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**Intelligente Verkehrssysteme –
DATEX II Datenaustauschspezifikation für Verkehrsmanagement und
Verkehrsinformationen –
Teil 7: Gemeinsame Datenelemente;
Englische Fassung EN 16157-7:2018**

Intelligent transport systems –
DATEX II data exchange specifications for traffic management and information –
Part 7: Common data elements;
English version EN 16157-7:2018

Systèmes de transport intelligents –
Spécifications DATEX II d'échange de données pour la gestion du trafic et l'information
routière –
Partie 7: Éléments de données communs;
Version anglaise EN 16157-7:2018

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DIN-Normenausschuss Automobiltechnik (NAAutomobil)

Nationales Vorwort

Dieses Dokument (EN 16157-7:2018) wurde vom Technischen Komitee CEN/TC 278 „Intelligente Verkehrssysteme“ ausgearbeitet, dessen Sekretariat von NEN (Niederlande) gehalten wird.

Das zuständige deutsche Normungsgremium ist der Gemeinschaftsarbeitsausschuss NA 052-02-71 GA „Gemeinschaftsarbeitsausschuss NAAutomobil/DKE, Intelligente Verkehrssysteme“ des DIN-Normenausschusses Automobiltechnik.

Diese Norm legt eine gemeinsame Menge von Datenaustausch Spezifikationen fest, um die Vision vom interoperablen Austausch von Verkehrs- und Reiseinformationsdaten über Grenzen hinweg zu ermöglichen.

Diese Norm basiert weiterhin auf einem Weißbuch der europäischen Kommission, welches die Koordination von Verkehrsmanagement und die Entwicklung von übergangslosen paneuropäischen Diensten festlegt.

Dieser Teil der Normenreihe beschäftigt sich mit gemeinsamen Datenelementen, die in mehr als nur einer Veröffentlichung verwendet werden. Die Norm legt wiederverwendbare Strukturen und Festlegungen von Informationen fest, die zu übertragbaren Informationen, die in den anderen Teilen dieser Normreihe beschrieben sind, ausgetauscht werden könnten. Die Elemente, die in diesem Dokument beschrieben werden, haben ihren eigenen gemeinsamen Namensraum.

Dieses Dokument enthält unter Berücksichtigung des DIN-Präsidialbeschlusses 1/2004 nur die englische Originalfassung von EN 16157-7:2018.

DIN EN 16157 besteht unter dem allgemeinen Titel *Intelligente Verkehrssysteme — DATEX II Datenaustauschspezifikation für Verkehrsmanagement und Verkehrsinformationen* aus folgenden Teilen:

- *Teil 1: Kontext und Rahmenwerk*
- *Teil 2: Ortsreferenzierung*
- *Teil 3: Publikation von Verkehrssituationen*
- *Teil 4: Veröffentlichungen Variable Verkehrszeichen (VMS)*
- *Teil 5: Gemessene und ausgearbeitete Datenveröffentlichungen*
- *Teil 7: Gemeinsame Datenelemente*

Für die in diesem Dokument zitierten internationalen Dokumente wird im Folgenden auf die entsprechenden deutschen Dokumente hingewiesen:

ISO 8601 siehe DIN EN ISO 8601

Änderungen

Gegenüber DIN CEN/TS 16157-1 (DIN SPEC 91269):2011-12 wurden folgende Änderungen vorgenommen:

- a) vordefinierte Modellelemente wurden aus Teil 1 in diesen Teil überführt.

Frühere Ausgaben

DIN CEN/TS 16157-1:2011-12

Nationaler Anhang NA (informativ)

Begriffe

Für die Anwendung dieses Dokuments gelten die Begriffe nach EN 16157-1 und die folgenden Begriffe.

ISO und IEC stellen terminologische Datenbanken für die Verwendung in der Normung unter den folgenden Adressen bereit:

- IEC Electropedia: unter <http://www.electropedia.org/>
- ISO Online Browsing Platform: unter <http://www.iso.org/obp>

3.1

Datenwert

(en: Data value)

Wert von etwas, das gemessen oder berechnet werden kann

3.2

Erweiterung

(en: Extension)

Datenmodellinhalt, der nicht Teil des DATEX II-Level-A-Modells ist, und der im Paket „Erweiterung“ (z. B. für projektspezifische Zwecke) ergänzt wird

3.3

Fehler

(en: Fault)

Information über eine Fehlfunktion bezogen auf eine spezifische Systemkomponente oder einen Prozess

3.4

allgemeine Publikation

(en: Generic publication)

DATEX-II-Publikation ohne vordefinierten Inhalt, welche für Erweiterungen auf Publikationsebene verwendet wird

3.5

veröffentlichte Auslastung

(en: Payload publication)

verkehrsbezogene Information oder zugeordnete Betriebsinformation, die zu einem festen Zeitpunkt erstellt und über die DATEX-II-Schnittstelle übertragen wurde

Anmerkung 1 zum Begriff: Die Klasse „Veröffentlichte Auslastung“ ist die obere Ebene der Stammklasse für DATEX-II-Level-A.

3.6

Gültigkeit

(en: Validity)

spezifizierter Zeitraum, in dem die ausgetauschten DATEX-II-Informationen gültig sind

3.7

Wetterdaten

(en: Weather data)

Informationssammlung bezogen auf gemessene oder abgeleitete (normalerweise transportbezogene) Wetterbedingungen an einem festgelegten Ort

3.8

Fahrzeugeigenschaften

(en: Vehicle characteristics)

Parametersammlung, die ein Fahrzeug beschreiben

Nationaler Anhang NB (informativ)

Literaturhinweise

DIN ISO 8601 — Datenelemente und Austauschformate — Informationsaustausch — Darstellung von Datum und Uhrzeit (ISO 8601:2004)

— Leerseite —

English Version

Intelligent transport systems - DATEX II data exchange
specifications for traffic management and information -
Part 7: Common data elements

Systèmes de transport intelligents - Spécifications
DATEX II d'échange de données pour la gestion du
trafic et l'information routière - Partie 7: Éléments de
données communs

Intelligente Verkehrssysteme - DATEX II
Datenaustauschspezifikation für Verkehrsmanagement
und Verkehrsinformationen - Teil 7: Gemeinsame
Datenelemente

This European Standard was approved by CEN on 3 September 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.

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

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

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European foreword

This document (EN 16157-7:2018) 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 June 2019, and conflicting national standards shall be withdrawn at the latest by June 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.

Together with EN 16157-1, this document will supersede CEN/TS 16157-1:2011.

EN 16157-7 is part of a multi-part standard under the general title *Intelligent transport systems — DATEX II data exchange specifications for traffic management and information*.

It covers the pre-defined model elements in the 'Common' namespace.

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, communications specification.

This European Standard supports a methodology that is extensible.

This part of EN 16157 is targeted to deal with the common data elements that are used in more than one publication. It specifies reused structures and definitions of information that may be exchanged to convey information described in the other parts of this EN. The elements described in this document have their own namespace "Common".

1 Scope

This document 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 data content, data structure and relationships, communications specification.

This document 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 document 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 document can be applicable for use by other actors.

This document 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,
- information about operator initiated actions – including both advisory and mandatory measures,
- 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 EN 16157 specifies common informational structures, relationships, roles, attributes and associated data types required for publishing information within the DATEX II framework. This is specified as a DATEX II sub-model which is part of the DATEX II platform independent model, but this part only covers common elements that are used by more than one publication. It excludes those elements that relate to location information which are specified in FprEN 16157-2.

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

ISO 639-1, *Codes for the representation of names of languages — Part 1: Alpha-2 code*

ISO 8601:2004, *Data elements and interchange formats — Information interchange — Representation of dates and times*

ISO/IEC 10646, *Information technology — Universal Coded Character Set (UCS)*

3 Terms and definitions

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

Data value

value of something that can be measured or calculated

3.2

Extension

data model content that is not part of the DATEX II Level A model and that is added in the container package “Extension” (e.g. for project specific purposes)

3.3

Fault

information about a malfunction relating to a specific piece of equipment or process

3.4

Generic publication

DATEX II publication without predefined content used to make extensions at the publication level

3.5

Payload publication

traffic related information or associated management information created at a specific point in time that can be exchanged via a DATEX II interface

Note 1 to entry The “PayloadPublication” class is the top level root class for DATEX II Level A.

3.6

Validity

time period specification for which the exchanged DATEX II information is valid

3.7

Weather data

collection of information related to measured or derived (usually transport related) weather conditions at a specified location

3.8

Vehicle characteristics

collection of parameters that characterize a vehicle

4 Symbols and abbreviations

GUID – Globally Unique Identifier

UML – Unified Modelling Language

XML – eXtensible Markup Language

XSD – XML Schema Definition

5 Conformance

The DATEX II platform independent data model of which the common data sub-model is a part, 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.

It is in principle possible to create models in accordance to EN 16157-1:2018, Clauses 6 and 7 (general and platform independent model related clauses) – even including the mapping to XML Schema Definition described in EN 16157-1:2018, A.3 – that do not comply with Clause 6 'Predefined model elements' of this document. Nevertheless, note that such a model cannot claim full compliance with this European Standard and thus shall not work with tools requiring full compliance.

6 Predefined model elements

6.1 General

Besides regulations for the use of UML constructors and a UML profile providing additional meta information via tagged values and stereotypes, the DATEX II modelling methodology furthermore stipulates a certain top-level model structure for all compliant UML models. These clauses are mainly motivated by the need to create a well-defined structure for DATEX II tools aiming at supporting users.

The types of attributes 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.

6.2 Top level model packages and classes

The following rules apply for top level model packages and classes:

- a) DATEX II compliant UML models shall have one single top-level UML package named “D2Payload” of stereotype “D2Namespace”.
- b) The DATEX II top level package “D2Payload” shall have four sub-packages with the following names:
 - “Common” of stereotype “D2Namespace”;
 - “Extension” of stereotype “D2Namespace”;
 - “LocationReferencing” of stereotype “D2Namespace”;
 - “PayloadPublication” of stereotype “D2Package”.
- c) The “PayloadPublication” package may contain several sub-packages of stereotype “D2Namespace”. EN 16157-3 specifies the sub-package “Situation” and its content. The standardization of further sub-packages may follow in the future.
- d) The usage of the “Extension” package for creating customized DATEX extensions is specified in EN 16157-1.
- e) The “Common” package shall have three sub-packages with the following names:
 - “Classes” of stereotype “D2Package” – see Clause 7;
 - “DataTypes” of stereotype “D2Package” – see 6.3;
 - “Enumerations” of stereotype “D2Package” – see 6.4;

The further content of these packages is specified in the further chapters of this document.

- f) The “Common::Classes” package shall contain one abstract UML Class named “PayloadPublication” of stereotype “D2ModelRoot”. It may contain further packages and classes.
- g) The tagged value “rootElement” of the DATEX II class “PayloadPublication” shall be set to “payload”.
- h) The tagged value “modelBaseVersion” of the DATEX II class “PayloadPublication” shall be set to “3” which is current DATEX II model version identifier. The tagged value “version” of the DATEX II class “PayloadPublication” shall be set to “3.n” where “n” is the minor version number.

NOTE The model base version “3” denotes the third iteration of the second generation of DATEX specifications, denoted “DATEX II”. The Arabic version number “3” is not to be mixed up with the Roman “II” used to give this generation a name that distinguishes it from the EDIFACT-based “DATEX” standard developed in the 1990ies, finally resulting in the meanwhile withdrawn ENV 13106:2000 and ENV 13777:2000.

- i) The tagged values “extensionName” and “extensionVersion” of the DATEX II class “Payload Publication” shall contain the name of the extension(s) contained in the model and a corresponding version identifier in the case that the “Extension” package is non-empty. These values shall be provided by the creator of the model (see also Figure 1).

