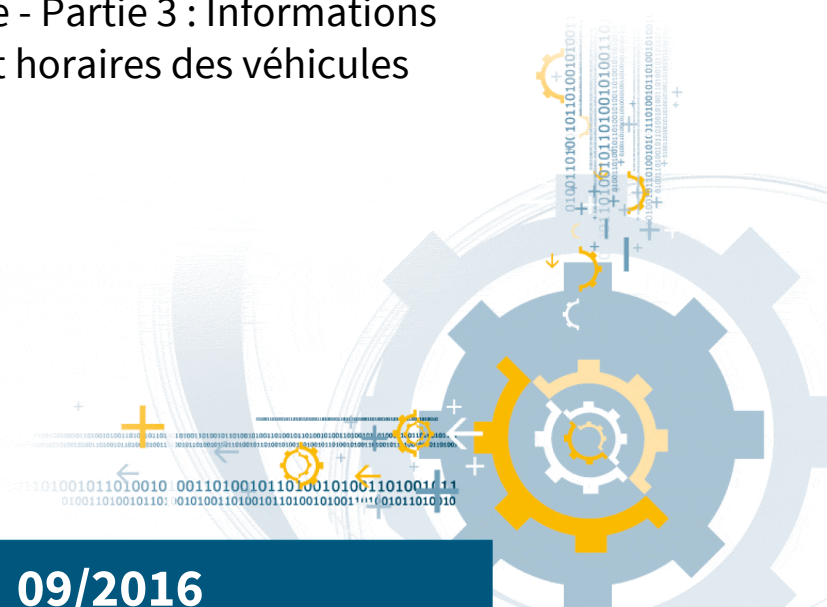
ILNAS-EN 12896-3:2016

Public transport - Reference data model - Part 3: Timing information and vehicle scheduling

Öffentlicher Verkehr -
Datenreferenzmodell - Teil 3:
Taktinformationen und
Fahrzeugdisposition

Transports publics - Modèle de données
de référence - Partie 3 : Informations
horaires et horaires des véhicules

09/2016



National Foreword

This European Standard EN 12896-3:2016 was adopted as Luxembourgish Standard ILNAS-EN 12896-3:2016.

Every interested party, which is member of an organization based in Luxembourg, can participate for FREE in the development of Luxembourgish (ILNAS), European (CEN, CENELEC) and International (ISO, IEC) standards:

- Participate in the design of standards
- Foresee future developments
- Participate in technical committee meetings

<https://portail-qualite.public.lu/fr/normes-normalisation/participer-normalisation.html>

THIS PUBLICATION IS COPYRIGHT PROTECTED

Nothing from this publication may be reproduced or utilized in any form or by any mean - electronic, mechanical, photocopying or any other data carries without prior permission!

English Version

Public transport - Reference data model - Part 3: Timing information and vehicle scheduling

Télématique du transport routier et de la circulation -
Modèle de données de référence - Partie 3 :
Informations horaires et horaires des véhicules

Öffentlicher Verkehr - Datenreferenzmodell - Teil 3:
Taktinformationen und Fahrzeugdisposition

This European Standard was approved by CEN on 5 May 2016.

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, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and United Kingdom.



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

CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

Contents

Page

European foreword.....	3
Introduction	4
1 Scope	5
1.1 General scope of the Standard.....	5
1.2 Functional domain description.....	6
1.3 Particular scope of this document	6
2 Normative references.....	7
3 Terms and definitions	7
4 Symbols and abbreviations	7
5 Timing information and vehicle scheduling data domain	7
5.1 Introduction	7
5.2 Overview	8
5.2.1 Model and document structure.....	8
5.3 Journey and journey times	8
5.3.1 Vehicle journey	8
5.3.2 Service journey	11
5.3.3 Time demand times.....	14
5.3.4 Journey timing.....	16
5.3.5 Journey pattern times.....	19
5.3.6 Vehicle journey times.....	21
5.3.7 Interchange	25
5.3.8 Interchange rule	28
5.3.9 Coupled journey	29
5.3.10 Flexible service	36
5.3.11 Journey accounting.....	38
5.4 Dated journey – Conceptual model.....	39
5.5 Passing times	40
5.5.1 Passing times	40
5.6 Vehicle scheduling	42
5.6.1 Tactical resource planning.....	42
5.6.2 Resources for tactical planning.....	43
5.6.3 Vehicle service	43
5.7 Vehicle journey assignments	49
5.7.1 Train component label assignment.....	49
5.7.2 Stopping position assignment	50
5.8 Explicit frames.....	52
5.8.1 Timetable frame	52
5.8.2 Vehicle schedule frame	52
Bibliography.....	85

European foreword

This document (EN 12896-3:2016) has been prepared by Technical Committee CEN/TC 278 “Transmodel”, 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 March 2017, and conflicting national standards shall be withdrawn at the latest by March 2017.

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 together with documents EN 12896-1:2016 and EN 12896-2:2016 supersedes EN 12896:2006.

The series composed of the following documents:

Public transport - Reference data model - Part 1: Common concepts

Public transport - Reference data model - Part 2: Public transport network

Public transport - Reference data model - Part 3: Timing information and vehicle scheduling

Public transport - Reference data model - Part 4: Operations monitoring and control

Public transport - Reference data model - Part 5: Fare management

Public transport - Reference data model - Part 6: Passenger information

Public transport - Reference data model - Part 7: Driver management

Public transport - Reference data model - Part 8: Management information and statistics

Together these create version 6 of the European Standard EN 12896, known as “Transmodel” and thus replace Transmodel V5.1.

