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Javni prevoz - Referenčni podatkovni model - 7. del: Upravljanje voznikov

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

Öffentlicher Verkehr - Referenzdatenmodell - Teil 7: Fahrermanagement

Transports publics - Modèle de données de référence - Partie 7 : Gestion des conducteurs

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35.240.60	Uporabniške rešitve IT v prometu	IT applications in transport

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EUROPEAN STANDARD
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EN 12896-7

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Supersedes EN 12896-7:2019

English Version

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

Transports publics - Modèle de données de référence - Partie 7 : Gestion des conducteurs

Öffentlicher Verkehr - Referenzdatenmodell - Teil 7: Fahrermanagement

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

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Ref. No. EN 12896-7:2026 E

Contents

Page

European foreword

This document (EN 12896-7:2025) 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of an identical text or by endorsement, at the latest by January 2027, and conflicting national standards shall be withdrawn at the latest by January 2027.

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 12896-7:2019

This document is part of the European standard EN 12896, known as “Transmodel”. This European standard is a series of documents that comprises of the following ones:

- EN 12896-1 Public transport - Reference data model - Part 1: Common concepts,
- EN 12896-2 Public transport - Reference data model - Part 2: Public transport network,
- EN 12896-3 Public transport - Reference data model - Part 3: Timing information and vehicle scheduling,
- EN 12896-4 Public transport - Reference data model - Part 4: Operations monitoring and control,
- EN 12896-5 Public transport - Reference data model - Part 5: Fare management,
- EN 12896-6 Public transport - Reference Data model - Part 6: Passenger information,
- EN 12896-7 Public transport - Reference data model - Part 7: Driver management,
- EN 12896-8 Public transport - Reference data model - Part 8: Management information and statistics,
- EN 12896-10 Public transport – Reference data model – Part 10: Alternative modes.

Together these documents create Transmodel version 6.2 and thus replace Transmodel V6.0.

In addition to the nine normative Parts of this European Standard, a Technical Report (Public Transport – Reference Data Model – Informative Documentation) was published in 2016 under the reference CEN/TR 12896-9. It provides 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 soon as all the normative parts are revised.

The split into several documents is intended to ease the task of users interested in particular functional domains. It corresponds to the modularisation of Transmodel into functionally related parts, each made up of distinct UML packages and subpackages that describe a particular aspect of public transport. The NeTEx UML model follows the same modularisation, allowing a direct mapping from the conceptual model to the implementation.

Annex C provides details of the significant technical changes between this document and EN 12896-7:2019

For information on the conventions, methodology and notations for conceptual modelling, for a clear overview to help understand the core principles, structure and purpose of Transmodel, and for information on the Functional domains and Modes of operation, refer to EN 12896-1.

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

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, 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.

1 Scope

This document is composed of the following data packages:

— Driver;

— Driver Schedule;

— Rostering;

— Personnel Disposition;

— Driver Control Action.

This document itself is composed of the following parts:

— main document representing the data model for the concepts shared by the different domains covered by Transmodel (normative);

— Annex A containing the data dictionary and attribute tables, i.e., the list of all the concepts presented in the main document together with their definitions (normative);

— Annex B presenting the model evolution (informative).

— Annex C, providing details of the significant technical changes between this document and EN 12896-7:2019 (informative)

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

3 Terms, definitions and abbreviations

3.1 Terms and definitions

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

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp/

— IEC Electropedia: available at https://www.electropedia.org/

3.1
relief
person taking the place of another person as responsible for a certain task (such as driving a bus)

3.2
roster
plan showing turns of duty or leave for individuals in an organization

3.2 Abbreviations

API	Application Programming Interface
GIS	Geographical Information System
GPS	Global Positioning System
HTTP	Hypertext Transfer Protocol
IFOPT	Identification of Fixed Objects in Public Transport
ISO	International Standards Organisation
IT	Information Technology
NeTEx	Network and Timetable Exchange
PT	Public Transport
OJP	Open API for Distributed Journey Planning
OpRa	Operating Raw Data and statistics exchange
SIRI	Service Interface for Real-time Information
TM	Transmodel
UML	Unified Modelling Language
URI	Uniform Resource Identifier
URL	Universal Resource Locator

4 General information

The following standards series are based on the Transmodel conceptual data model for public transport domain to provide a harmonized, interoperable, and consistent approach for public transport data, service interfaces, and journey planning across Europe.:

- EN 15531 Series [11–17] – Service interfaces for real-time public transport operations.
- CEN/TS 16614 Series (NeTEx) [18–23] – Network and timetable data exchange, including passenger information and accessibility.
- CEN/TS 17118 [24] – Open API for distributed journey planning.