The tagged values “profileName” and “profileVersion” of the DATEX II class “Payload Publication” shall contain the name of the profile (sub-model) and a corresponding version identifier in the case a profile is derived from the model. These values shall be provided by the creator of the model - see also Figure 1.

These rules provide a well-defined entry structure into a DATEX II XML publication, which always starts at top level with one concrete instance of a class specialized from “PayloadPublication”.

Tag	Value
definition	A payload publication of traffic related information or associated management information created at a specific point in time that can be exchanged via a DATEX II interface.
extensionName	
extensionVersion	
modelBaseVersion	3
profileName	
profileVersion	
regulatoryContext	
rootElement	payload
version	3.0 (minor version is exemplary only)

Figure 1 — Tagged Values of top level class “PayloadPublication”

- j) The class “PayloadPublication” shall have the following structure:

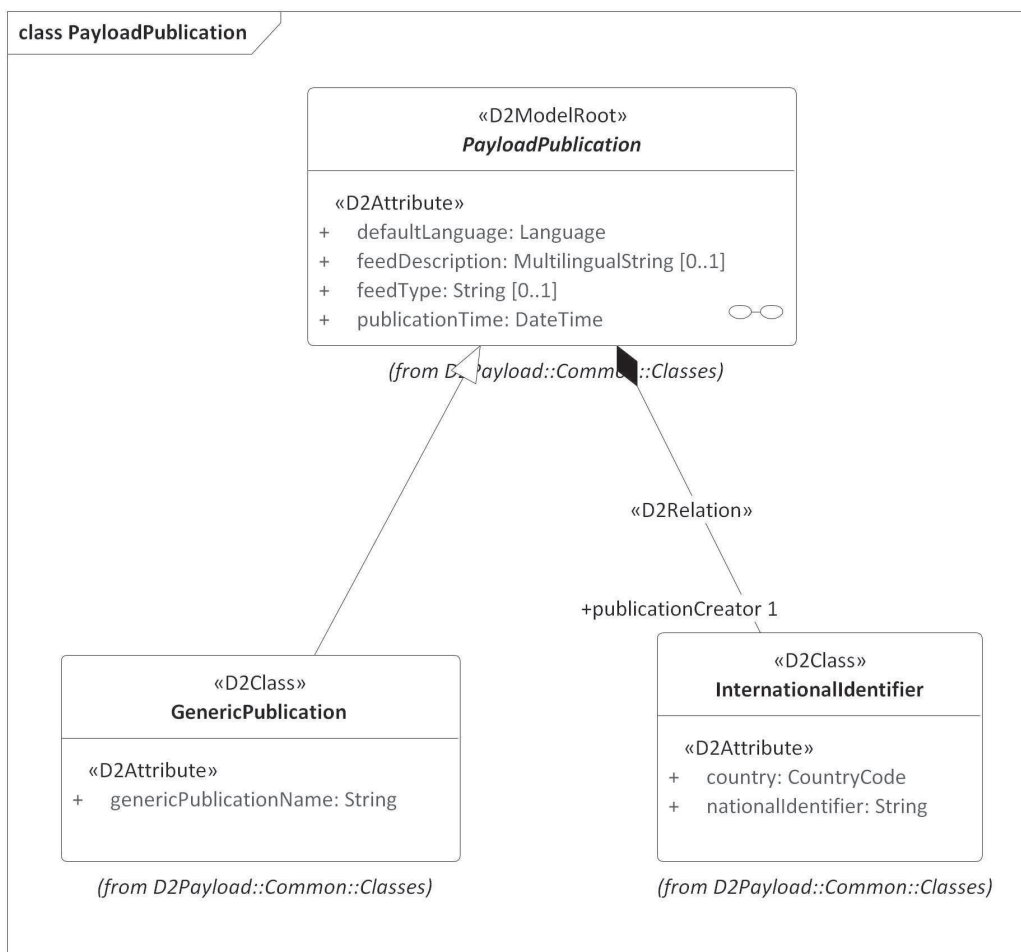


Figure 2 —Top level class “PayloadPublication”

The class “PayloadPublication” shall have a “D2Relation” composition to the “InternationalIdentifier” class.

The “GenericPublication” class (see Figure 2) is a specific realizable case of a “PayloadPublication” and used to make level B extensions at the publication level. Its attribute “genericPublicationName” is used to specify a name for any level B extended publication.

The “InternationalIdentifier” class (see Figure 2) shall provide an identifier/name whose range is specific to the particular country.

NOTE The possible upper-case two-letter codes related to the “country” attribute of class “InternationalIdentifier” are specified in EN ISO 3166-1 and can be obtained from the Online Browsing Platform of ISO¹.

- k) The “DataTypes” package shall have two sub-packages named “Generic” and “Specific” of stereotype “D2Package”.

¹ <https://www.iso.org/obp/ui/#search/code/>.

6.3 Basic datatypes

The “DataTypes::Generic” package (as defined in 6.2 k)) shall contain the following classes of stereotype “D2Datatype”:

- “Base64Binary”, “Boolean”, “Date”, “DateTime”, “Decimal”, “Double”, “Float”, “Integer”, “Language”, “LongString”, “MultilanguageString”, “NonNegativeInteger”, “Reference”, “String”, “Time”, “Url”, “VersionedReference”.

According definitions and XML Schema Definition mappings for these datatypes are described in A.3.

The “DataTypes::Specific” package (as defined in 6.2 k)) shall contain the following classes of stereotype “D2Datatype”:

- “AngleInDegrees”, “AxlesPerHour”, “ConcentrationKilogramsPerCubicMetre”, “Concentration-MicrogramsPerCubicMetre”, “CountryCode”, “CubicMetres”, “Hectopascal”, “IntensityKilogramsPer-SquareMetre”, “IntensityMillimetresPerHour”, “KilometresPerHour”, “MetresAsFloat”, “MetresAs-NonNegativeInteger”, “Percentage”, “Seconds”, “TemperatureCelsius”, “Tonnes”, “VehiclesPerHour”, “Year”.

According definitions and XML Schema Definition mappings for these datatypes are described in A.3.

The datatype “MultilingualString” shall represent text that can be defined in more than one language. For this reason, it shall be defined as an unbounded sequence of pairs of “value” and “lang”, with “value” representing a string of max. length 1 024 characters and “lang” representing a language. The corresponding XML Schema definition mapping can be found in B.3 (see in “Common.xsd” the complex types “MultilingualString”, “MultilingualStringValue” and “MultilingualStringValue”).

If text within a “MultilingualString” is specified in more than one language, the usage of the “lang” attribute shall be mandatory.

6.4 Enumerations

The “Enumerations” package shall contain the “D2Enumeration” stereotyped elements with according definitions and XML Schema Definition mappings as described in A.4.

7 D2Package “Common::Classes”

7.1 The WeatherRelated package

7.1.1 Overview of the WeatherRelated package

The package “WeatherRelated” shall comprise a collection of classes used to specify road weather related measurements.

7.1.2 Semantics of the WeatherRelated package

7.1.2.1 WeatherRelated package semantics – General

The aspects of weather or pollution measurements modelled in this package relate to humidity, temperature, visibility, wind, pollution, precipitation and road surface conditions.

7.1.2.2 Humidity class

The “Humidity” class shall allow relative humidity measurements to be specified (see Figure 3).

```

classDiagram
    class Humidity {
        <<D2Class>>
    }
    class PercentageValue {
        <<D2Class>>
        +percentage: Percentage
    }
    Humidity "1" *-- "1" PercentageValue : +relativeHumidity
    note for Humidity "(from D2Payload::Common::Classes::WeatherRelated)"
    note for PercentageValue "(from D2Payload::Common::Classes::DataValue)"

```

7.1.2.3 Temperature class

Individual measurements of air temperature, dew point temperature, maximum temperature and minimum temperature may be specified. Note that each instance of a measurement may be accompanied by information about the measurement via the `TemperatureValue` class which inherits a number of metadata attributes from the `DataValue` class.

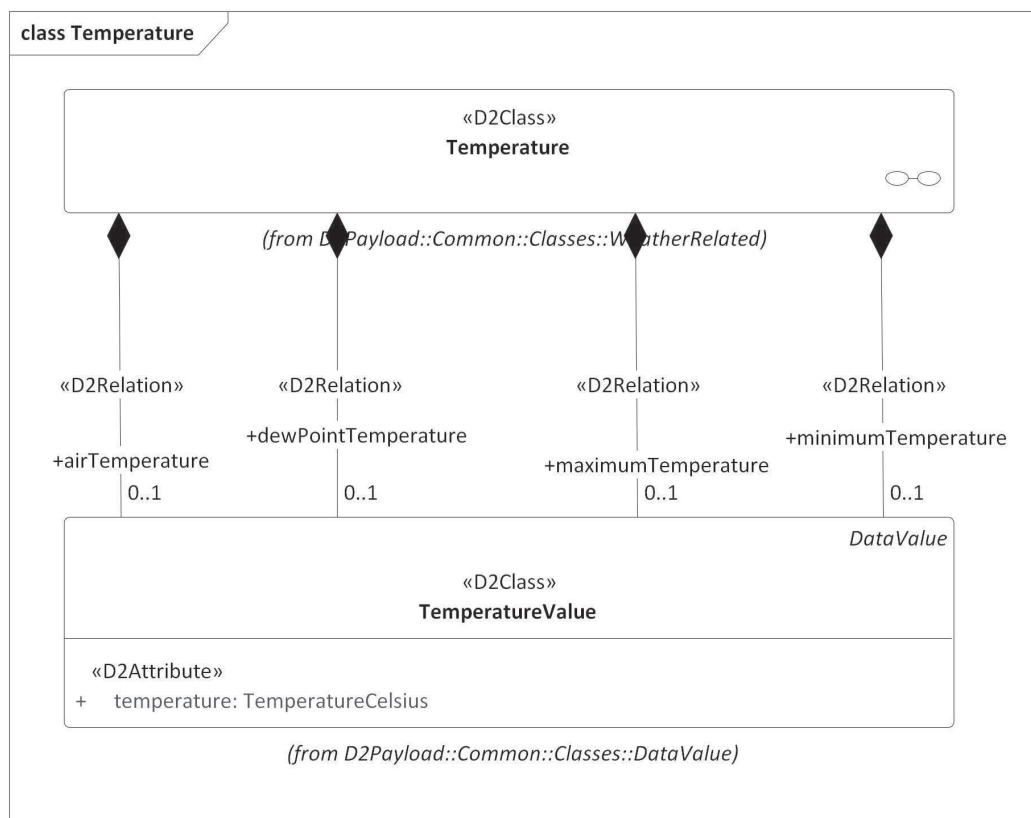


Figure 4 — The Temperature class model

7.1.2.4 Visibility class

The “Visibility” class shall allow minimum visibility distance measurements to be specified (see Figure 5).

Minimum visibility distance measurements shall be given in integer metres. Note that each instance of a measurement may be accompanied by information about the measurement via the IntegerMetreDistanceValue class which inherits a number of metadata attributes from the DataValue class.