The split into several documents intends to ease the task of users interested in particular functional domains. Modularisation of Transmodel, undertaken within the NeTEx project, has contributed significantly to this new edition of Transmodel.

In addition to the eight Parts of this European Standard, an informative Technical Report (Public transport – Reference data model – Informative documentation) is also being prepared to provide additional information to help those implementing projects involving the use of Transmodel. It is intended that this Technical Report will be extended and republished as all the eight parts are completed.

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, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

Introduction

EN 12896-3 presents the following items:

- rationale for the Transmodel Standard;
- use of the Transmodel Standard;
- applicability of the Transmodel Standard;
- conformance statement;
- Transmodel origins;
- reference to the previous version and other documents.

The data structures represented in EN 12896-1 are generic patterns that are referenced by different other parts.

EN 12896-2 presents space-related data structures.

This European Standard presents time-related data structures and replaces the sections of EN 12896:2006 referring to the *time-related* tactical planning components and to vehicle scheduling.

1 Scope

1.1 General scope of the Standard

The main objective of the present standard is to present the reference data model for public transport, based on:

- the reference data model, EN 12896, known as Transmodel V5.1;
- EN 28701, known as IFOPT;

incorporating the requirements of:

- EN 15531-1 to -3 and CEN/TS 15531-4 and CEN/TS 15531-5, *Service interface for real-time information relating to public transport operations (SIRI)*;
- CEN/TS 16614-1 and CEN/TS 16614-2, *Network and Timetable Exchange (NeTEx)*, in particular, the specific needs for long distance train operation.

A particular attention is drawn to the data model structure and methodology:

- the data model is described in a modular form in order to facilitate the understanding and the use of the model;
- the data model is entirely described in UML.

In particular, a Reference Data Model kernel is described, referring to the data domain:

- network description: routes, lines, journey patterns, timing patterns, service patterns, scheduled stop points and stop places.

This part corresponds to the Transmodel V5.1 network description extended by the IFOPT relevant parts.

Furthermore, the following functional domains are considered:

- timing information and vehicle scheduling (runtimes, vehicle journeys, day type-related vehicle schedules);
- passenger information (planned and real-time);
- fare management (fare structure, sales, validation, control);
- operations monitoring and control: operating day-related data, vehicle follow-up, control actions;
- management information and statistics (including data dedicated to service performance indicators);
- driver management:
 - driver scheduling (day-type related driver schedules);
 - rostering (ordering of driver duties into sequences according to some chosen methods);
 - driving personnel disposition (assignment of logical drivers to physical drivers and recording of driver performance).

The data modules dedicated to cover most functions of the above domains will be specified.

Several concepts are shared by the different functional domains. This data domain is called “common concepts”.

1.2 Functional domain description

The different functional domains taken into account in the present standard and of which the data have been represented as the reference data model are described in “Public transport reference data model - part 1: Common concepts”.

They are:

- public transport network and stop description;
- timing information and vehicle scheduling;
- passenger information;
- fare management;
- operations monitoring and control;
- management information;
- personnel management: driver scheduling, rostering, personnel disposition.

The aspects of multi-modal operation and multiple operators’ environment are also taken into account.

1.3 Particular scope of this document

The present European Standard entitled “Reference data model for public transport – Part 3: Timing information and vehicle scheduling” incorporates:

- journey and journey times model: describes the time-related information at the level of vehicle journeys, i.e. planned timing for the vehicles at day-type level;
- dated journey model: describes the link of the timing information for a single operating day and the day type related timing;
- passing times model: describes all the different types of passing times for the day type related information;
- vehicle service model: describes the information related the work of vehicles as planned for days types. it constitutes the main part of the vehicle scheduling data domain;
- vehicle journey assignment model: describes operational assignments (advertised vehicle labels, stopping positions) related to particular vehicle journeys.

This document itself is composed of the following parts:

- main document (normative) representing the data model;
- Annex A (normative), containing the data dictionary and attributes tables, i.e. the list of all the concepts present in the main document together with the definitions;
- Annex B (informative), indicating the data model evolutions.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 12896-1:2016, *Public transport - Reference data model - Part 1: Common concepts*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 12896-1:2016 apply.

4 Symbols and abbreviations

AVM	Automated vehicle monitoring
AVMS	Automated vehicle management system
IFOPT	Identification of fixed objects in public transport
ISO	International standards organization
IT	Information technology
NeTEx	Network and Timetable Exchange
PT	Public transport
PTO	Public transport operator
SIRI	Service interface for real-time information
UML	Unified modelling language
URI	Uniform resource identifier
URL	Universal resource locator

5 Timing information and vehicle scheduling data domain

5.1 Introduction

The work of the vehicles necessary to provide the service offer advertised to the public consists of service journeys and dead runs (unproductive journeys are necessary to transfer vehicles where they are needed, mainly from the depot into service and vice versa). Vehicle journeys are defined for day types rather than individual operating days. A day type is a classification of all operating days for which the same service offer has been planned. The whole tactical planning process is seen on the level of day types in the reference data model, with all entities necessary to develop schedules. These include a series of entities describing different types of run times and wait times, scheduled interchanges, turnaround times etc.

Chaining vehicle journeys into blocks of vehicle operations, and cutting driver duties from the vehicle blocks, are parts of the main functions of vehicle scheduling and driver scheduling, respectively. The corresponding entities and relationships included in the reference data model allow a comprehensive description of the data needs associated with this functionality, independently of the particular methods and algorithms applied by the different software systems.