5 Driver Management

5.1 Introduction

The description of driver management is divided into three main parts.

The first main part concerns *driver scheduling*, in essence creating the day-type related driver schedules where the required work is divided into duties that represents a set of work to be performed by one driver on one day.

The second main part concerns *rostering*, describing how the driver duties are ordered into sequences, according to some chosen method, to obtain a starting point for a balanced work share among the personnel over the planning period.

The third main part is the *personnel disposition*, describing how physical drivers are assigned to do the work of a logical driver. This part also covers the recording of driver performance.

Additionally, there are clauses concerning *driver*, *driver trip* and *driver control actions*.

5.2 Driver

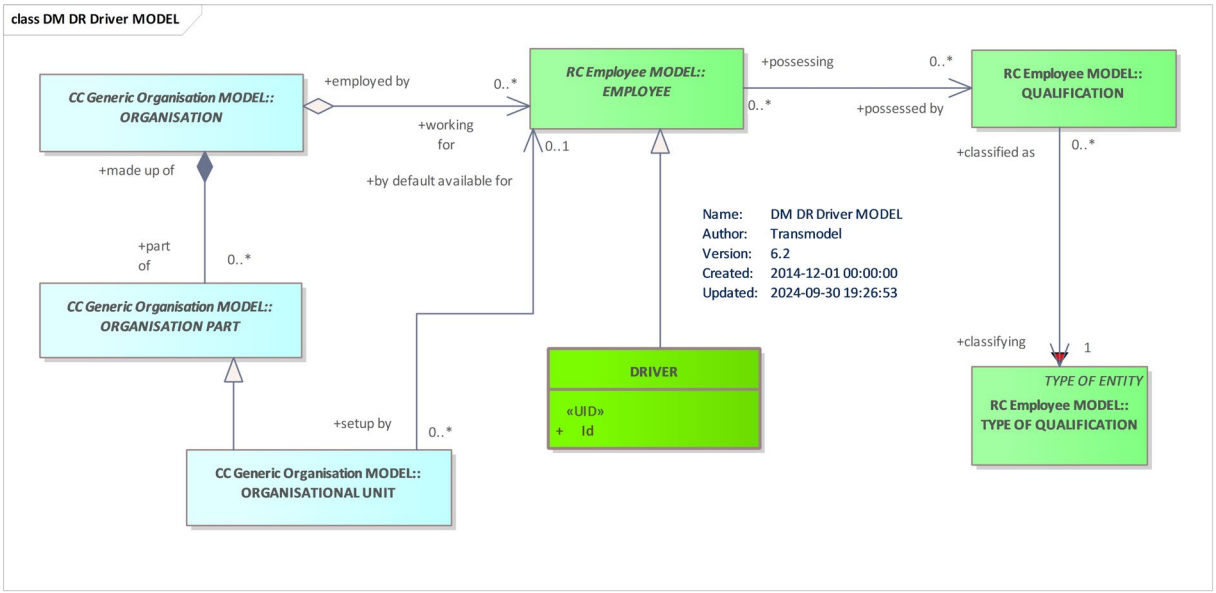

Figure 1 – Driver MODEL

The DRIVER entity describes a physical driver, who is an EMPLOYEE (see EN 12896-1, Public transport - Reference data model - Part 1: Common concepts) of the public transport organisation. A DRIVER may have one or more QUALIFICATIONs of different TYPEs OF QUALIFICATION, for example driving licences for different categories of vehicle, accessibility assistance training, etc.