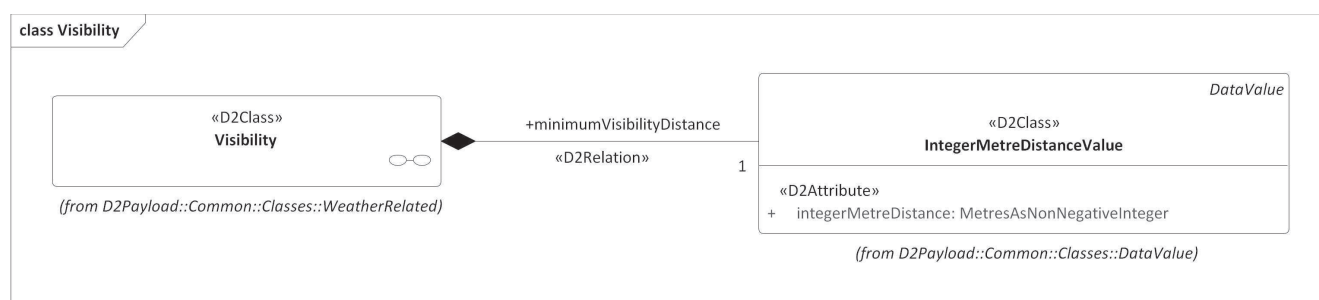


Figure 5 — The Visibility class model

7.1.2.5 Wind class

The “Wind” class shall allow a number of different measurements relating to wind to be specified (see Figure 6).

Individual measurements of wind speed, maximum wind speed, wind direction and direction of maximum wind (both bearing and compass) may be specified. Note that each instance of a measurement may be accompanied by information about the measurement via the WindSpeedValue, DirectionBearingValue and DirectionCompassValue classes which inherit a number of metadata attributes from the DataValue class.

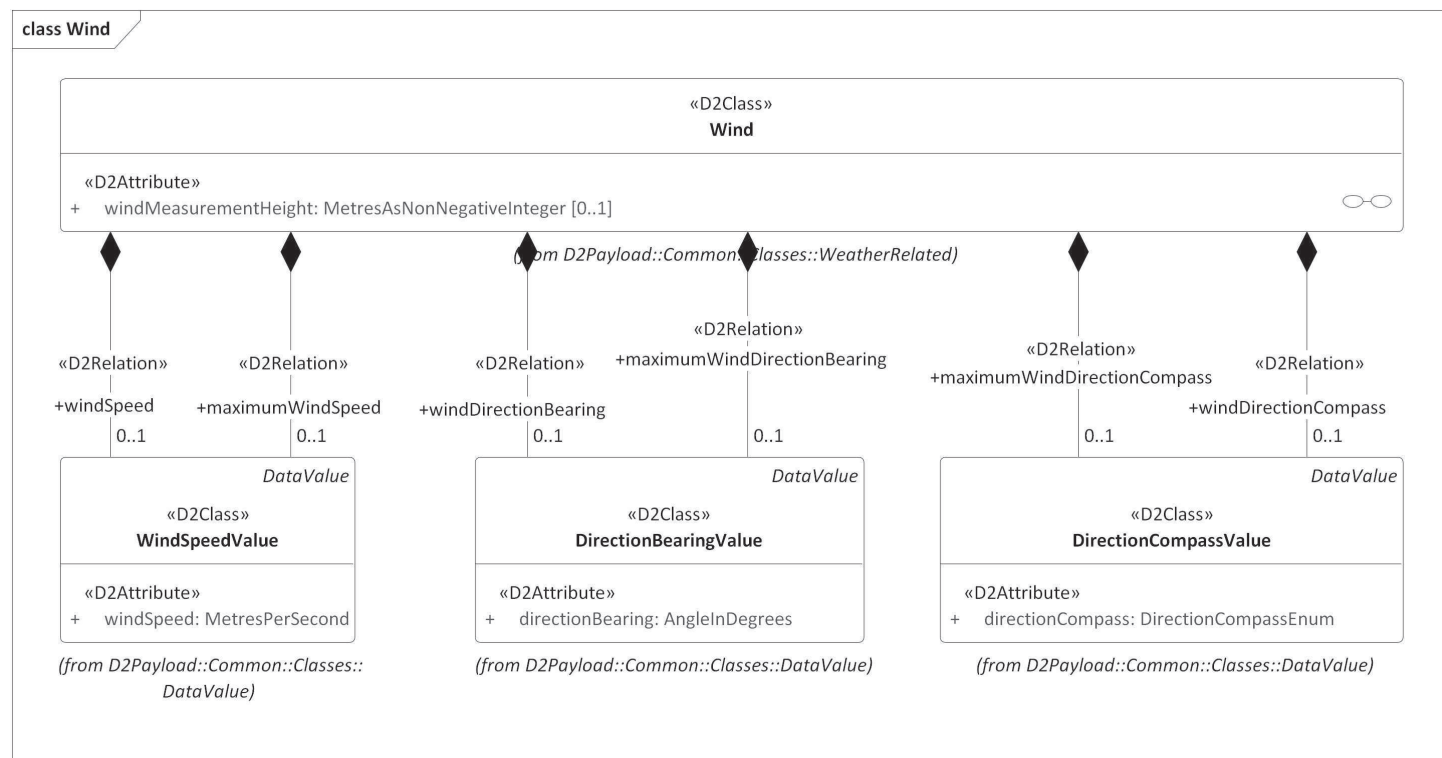


Figure 6 — The Wind class model

7.1.2.6 Pollution class

The “Pollution” class shall allow pollution concentration measurements to be specified (see Figure 7).

Pollution concentration measurements shall be given in micrograms per cubic metre. Note that each instance of a measurement may be accompanied by information about the measurement via the MicrogramsConcentrationValue class which inherits a number of metadata attributes from the DataValue class.

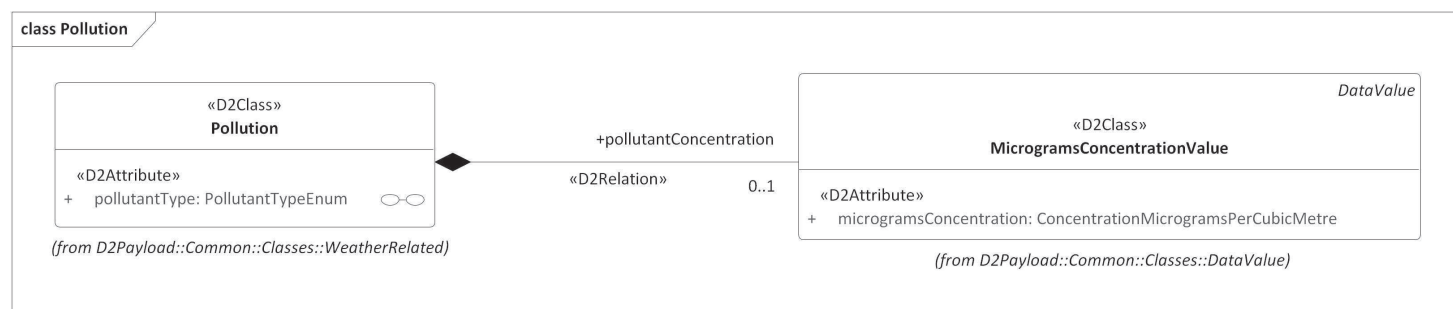


Figure 7 — The Pollution class model

7.1.2.7 Pressure class

The “Pressure” class shall allow atmospheric pressure measurements to be specified (see Figure 8).

Pressure measurements shall be given in hectopascal. Note that each instance of a measurement may be accompanied by information about the measurement via the PressureValue class which inherits a number of metadata attributes from the DataValue class.

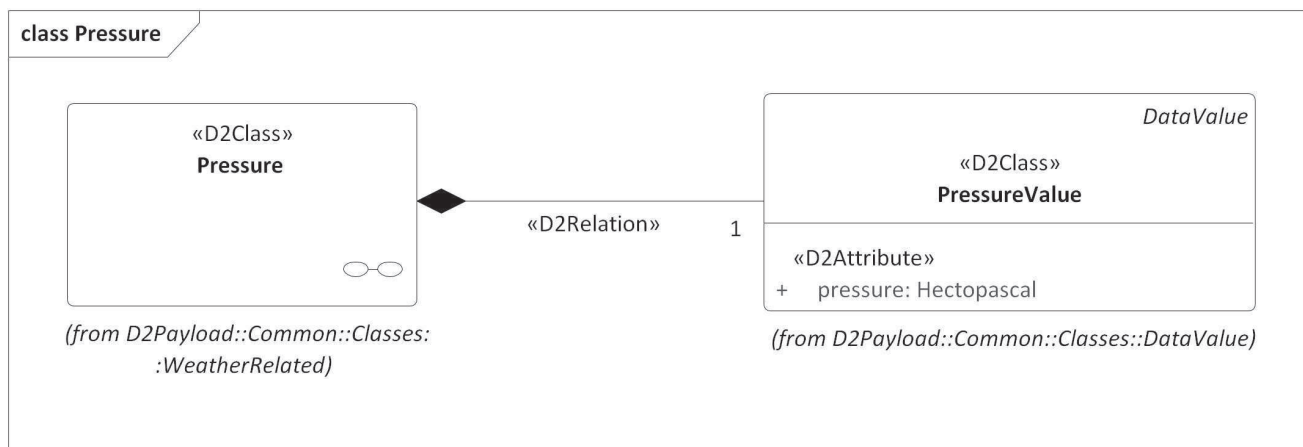


Figure 8 — The Pressure class model

7.1.2.8 PrecipitationDetail class

The “PrecipitationDetail” class shall allow measurements relating to precipitation to be specified (see Figure 9).

Information on the precipitation type and its intensity may be provided by using the enumerations “PrecipitationTypeEnum” and “PrecipitationIntensityEnum” (see data dictionary).

Individual measurements of intensity and depth of precipitation may be specified. Note that each instance of a measurement may be accompanied by information about the measurement via the PrecipitationIntensityValue and FloatingPointMetreDistanceValue classes which inherit a number of metadata attributes from the DataValue class.

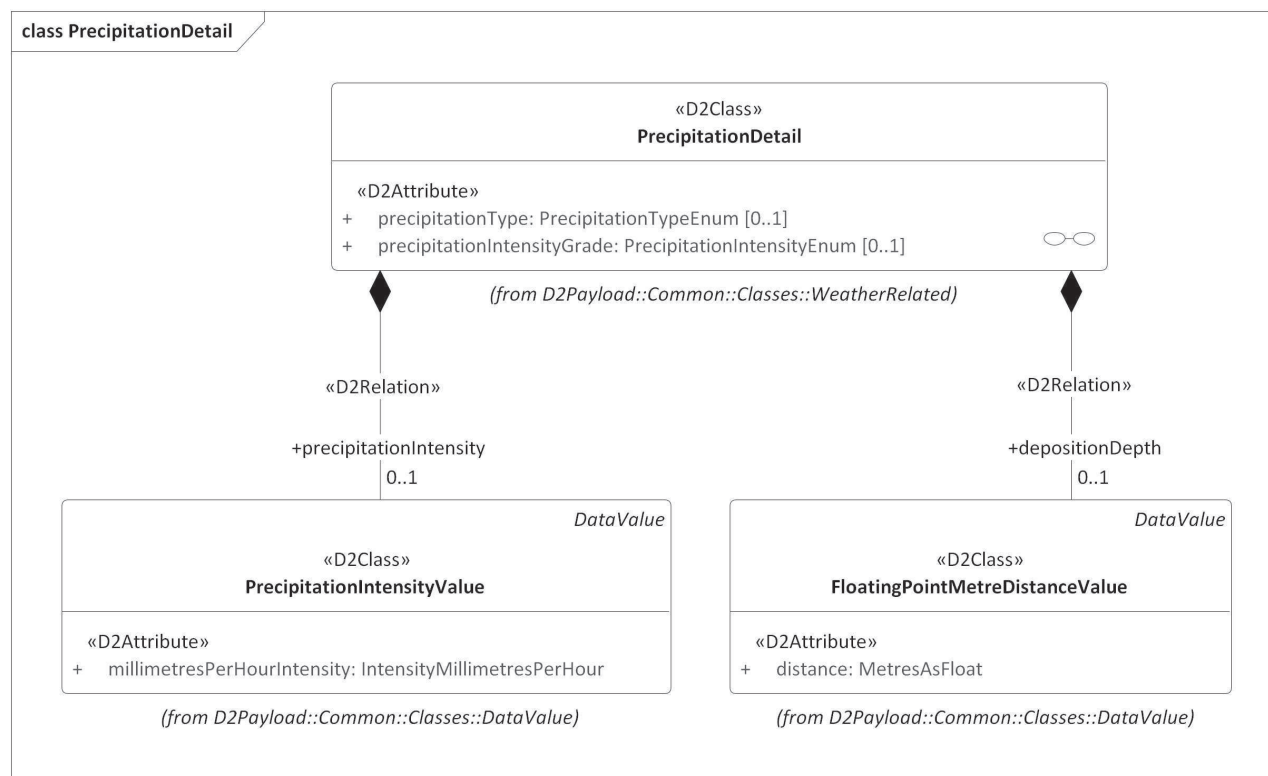


Figure 9 — The PrecipitationDetail class model

7.1.2.9 RoadSurfaceConditionMeasurements and TemperatureAboveOrBelowRoadSurface class

The “RoadSurfaceConditionMeasurements” class shall allow road surface condition measurements which are related specifically to the weather to be specified (see Figure 10).

Individual measurements of road surface temperature, road surface protection temperature, de-icing application rate, de-icing concentration, depth of snow, ice layer thickness and percentage, water film thickness and friction may be specified.

By using the “TemperatureAboveOrBelowRoadSurface” class, it is possible to specify temperatures for individual measurement heights above or below the road surface.

Note that each instance of a measurement may be accompanied by information about the measurement via the TemperatureValue, ApplicationRateValue, KilogramsConcentrationValue, FloatingPointMetreDistanceValue, FrictionValue and PercentageValue classes which inherit a number of metadata attributes from the DataValue class.

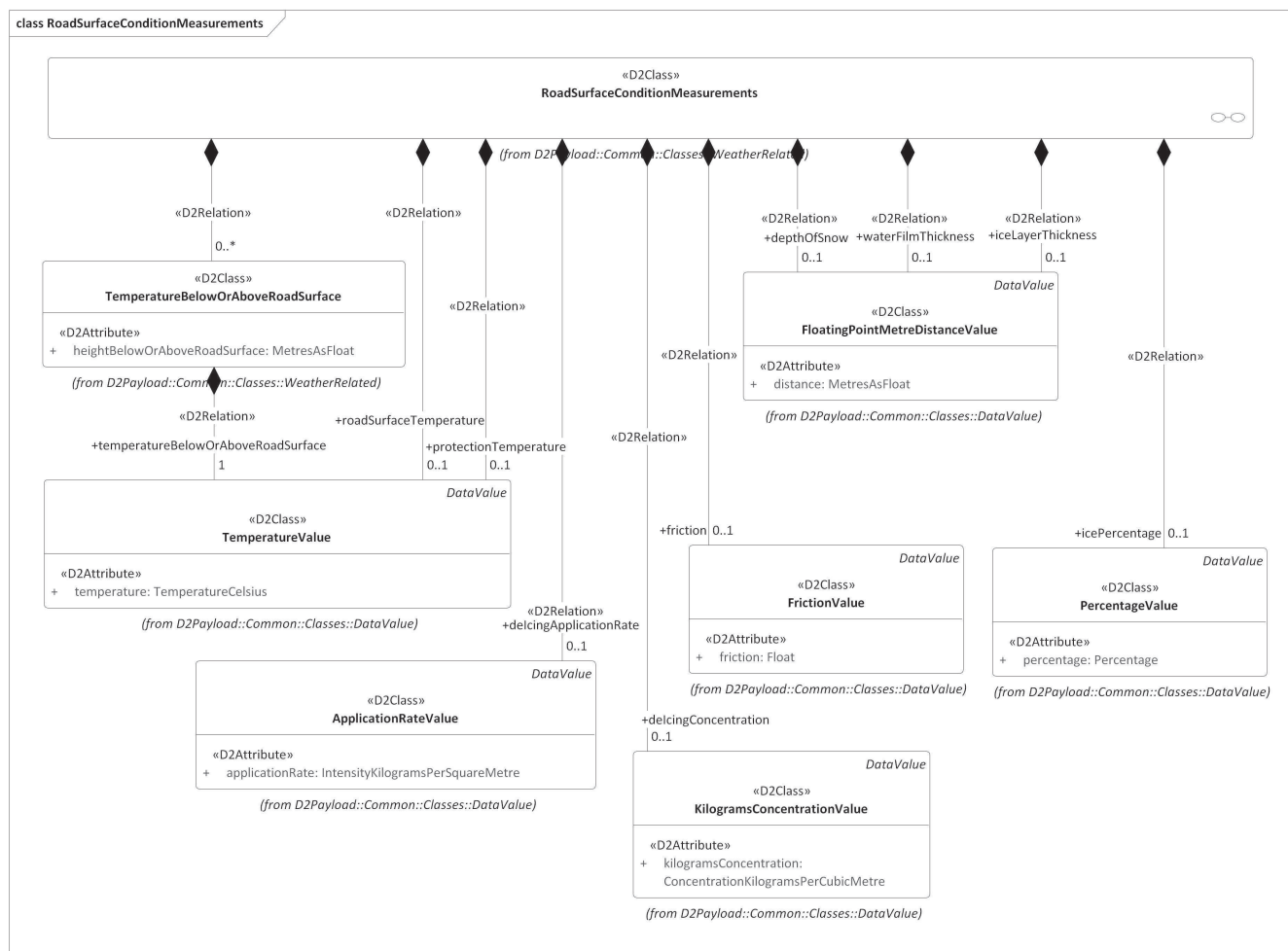


Figure 10 — The RoadSurfaceConditionMeasurements class model

7.2 The DataValue package

7.2.1 Overview of the DataValue package

This package describes data values of something that can be measured or calculated (see Figure 11).

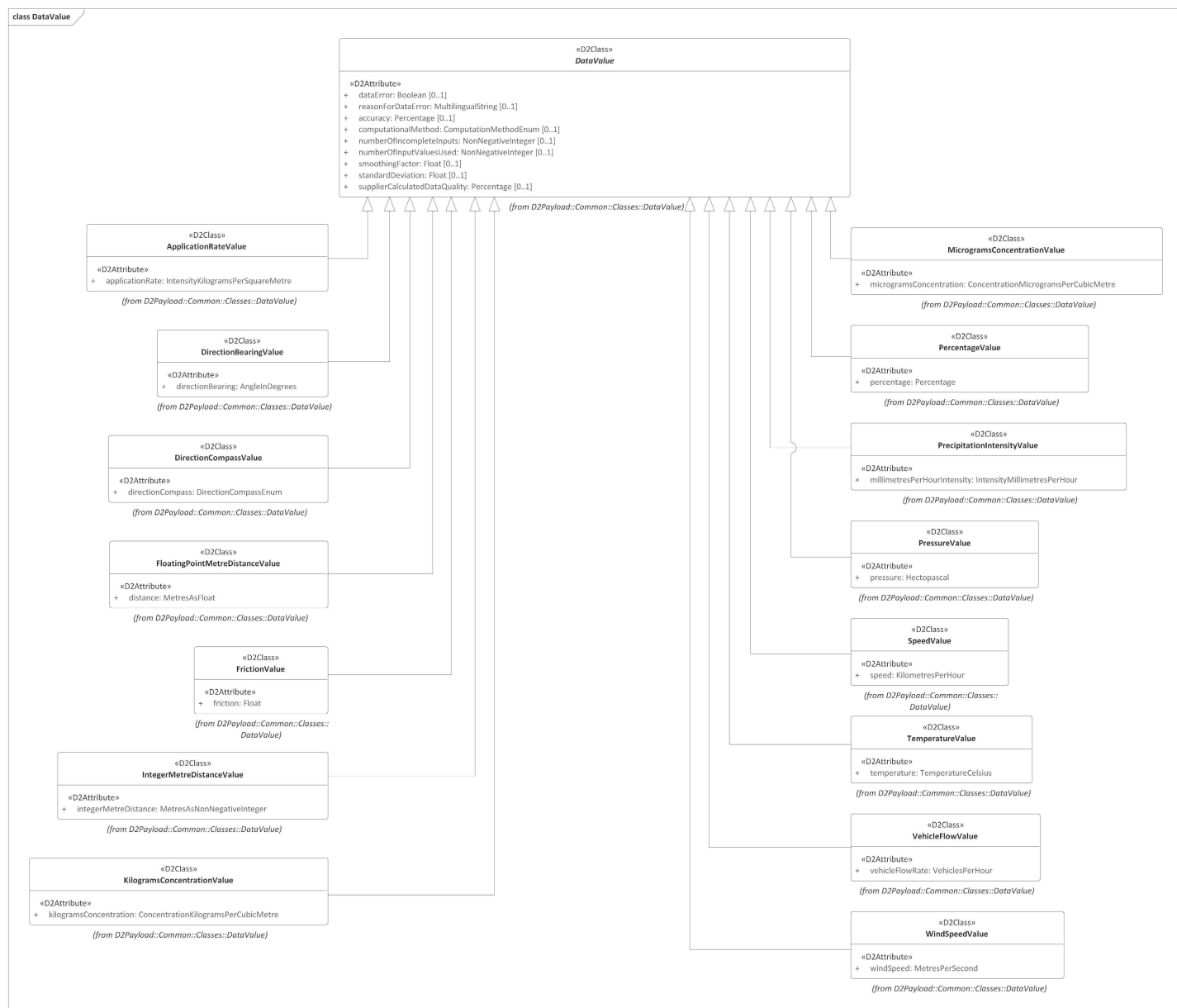


Figure 11 — The DataValue package class model

7.2.2 Semantics of the DataValue package

7.2.2.1 DataValue package semantics – general

This package contains types for data values (see following subclauses) and adds additional quality and error information to these types.

7.2.2.2 DataValue class

The “DataValue” class is an abstract class i.e. shall be specialized by other classes such as those given in this package. It provides the following quality and error information for each specialized data value:

- Information on data error and reason for it;
- Accuracy and computation method;

- Number of input values used and number of incomplete inputs;
- Smoothing factor and standard deviation;
- Information on supplier calculated data quality (in percent).

7.2.2.3 ApplicationRateValue class

A measured or calculated value of the application rate of a substance.

7.2.2.4 DirectionBearingValue class

A measured or calculated value of direction as a bearing.

7.2.2.5 DirectionCompassValue class

A measured or calculated value of direction as a point of the compass.

7.2.2.6 FloatingPointMetreDistanceValue class

A measured or calculated value of distance in metres in a floating-point format.

7.2.2.7 FrictionValue class

A measured or calculated value of road surface friction.

7.2.2.8 IntegerMetreDistanceValue class

A measured or calculated value of distance in whole metres.

7.2.2.9 KilogramsConcentrationValue class

A measured or calculated value of concentration of a substance in kilograms per unit volume.

7.2.2.10 MicrogramsConcentrationValue class

A measured or calculated value of concentration of a substance in micrograms per unit volume.

7.2.2.11 PercentageValue class

A measured or calculated value expressed as a percentage.

7.2.2.12 PrecipitationIntensityValue class

A measured or calculated value of the accumulation rate of precipitation.

7.2.2.13 PressureValue class

A measured or calculated value of atmospheric pressure.

7.2.2.14 SpeedValue class

A measured or calculated value of speed.

7.2.2.15 TemperatureValue class

A measured or calculated value of temperature.

7.2.2.16 VehicleFlowValue class

A measured or calculated value of the flow rate of vehicles.

7.2.2.17 WindSpeedValue class

A measured or calculated value of wind speed.

7.3 The Fault package

7.3.1 Overview of the Fault package

This package describes information about faults (see Figure 12).