Note that in the first stages of the planning process there are no direct references to the DRIVER (i.e. the physical driver). Instead, a theoretical LOGICAL DRIVER is used during planning. And, later on, there will be a separate assignment of which DRIVER (physical driver) shall perform the duties specified for a certain LOGICAL DRIVER.

5.3 Driver scheduling

5.3.1 General remarks

Driver scheduling involves the construction of driver DUTies to cover the scheduled SERVICE JOURNEYs (see EN 12896-3, Public transport - Reference data model - Part 3: Timing Information and Vehicle Scheduling) at minimum cost. This process shall also give DRIVERs fair workloads, which comply with the law and with the agreements made between the company and, for example, driver unions. There are numerous parameters, such as maximum length of driving time allowed without a break, which will be essential input for the driver scheduling algorithm. These are not included in the reference model, because they do not have a complex structure or relationships to the data model entities but are simple values.

In many cases, BLOCKs (see EN 12896-3, Public transport - Reference data model - Part 3: Timing Information and Vehicle Scheduling) will already be compiled before the start of the driver scheduling process and will be used as input. However, schedulers do not always want to work in that order; the model allows DUTies to be entered into the system before pieces of vehicle work have been assigned to them.

5.3.2 Duties

5.3.2.1 Duties components

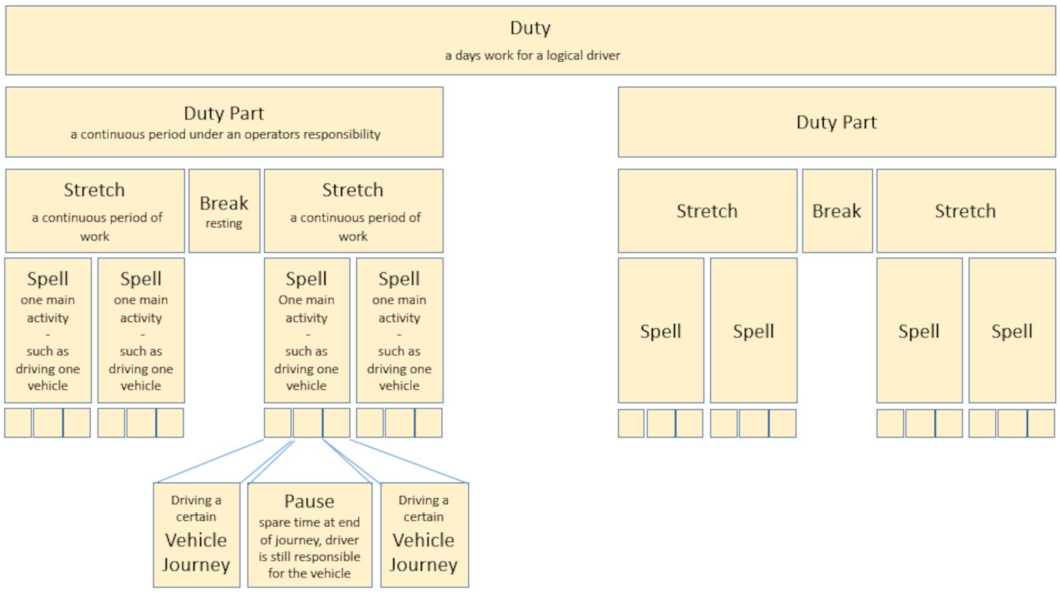

Figure 2 – Simplified overview of the main concepts in a duty in relation to a driver

A DUTY describes a day's work for a LOGICAL DRIVER on one DAY TYPE. A DUTY may be a SPARE DUTY, in which case no specific work has yet been assigned to it, or an ASSIGNED DUTY, which is composed of a hierarchy of components.

Operators and applications use various DUTY component levels. The reference model includes more levels than any one organisation is likely to want, to support these existing ways of structuring the data. Some of these levels may only be used within the driver scheduling package and will not be needed in an organisation database. They are included in the model because they explain the relationships between entities that will be in such an organisation database.