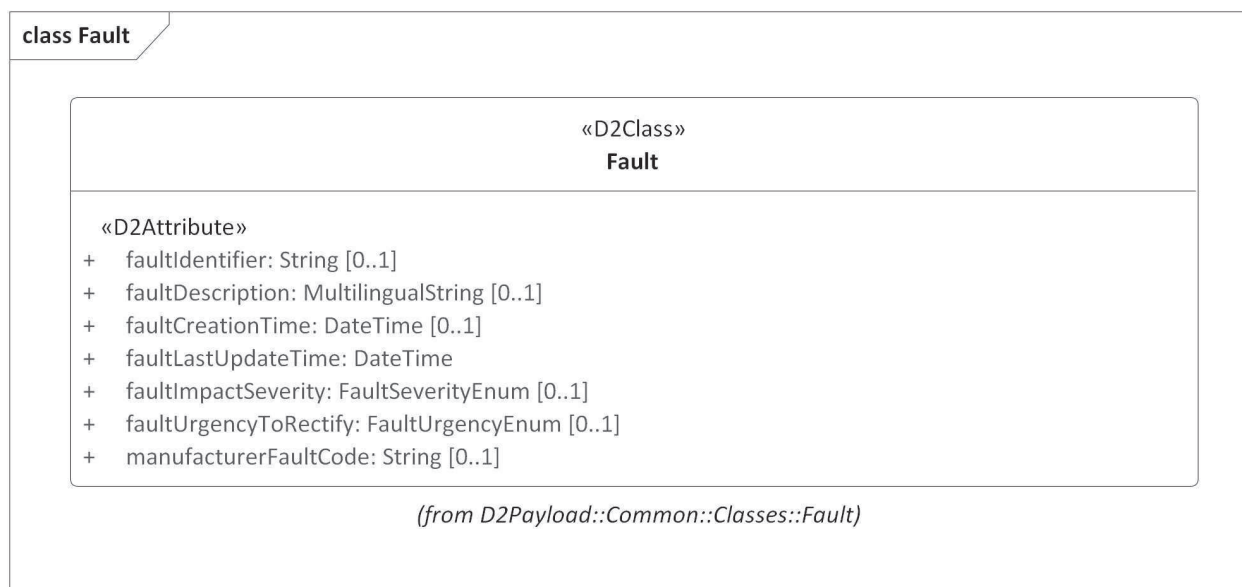


Figure 12 — The Fault package class model

7.3.2 Semantics of the Fault package

7.3.2.1 Fault package semantics – general

This package describes information about faults.

7.3.2.2 Fault class

The “Fault” class specifies information about a fault relating to a specific piece of equipment or process.

7.4 The Validity package

7.4.1 Overview of Validity package

The package “Validity” shall comprise a sub-model for defining the temporal validity of a situation element (for instance described in a “SituationRecord” instance), or the impact of such a situation element, where validity in this context means the time period in which the real-world event, activity, action or impact being described actually occurs or is predicted to occur (see Figure 13).

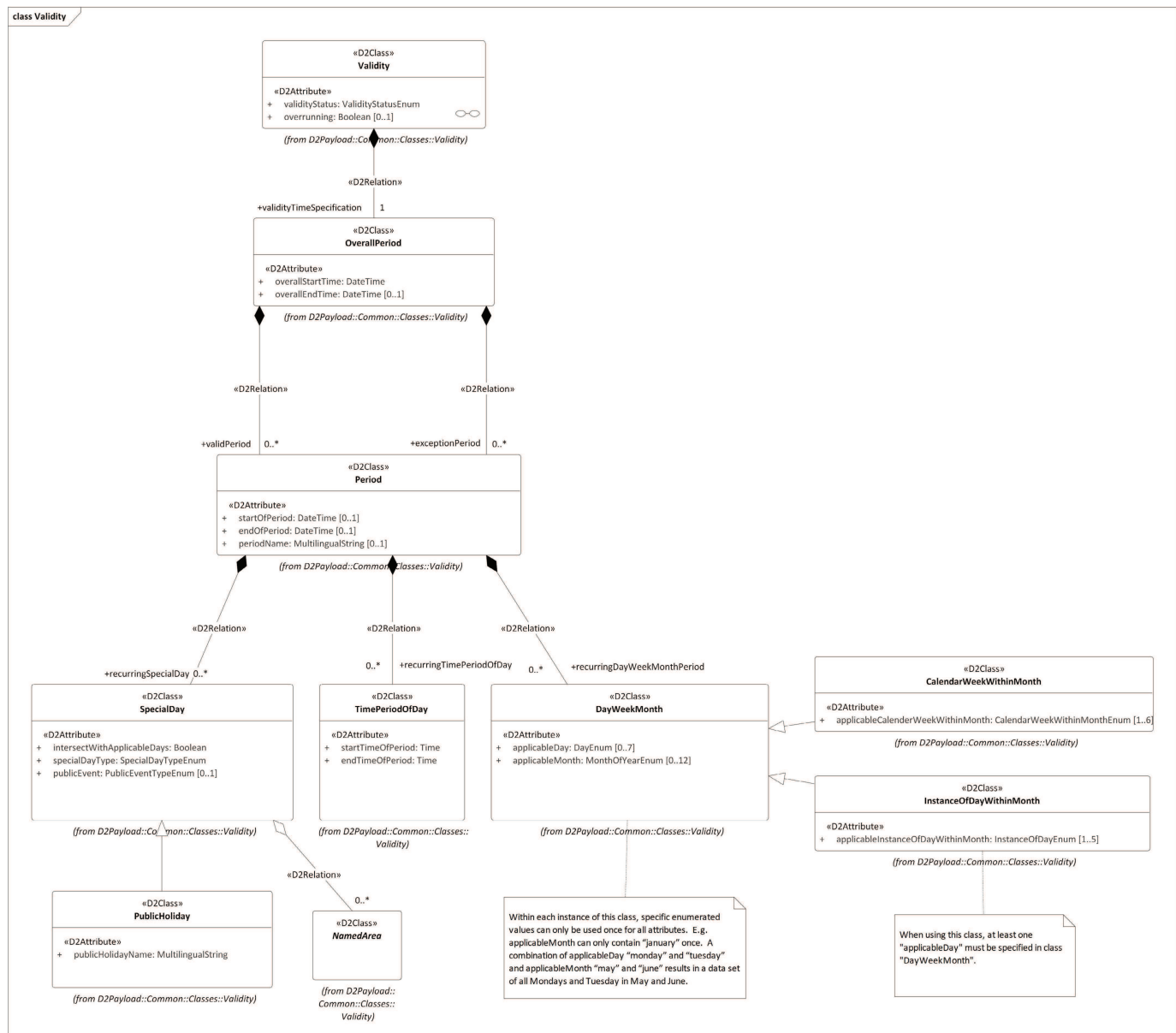


Figure 13 — The Validity package class model

7.4.2 Semantics of the Validity package

7.4.2.1 Validity package semantics – general

The temporal validity of a situation element (for example defined by a “SituationRecord”) or its impact can be very simple with just overall start and end times, or complex having several valid and invalid periods within a period defined by overall start and end times. The temporal validity may also be temporarily suspended or active regardless of the validity time specification (i.e. the validity time specification is temporarily overridden).

7.4.2.2 Validity class

The “Validity” class shall allow a supplier to identify whether the temporal validity specified in the remainder of the package is currently overridden and whether the validity period is overrunning that previously stated.

Attribute “validityStatus” shall specify whether the temporal validity is specified by the remainder of this package or not. If not, it shall be specified as being “active” (i.e. temporarily valid regardless of the validity time specification in the remainder of this package) or “suspended” (i.e. temporarily invalid regardless of the validity time specification in the remainder of this package).

Attribute “overrunning” may be used to specify whether the validity period is overrunning its expected duration as defined in previous versions of the publication, or even in current version.

7.4.2.3 OverallPeriod class

The “OverallPeriod” class shall be used to specify the bounding start and end times of the validity period, within which there may be any number of valid and invalid (exception) periods. There shall be at least an overall start time specified here.

7.4.2.4 Period class

The “Period” class may be used to specify either a single valid or invalid (exception) period or a set of repeating valid or invalid periods within a specified period. Hence each period shall be specified as either a single time period, or as a number of recurring time periods within a single time period.

There may be any number of these valid and invalid (exception) periods within the overall validity period. The overall validity period defined in the “OverallPeriod” class by the “startOfPeriod” and “endOfPeriod” attributes shall strictly bound (i.e. override) any periods defined in this class.

Note that where an invalid (exception) period overlaps (intersects) a valid period the validity shall be regarded as invalid.

7.4.2.5 DayWeekMonth class

The “DayWeekMonth” class may be used to allow recurring periods to be specified in terms of days of the week and months of the year. The recurring periods are defined by the intersection of each of these values (see also note below).

This class may be specialized by the class “CalendarWeekWithinMonth” to allow recurring periods to be specified in terms of the calendar week(s) of the month or may be specialized by “InstanceOfDayWithinMonth” to allow recurring periods to be specified in terms of instance(s) of the specified weekday within a month.

This class shall be used with an association that has a role name of “recurringDayWeekMonthPeriod” identifying that it is used for specifying recurring periods.

Attribute “applicableDay” may be used to identify in which day of the week the period resides. Note that where this recurring period is specified in conjunction with a “TimePeriodOfDay” (via the role name “recurringTimePeriodOfDay”) and that specifies a period which spans midnight then this “applicableDay” value relates to the start time of that period.

Attribute “applicableMonth” may be used to identify in which month of the year the period resides.

NOTE Within each instance of this class, specific enumerated values can only be used once for all attributes. E.g. applicableMonth can only contain “january” once. A combination of applicableDay “monday” and “tuesday” and applicableMonth “may” and “june” results in a data set of all Mondays and Tuesday in May and June.

7.4.2.6 CalendarWeekWithinMonth class

The “CalendarWeekWithinMonth” class may be used to allow recurring periods to be specified in terms of the calendar week(s) of the month.

NOTE By default, the WeekofMonth is calculated as follows: The calendar week commences on a Monday (as per ISO 8601). The first week of a month is the calendar week containing the first of the month. Several days of the first week of the month may occur in the previous calendar month. The last week of the month contains the last day of the month in question.

7.4.2.7 InstanceOfDayWithinMonth class

The “InstanceOfDayWithinMonth” class may be used to allow recurring periods to be specified in terms of instance(s) of the specified weekday within a month.

When using this class, at least one “applicableDay” shall be specified in class “DayWeekMonth”.

7.4.2.8 TimePeriodOfDay class

The “TimePeriodOfDay” class may be used to allow recurring periods to be specified in terms of start and end time within a day. The recurring periods are defined by the intersection of each of these values.

This class shall be used with an association that has a role name of “recurringTimePeriodOfDay” identifying that it is used for specifying recurring periods.

7.4.2.9 SpecialDay class

The “SpecialDay” class may be used to allow recurring periods to be specified in terms of special days. It is also possible to specialize this class with the “PublicHoliday” class.

This class shall be used with an association that has a role name of “recurringSpecialDay” identifying that it is used for specifying recurring periods.

The special day shall be defined using an enumeration and optional an associated event. It is possible to attach a named area to the “SpecialDay” class.

Attribute “intersectionWithApplicableDays” specifies, whether the intersection or union of days is defined.

7.4.2.10 NamedArea class

The “NamedArea” class shall be an abstract hook class to hook in a model for a named area.

7.4.2.11 PublicHoliday class

The “PublicHoliday” class may be used to specialize the “SpecialDay” class representing a public holiday.

7.5 The Vehicle package

7.5.1 Overview of the Vehicle package

The package “Vehicle” shall comprise a sub-model for defining information about an individual vehicle (see Figure 14).

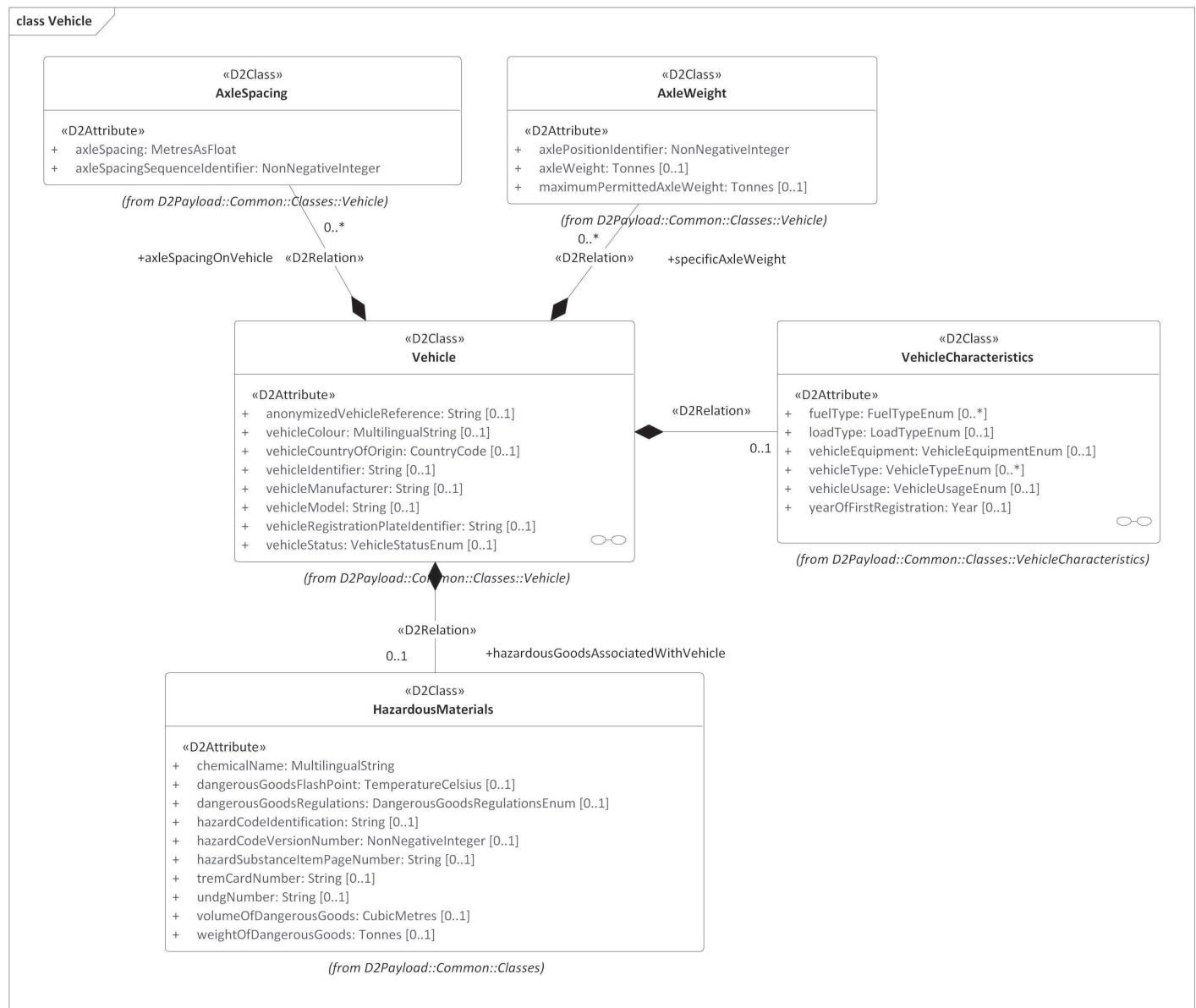


Figure 14 — The Vehicle package class model

7.5.2 Semantics of the Vehicle package

7.5.2.1 Vehicle package semantics – general

The information that is modelled in the “Vehicle” package shall identify details of an individual vehicle and the load which it may be carrying.

7.5.2.2 Vehicle class

An instance of the “Vehicle” class shall allow a supplier to identify the specific details relating to a single individual vehicle and its load.

7.5.2.3 AxleSpacing class

The “AxleSpacing” class may be used to allow a supplier to identify the spacing between adjacent sets of axles on a specific vehicle, indexed from the front of the vehicle.

Attribute “axleSpacingSequenceIdentifier” shall identify which axle spacing is being specified, e.g. a value of ‘1’ indicates that the “axleSpacing” value relates to the distance between the front axle and the next axle from the front of the vehicle.

7.5.2.4 AxleWeight class

The “AxleWeight” class may be used to allow a supplier to identify the actual weight and the maximum permitted weight on a specified axle on a specific vehicle.

Attribute “axlePositionIdentifier” shall identify to which axle the specified weight values relate, e.g. a value of ‘1’ indicates that it is the front axle weight that is being specified.

7.6 The VehicleCharacteristics package

7.6.1 Overview of the VehicleCharacteristics package

The package “VehicleCharacteristics” shall comprise a sub-model for defining the characteristics of vehicles (see Figure 15).

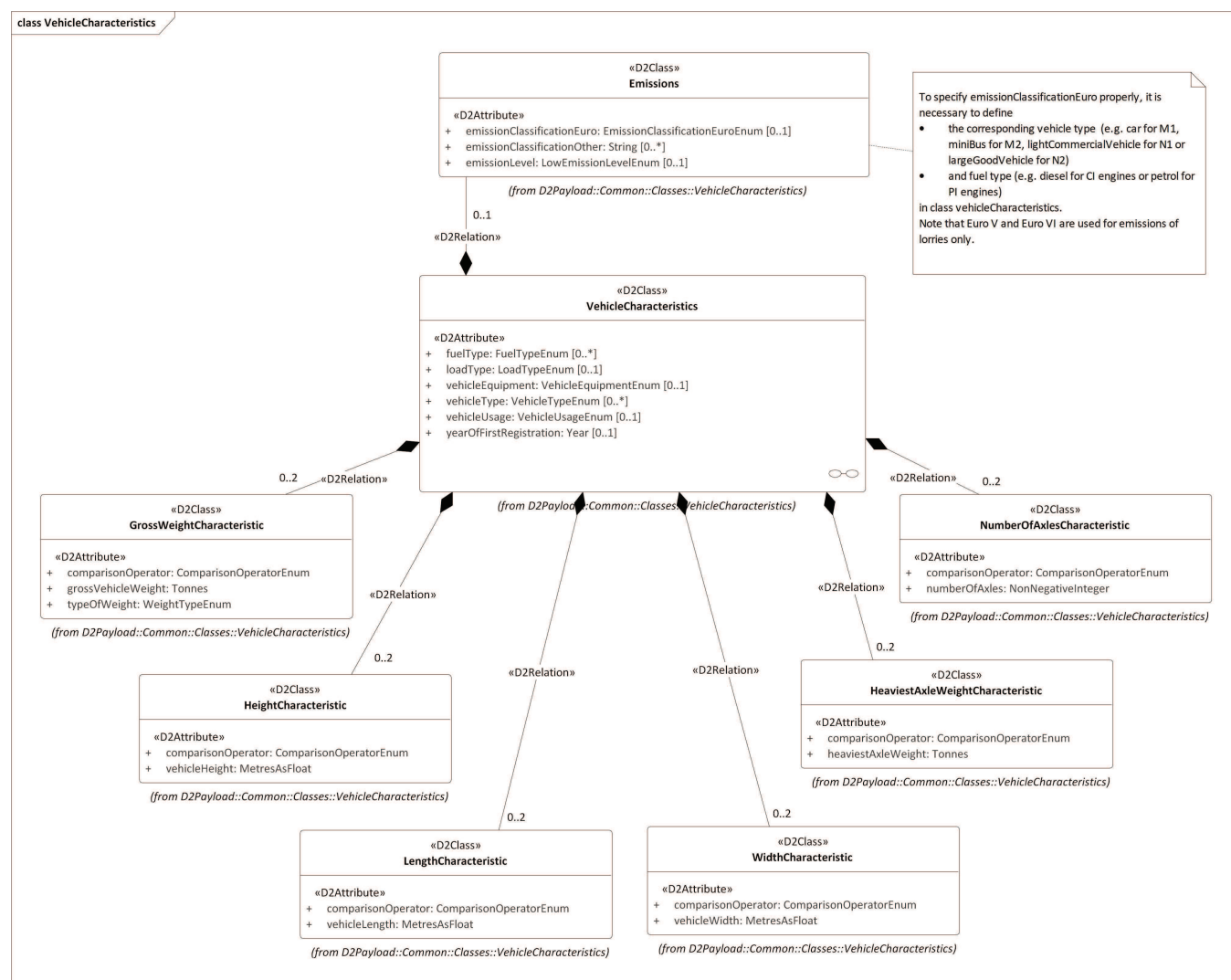


Figure 15 — The VehicleCharacteristics package class model

7.6.2 Semantics of the VehicleCharacteristics package

7.6.2.1 VehicleCharacteristics package semantics – general

The information that is modelled in the “VehicleCharacteristics” package shall identify a set of vehicle characteristics, some of whose values can be specified using comparative operators (e.g. greater than ‘x’ but less than ‘y’).

7.6.2.2 VehicleCharacteristics class

An instance of the “VehicleCharacteristics” class shall allow a supplier to identify a base set of vehicle characteristics.

7.6.2.3 Emissions class

The “Emissions” class may be used to specify a vehicle emission level either by Euro-norm, by self-defined emission categories or by a low emission level flag.

7.6.2.4 GrossWeightCharacteristics class

The “GrossWeightCharacteristics” class may be used to allow a supplier to identify the actual gross weight of a vehicle. By providing two instances of this class a supplier can specify the gross weight as being between a lower and upper limit.

7.6.2.5 HeightCharacteristic class

The “HeightCharacteristic” class may be used to allow a supplier to identify the actual height of a vehicle. By providing two instances of this class a supplier can specify the height as being between a lower and upper limit.

7.6.2.6 LengthCharacteristic class

The “LengthCharacteristic” class may be used to allow a supplier to identify the actual length of a vehicle. By providing two instances of this class a supplier can specify the length as being between a lower and upper limit.

7.6.2.7 WidthCharacteristic class

The “WidthCharacteristic” class may be used to allow a supplier to identify the actual width of a vehicle. By providing two instances of this class a supplier can specify the width as being between a lower and upper limit.

7.6.2.8 HeaviestAxleWeightCharacteristic class

The “HeaviestAxleWeightCharacteristic” class may be used to allow a supplier to identify the actual heaviest axle weight of a vehicle. By providing two instances of this class a supplier can specify the heaviest axle weight as being between a lower and upper limit.

7.6.2.9 NumberOfAxlesCharacteristic class

The “NumberOfAxlesCharacteristic” class may be used to allow a supplier to identify the actual number of axles on a vehicle. By providing two instances of this class a supplier can specify the number of axles as being between a lower and upper limit.

7.7 Other classes of the Common::Classes package

7.7.1 GlobalReference class

The “GlobalReference” class (see Figure 16) shall provide a versioned reference to an object that may be in another publication from another publisher.