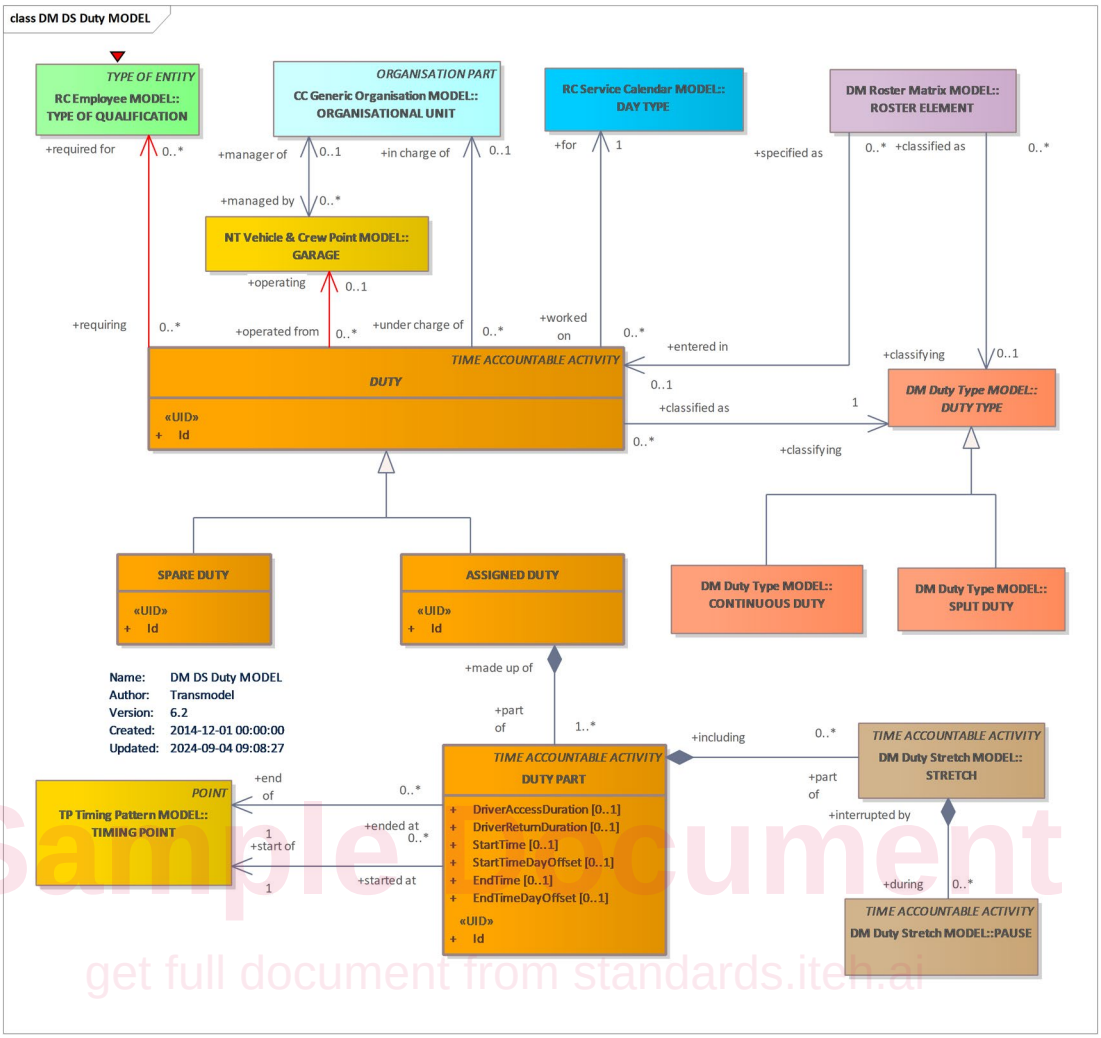

Figure 3 – Duty MODEL

An ASSIGNED DUTY may be divided into one or two (or sometimes even more) DUTY PARTs, which are each bounded by sign on and sign off. A DUTY consisting of two DUTY PARTs is commonly known as a "split" duty. A DUTY PART is a continuous period during which the driver is under the responsibility of the OPERATOR (see EN 12896-1, Public transport - Reference data model - Part 1: Common concepts). In many organisations, a DUTY PART is therefore a continuous paid period as well.