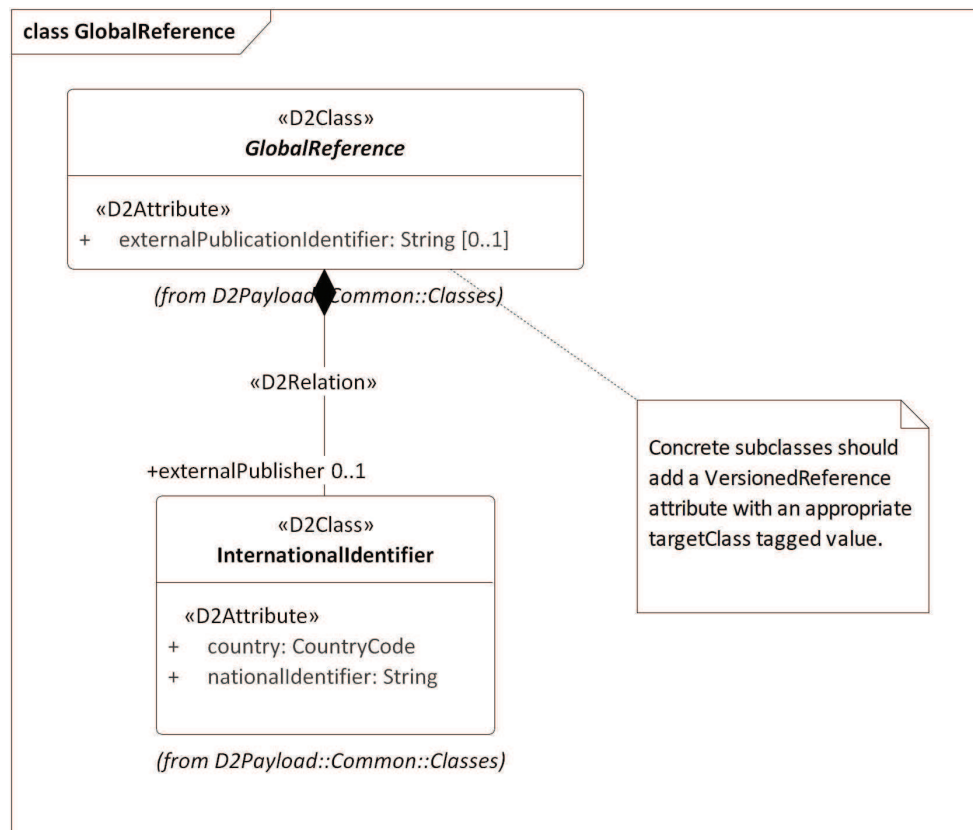


Figure 16 — The GlobalReference class model

7.7.2 GroupOfVehiclesInvolved class

The “GroupOfVehiclesInvolved” (see Figure 17) class may be used for describing a group of vehicles involved having common characteristics (“VehicleCharacteristics”, see 7.6) and/or status.

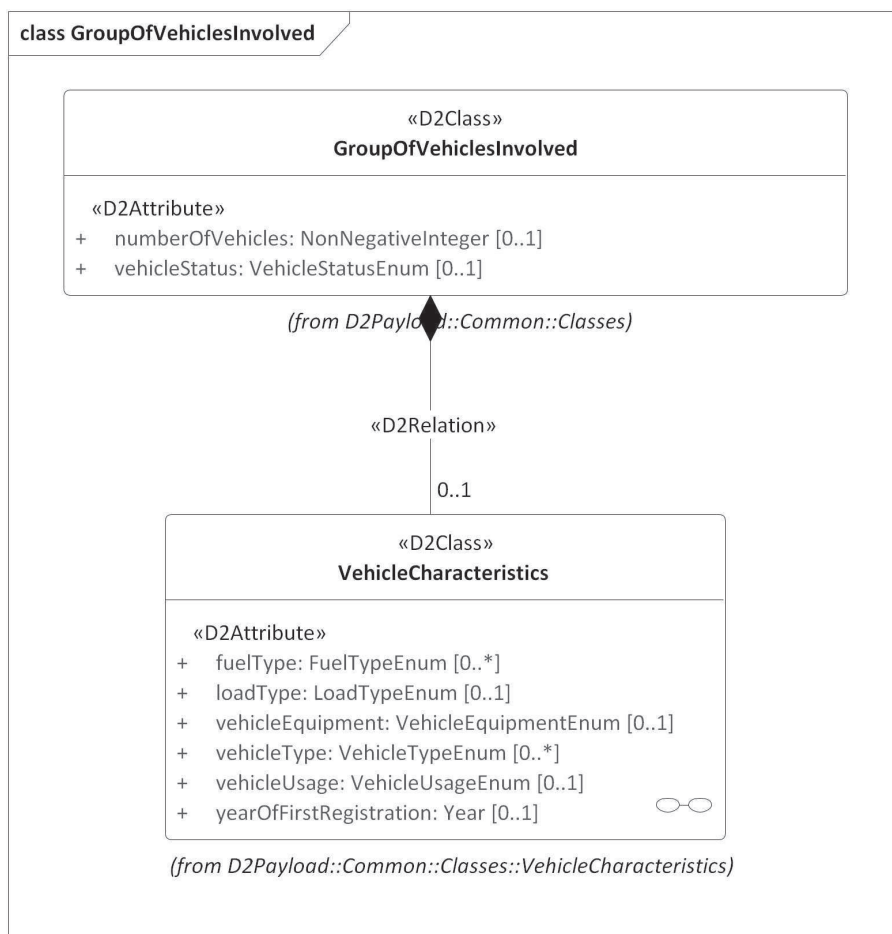


Figure 17 — The GroupOfVehiclesInvolved class model

7.7.3 HazardousMaterials class

The “HazardousMaterials” class (see Figure 18) may be used to allow a supplier to identify the actual details of any hazardous material or dangerous goods that the vehicle is carrying or at least is thought to be carrying.

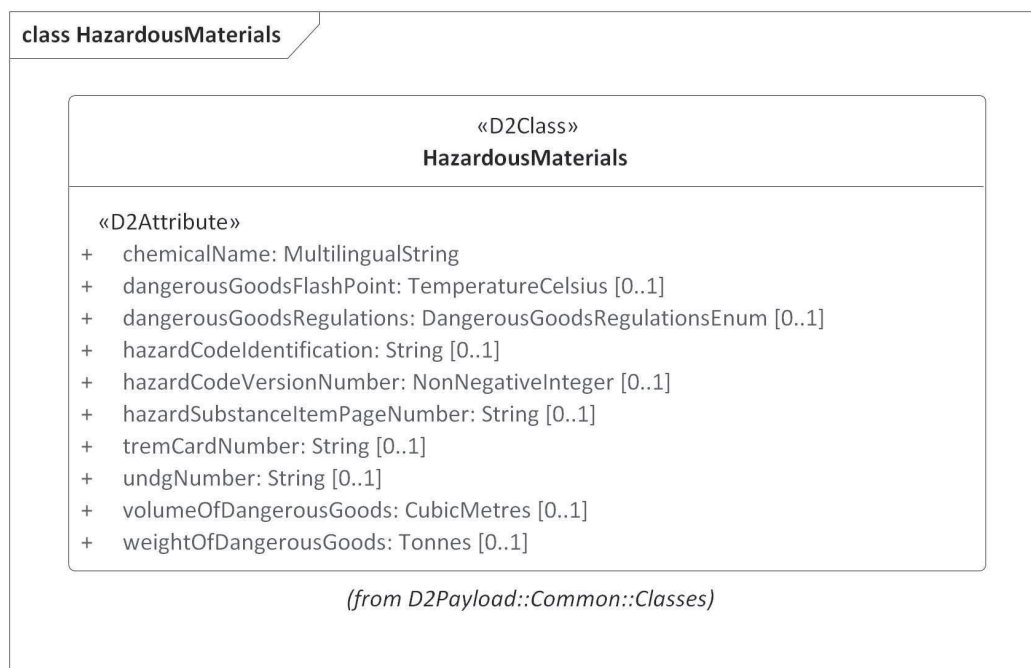


Figure 18 — The HazardousMaterials class model

7.7.4 HeaderInformation class

The “HeaderInformation” class (see Figure 19) shall specify management information relating to the data contained within a publication.

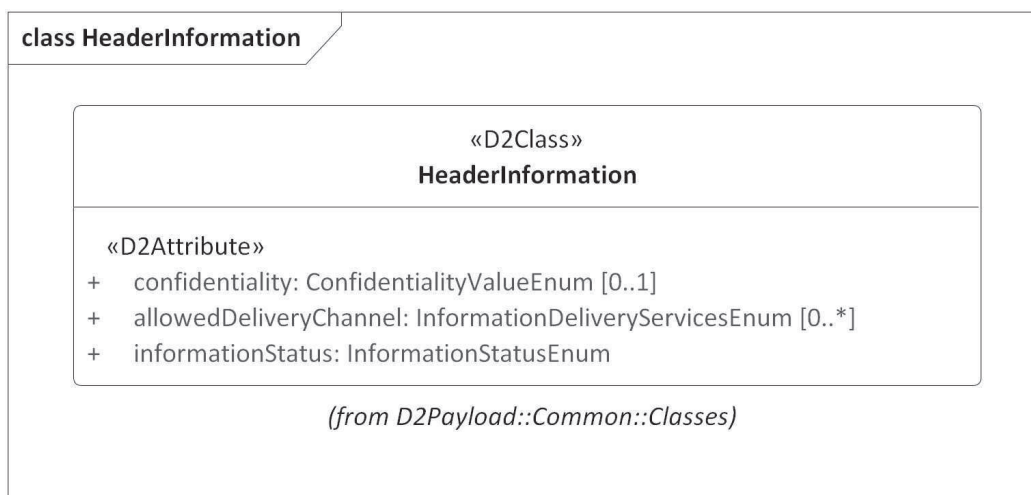


Figure 19 — The HeaderInformation class model

7.7.5 Source class

The "Source" class (see Figure 20) may provide information on the organisation or the equipment which has produced the information.

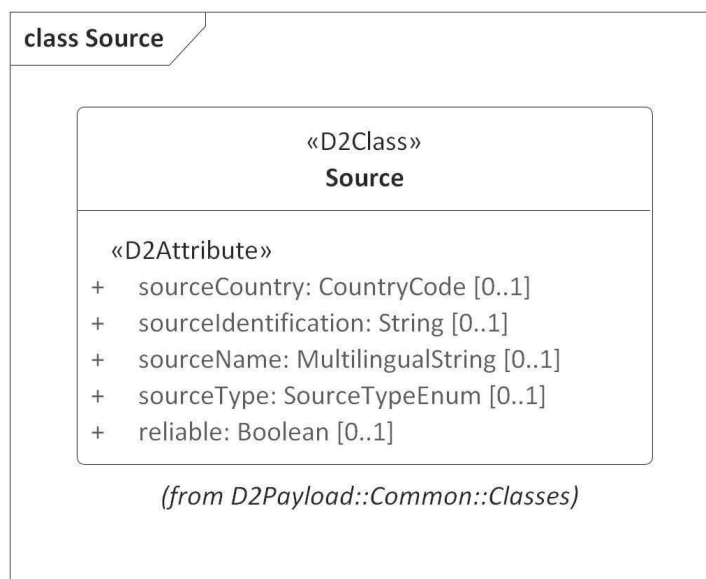


Figure 20 — The Source class model

7.7.6 UrlLink class

The “UrlLink” class (see Figure 21) may provide details of a Uniform Resource Locator (URL) address pointing to a resource available on the Internet from where further relevant information may be obtained.