As a DUTY PART may last a relatively long time, they often include breaks planned for driver resting. Each DUTY PART is composed of one or several STRETCHes, which are continuous period of work not interrupted by any BREAK. A BREAK shall therefore follow a STRETCH and is included in the corresponding DUTY PART.

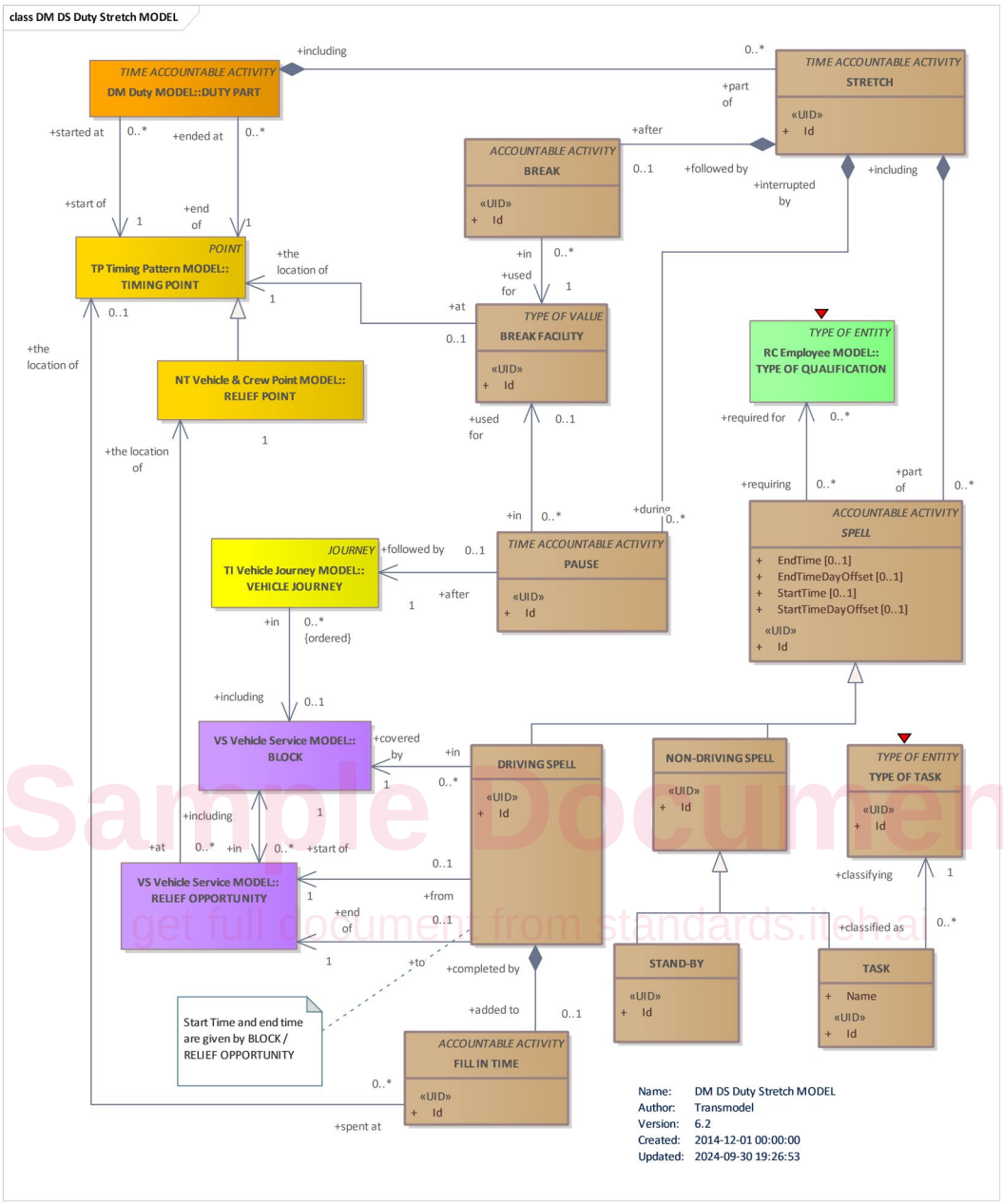

Figure 4 – Duty Stretch MODEL

Each STRETCH is composed of one or several SPELLs. A SPELL describes a period during which the same main activity is to be performed (e.g. driving a vehicle, stand-by period etc.). SPELLs are subdivided into DRIVING SPELLs and NON-DRIVING SPELLs.

5.3.2.2 Driving spells

A DRIVING SPELL is a SPELL that is performed continuously on the same vehicle (i.e. the same BLOCK). A DRIVING SPELL is bordered by two actual reliefs, which are organised on appropriate RELIEF OPPORTUNITies (see EN 12896-3, Public transport - Reference data model - Part 3: Timing Information and Vehicle Scheduling). These RELIEF OPPORTUNITies are points in time and space (at RELIEF POINTs – see EN 12896-2, Public transport - Reference data model - Part 2: Public transport network topology) in the same particular BLOCK.

In principle, the first DRIVING SPELL covering a BLOCK starts with a relief involving only the driver taking charge of the vehicle from the PARKING POINT (see EN 12896-2, Public transport - Reference data model - Part 2: Public transport network topology). By contrast, the last DRIVING SPELL covering a BLOCK involves only the last driver. In between, reliefs concern both a relieved driver and a relieving driver.

The RELIEF OPPORTUNITY entity, relating a BLOCK to a DRIVING SPELL, is a crucial concept to associate the work of LOGICAL VEHICLEs (vehicle schedules) and the work of LOGICAL DRIVERs (driver schedules). In a real implementation, those RELIEF OPPORTUNITies that are chosen for actual reliefs may be flagged as being related to an actual DRIVING SPELL. However, other (unused) RELIEF OPPORTUNITies may remain of interest for real-time control, in case of duty modification.

The VEHICLE JOURNEYs (and SPECIAL SERVICEs) to be covered by each DRIVING SPELL can be derived from the other data. A DRIVING SPELL is bounded by two RELIEF OPPORTUNITies on the same BLOCK. All the VEHICLE JOURNEYs in that BLOCK, between the start and the end RELIEF OPPORTUNITies, will be driven by the driver who has to work that DRIVING SPELL.

Some relief opportunities are organised during a VEHICLE JOURNEY, at an intermediate RELIEF POINT. In such a case, only a part of the journey belongs to each (relieved or relieving) DRIVING SPELL. In a real implementation, such characteristics may be implemented using redundant JOURNEY PARTs (see EN 12896-3, Public transport - Reference data model - Part 3: Timing Information and Vehicle Scheduling).

DRIVING SPELLs may include PAUSEs planned in the covered BLOCK, after a VEHICLE JOURNEY (see EN 12896-3, Public transport - Reference data model - Part 3: Timing Information and Vehicle Scheduling).

5.3.2.3 Breaks and pauses

Drivers cannot work continuously for long periods of time and shall be given BREAKs. The length of work periods without any BREAK, as well as the length of BREAKs, is a matter of legal requirement and agreement between the organisation and the unions.

A BREAK is defined as a period of time, during which the driver is still under the responsibility of the organisation (and normally still paid), devoted only to resting.

BREAKs are identified by the STRETCH of work that they follow. BREAKs shall be arranged at a TIMING POINT (see EN 12896-2, Public transport - Reference data model - Part 2: Public transport network topology) where there is a BREAK FACILITY, with toilets and where meals and other refreshments may be available. The place of a BREAK FACILITY is often at a RELIEF POINT where another driver relieves the driver. In some cases, the driver may have to walk to another TIMING POINT, which is near to the RELIEF POINT and is a more suitable place to stay during a BREAK (for example a service area in a pedestrian zone).

BREAKs are deliberately built into the DUTies. PAUSEs, on the contrary, are spare times at the end of VEHICLE JOURNEYs which usually arise as a result of the vehicle scheduling process, but which may also be used as rest or refreshment time by drivers. A PAUSE can be organised if, for instance, the VEHICLE (see EN 12896-1, Public transport - Reference data model - Part 1: Common concepts) has a planned long waiting time at a PARKING POINT far from the centre of the city. In such a case, it is wiser to plan a PAUSE than to organise a relief. In some cases, PAUSEs may also be planned deliberately. They may be taken in a BREAK FACILITY, but the driver remains responsible for the VEHICLE during the PAUSE.

5.3.2.4 Time allowance and fill-in times

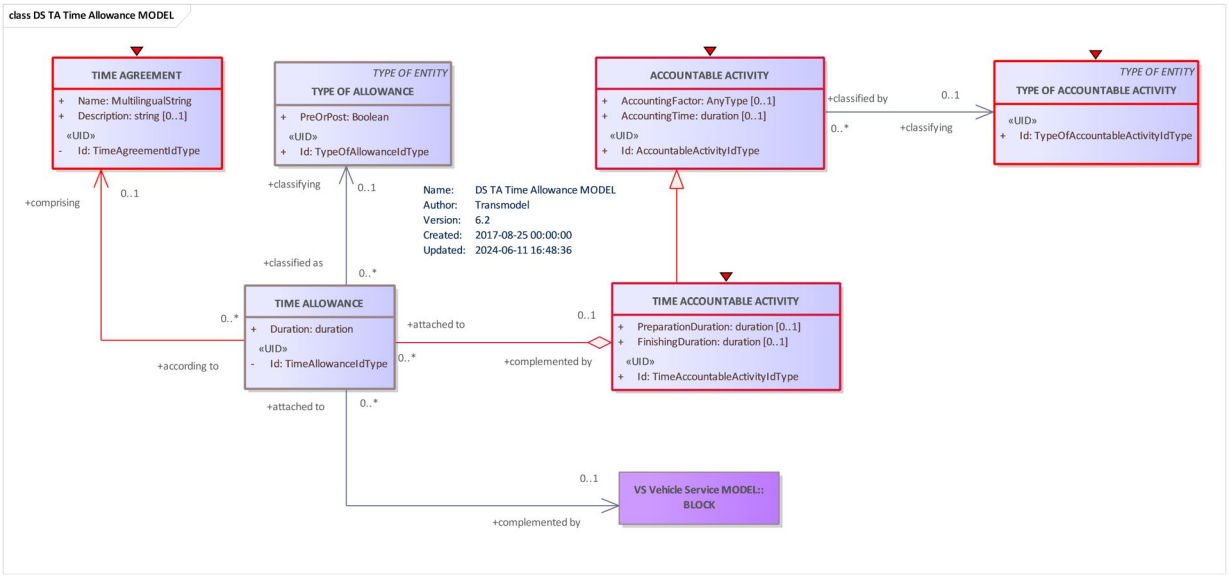

Figure 5 – Time Allowance MODEL

At the beginning or at the end of a BLOCK, DUTY, a DUTY PART, a STRETCH or a SPELL, a fixed time may be allowed to perform certain activities to prepare for or to complete the work regularly assigned to this element. These activities may include signing on or off, controlling the vehicle condition, cleaning or refuelling the vehicle, controlling the amount of cash, etc.

The total duration scheduled for preparation and finishing activities may, for each of the activities mentioned above, be recorded as a TIME ACCOUNTABLE ACTIVITY using the attributes, 'PreparationDuration' and/or 'FinishingDuration'.

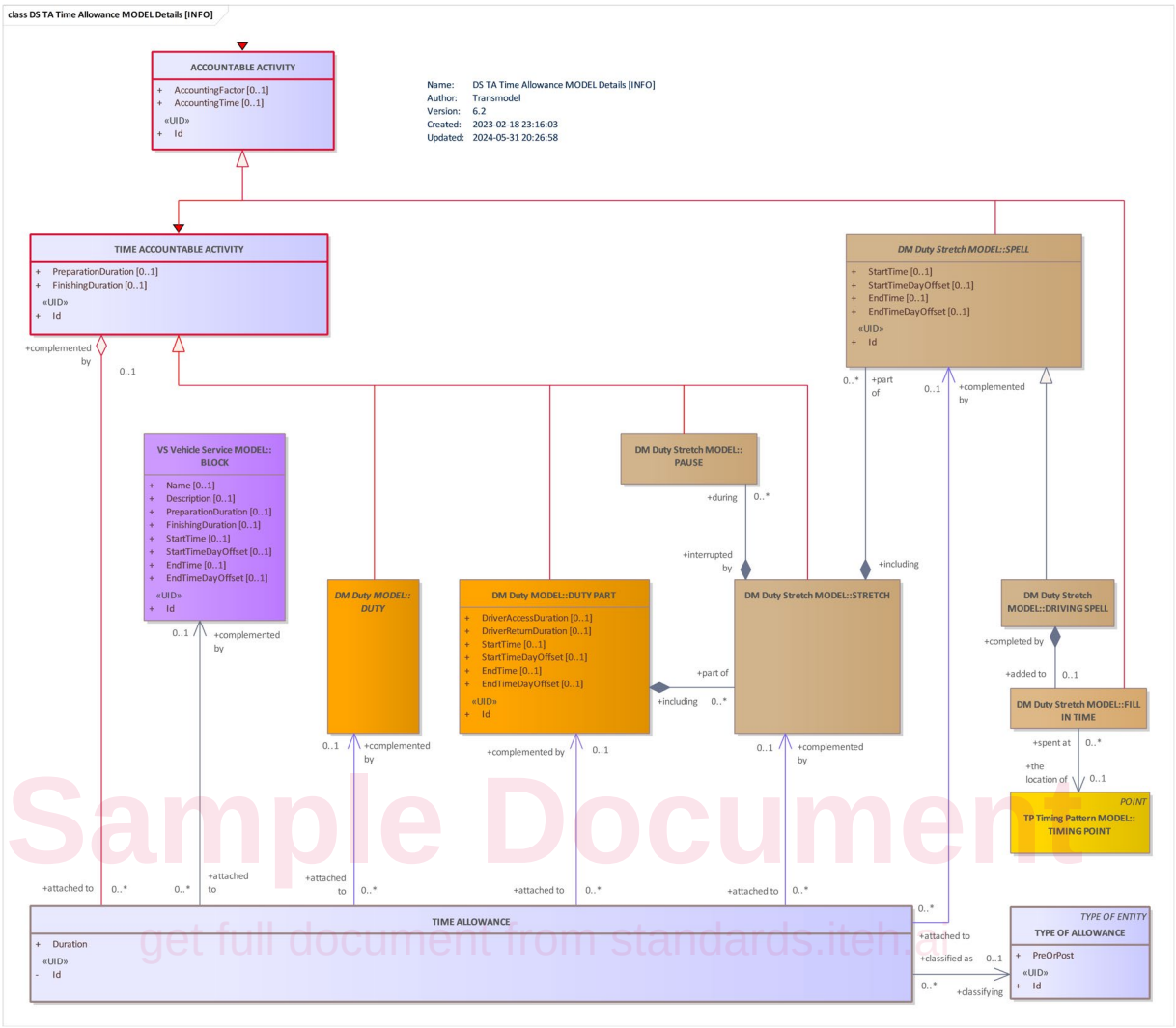

Figure 6– Time Allowance VIEW

Most operators need to classify such times in a more detailed way. One or several TIME ALLOWANCEs may be attached to a BLOCK, DUTY, a DUTY PART, a STRETCH or a SPELL. The TYPE OF ALLOWANCE permits these times to be classified according to the specific local conditions, and to express whether the TIME ALLOWANCE is applied at the beginning or at the end of the considered element.

FILL-IN TIMEs are similar to TIME ALLOWANCEs, but do not have any operational meaning. A FILL-IN TIME is a period of time, after a DRIVING SPELL, during which a driver is not assigned to any precise activity. It may be spent at a particular TIMING POINT. Such an extra time is allowed at the end of a SPELL for it to come up to an agreed minimum. It may be also a spare time resulting from the driver scheduling process.

The start and end times of any DUTY component shall embrace any attached 'PreparationDuration', 'FinishingDuration', TIME ALLOWANCE or FILL-IN TIME (see model diagram in subclause 5.3.1).

5.3.2.5 Start and end places of duty components

The start and end places of a DRIVING SPELL are RELIEF POINTs, which can be derived from the RELIEF OPPORTUNITies bordering that DRIVING SPELL.

The place of a NON-DRIVING SPELL is to be specified at a particular TIMING POINT.