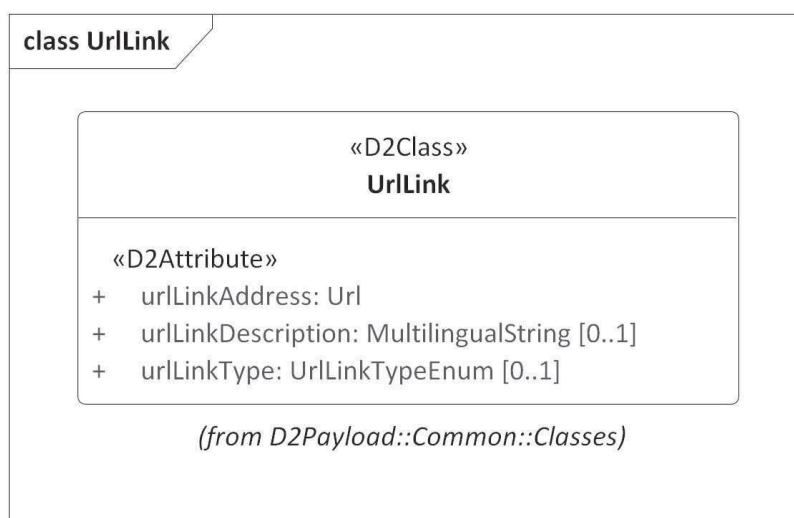


Figure 21 — The UrlLink class model

Annex A (normative)

Data Dictionary

A.1 Overview

This data dictionary identifies the definitions and characteristics of the different classes, attributes, association ends, data types and enumerations appearing in the common data model defined in 6 and 7. The data dictionary is specified in three parts, one for packages, one for <<D2Datatypes>> and one for <<D2Enumerations>>, each ordered alphabetically.

The first part of the data dictionary is partitioned into subclauses which relate to each of the UML model packages and each subclause defines the contained classes, their attributes and any association ends defined between the classes within that package.

The Data Dictionary tables use the following columns:

- 1) Column **Class name**: it provides the symbolic name (Upper Camel Case) given to the corresponding class.
- 2) Column **Association end**: it provides the symbolic name (Lower Camel Case) given to the corresponding association end.
- 3) Column **Attribute name**: it provides the symbolic name (Lower Camel Case) given to the corresponding attribute of a class.
- 4) Column **Enumerated value name**: It provides the symbolic name (Lower Camel Case) given to the corresponding enumerated value.
- 5) Column **Designation**: it provides the corresponding name in natural language of the corresponding class, attribute, association end or enumeration value.
- 6) Column **Definition**: it provides a comprehensive definition detailing the class, attribute or association end.
- 7) Column **Stereotype**: it provides a statement of the stereotype that is assigned to the class – see EN 16157-1:2018, 6.2 for further details.
- 8) Column **Abstract**: it provides a statement as to whether the class is abstract (non-realizable) or concrete (realizable).
- 9) Column **Multiplicity**: it provides a statement of the allowed multiplicity for the attribute or association end.

10) Column **Target**: It provides the name of the class to which the association end applies.

11) Column **Type**: it provides the name of the class used to define the data type relating to the attribute of the Overview

A.2 Data Dictionary for “Common”

A.2.1 “Classes” package

A.2.1.1 General

D2Payload/Common/Classes

A.2.1.2 “Classes” package classes

Table A.1— Classes of the “Classes” package

Class name	Designation	Definition	Stereotype	Abstract
GenericPublication	Generic publication	A publication used to make level B extensions at the publication level.	D2Class	no
GlobalReference	Global reference	A versioned reference to an object that may be in another publication from another publisher.	D2Class	yes
GroupOfVehiclesInvolved	Group of vehicles involved	Group of the vehicles involved having common characteristics and/or status.	D2Class	no
HazardousMaterials	Hazardous materials	Details of hazardous materials.	D2Class	no
HeaderInformation	Header information	Management information relating to the data contained within a publication.	D2Class	no
InternationalIdentifier	International identifier	An identifier/name whose range is specific to the particular country.	D2Class	no
PayloadPublication	Payload publication	A payload publication of traffic related information or associated management information created at a specific point in time that can be exchanged via a DATEX II interface.	D2ModelRoot	yes
Source	Source	Details of the source from which the information was obtained.	D2Class	no
UrlLink	URL link	Details of a Uniform Resource Locator (URL) address pointing to a resource available on the Internet from where further relevant information may be obtained.	D2Class	no

A.2.1.3 Associations of “Classes” package

Table A.2— Associations of the “Classes” package

Class name	Association end	Designation	Definition	Multiplicity	Target
GlobalReference	externalPublisher	External publisher	Identifier for an external DATEX II publisher	0..1	InternationalIdentifier
GroupOfVehiclesInvolved	vehicleCharacteristics	Vehicle characteristics		0..1	VehicleCharacteristics
PayloadPublication	publicationCreator	Publication creator		1..1	InternationalIdentifier

A.2.1.4 “Classes” package attributes

Table A.3— Attributes of the “Classes” package

Class name	Attribute name	Designation	Definition	Multiplicity	Type
GenericPublication	genericPublicationName	Generic publication name	The name of the generic publication.	1..1	String
GlobalReference	externalPublicationIdentifier	External publication identifier	Identifier for an external DATEX II publication	0..1	String
GroupOfVehiclesInvolved	numberOfVehicles	Number of vehicles	The number of vehicles of this group that are involved.	0..1	NonNegativeInteger
	vehicleStatus	Vehicle status	Vehicle status.	0..1	VehicleStatusEnum
HazardousMaterials	chemicalName	Chemical name	The chemical name of the hazardous substance carried by the vehicle.	1..1	MultilingualString
	dangerousGoodsFlashPoint	Dangerous goods flash point	The temperature at which the vapour from a hazardous substance will ignite in air.	0..1	TemperatureCelsius

Class name	Attribute name	Designation	Definition	Multiplicity	Type
	dangerousGoodsRegulations	Dangerous goods regulations	The code defining the regulations, international or national, applicable for a means of transport.	0..1	DangerousGoodsRegulationsEnum
	hazardCodeIdentification	Hazard code identification	The dangerous goods description code.	0..1	String
	hazardCodeVersionNumber	Hazard code version number	The version/revision number of date of issuance of the hazardous material code used.	0..1	NonNegativeInteger
	hazardSubstanceItemPageNumber	Hazard substance item page number	A number giving additional hazard code classification of a goods item within the applicable dangerous goods regulation.	0..1	String
	tremCardNumber	Trem card number	The identification of a transport emergency card giving advice for emergency actions.	0..1	String
	undgNumber	UNDG number	A unique serial number assigned within the United Nations to substances and articles contained in a list of the dangerous goods most commonly carried.	0..1	String
	volumeOfDangerousGoods	Volume of dangerous goods	The volume of dangerous goods on the vehicle(s) reported in a traffic/travel situation.	0..1	CubicMetres
	weightOfDangerousGoods	Weight of dangerous goods	The weight of dangerous goods on the vehicle(s) reported in a traffic/travel situation.	0..1	Tonnes
HeaderInformation	allowedDeliveryChannel	Allowed delivery channel	The allowed delivery channel.	0..*	InformationDeliveryServicesEnum

Class name	Attribute name	Designation	Definition	Multiplicity	Type
	confidentiality	Confidentiality	The extent to which the related information may be circulated, according to the recipient type.	0..1	ConfidentialityValueEnum
	informationStatus	Information status	The status of the related information (real, test, exercise ...).	1..1	InformationStatusEnum
InternationalIdentifier	country	Country	EN ISO 3166-1 two-character country code.	1..1	CountryCode
	nationalIdentifier	National identifier	Identifier or name unique within the specified country.	1..1	String
PayloadPublication	defaultLanguage	Default language	The default language used throughout the payload publication.	1..1	Language
	feedDescription	Feed description	A description of the information which is to be found in the publications originating from the particular feed (URL).	0..1	MultilingualString
	feedType	Feed type	A classification of the information which is to be found in the publications originating from the particular feed.	0..1	String
	publicationTime	Publication time	Date/time at which the payload publication was created.	1..1	DateTime
Source	reliable	Reliable	An indication as to whether the source deems the associated information to be reliable/correct. "True" indicates it is deemed reliable.	0..1	Boolean
	sourceCountry	Source country	EN ISO 3166-1 two-character country code of the source of the information.	0..1	CountryCode

Class name	Attribute name	Designation	Definition	Multiplicity	Type
	sourceIdentification	Source identification	Language independent textual code or identifier for the organization or the equipment that has produced the information.	0..1	String
	sourceName	Source name	The name of the organization which has produced the information relating to this version of the information.	0..1	MultilingualString
	sourceType	Source type	Information about the technology used for measuring the data or the method used for obtaining qualitative descriptions relating to this version of the information.	0..1	SourceTypeEnum
UrlLink	urlLinkAddress	URL link address	A Uniform Resource Locator (URL) address pointing to a resource available on the Internet from where further relevant information may be obtained.	1..1	Url
	urlLinkDescription	URL link description	Description of the relevant information available on the Internet from the URL link.	0..1	MultilingualString
	urlLinkType	URL link type	Details of the type of relevant information available on the Internet from the URL link.	0..1	UrlLinkTypeEnum

A.2.2 "DataValue" package

A.2.2.1 General

D2Payload/Common/Classes/DataValue

A.2.2.2 “DataValue” package classes

Table A.4— Classes of the “DataValue” package

Class name	Designation	Definition	Stereotype	Abstract
ApplicationRateValue	Application rate value	A measured or calculated value of the application rate of a substance.	D2Class	no
DataValue	Data value	A data value of something that can be measured or calculated. Any provided meta-data values specified in the attributes override any specified generic characteristics such as defined for a specific measurement in the MeasurementSiteTable.	D2Class	yes
DirectionBearingValue	Direction bearing value	A measured or calculated value of direction as a bearing.	D2Class	no
DirectionCompassValue	Direction compass value	A measured or calculated value of direction as a point of the compass.	D2Class	no
FloatingPointMetreDistanceValue	Floating-point metre distance value	A measured or calculated value of distance in metres in a floating-point format.	D2Class	no
FrictionValue	Friction value	A measured or calculated value of road surface friction.	D2Class	no
IntegerMetreDistanceValue	Integer metre distance value	A measured or calculated value of distance in whole metres.	D2Class	no
KilogramsConcentrationValue	Kilograms concentration value	A measured or calculated value of concentration of a substance in kilograms per unit volume.	D2Class	no
MicrogramsConcentrationValue	Micrograms concentration value	A measured or calculated value of concentration of a substance in micrograms per unit volume.	D2Class	no
PercentageValue	Percentage value	A measured or calculated value expressed as a percentage.	D2Class	no
PrecipitationIntensityValue	Precipitation intensity value	A measured or calculated value of the accumulation rate of precipitation.	D2Class	no
PressureValue	Pressure value	A measured or calculated value of atmospheric pressure.	D2Class	no
SpeedValue	Speed value	A measured or calculated value of speed.	D2Class	no

Class name	Designation	Definition	Stereotype	Abstract
TemperatureValue	Temperature value	A measured or calculated value of temperature.	D2Class	no
VehicleFlowValue	Vehicle flow value	A measured or calculated value of the flow rate of vehicles.	D2Class	no
WindSpeedValue	Wind speed value	A measured or calculated value of wind speed.	D2Class	no

A.2.2.3 Associations of “DataValue” package

There are no defined associations in the “DataValue” package.

A.2.2.4 “DataValue” package attributes

Table A.5— Attributes of the “DataValue” package

Class name	Attribute name	Designation	Definition	Multiplicity	Type
ApplicationRateValue	applicationRate	Application rate	A value of the rate of application of a substance expressed in kilogrammes per square metre.	1..1	IntensityKilogramsPerSquareMetre
DataValue	accuracy	Accuracy	The extent to which the value is expected to be free from error, measured as a percentage of the data value. 100 % means fully accurate.	0..1	Percentage
	computationalMethod	Computational method	Method of computation which has been used to compute this data value.	0..1	ComputationMethodEnum
	dataError	Data error	Indication of whether the value is deemed to be erroneous by the supplier (true = erroneous). If not present, the data value is assumed to be ok. This may be used when automatic fault detection information relating to sensors is available.	0..1	Boolean

Class name	Attribute name	Designation	Definition	Multiplicity	Type
	numberOfIncompleteInputs	Number of incomplete inputs	The number of inputs detected but not completed during the sampling or measurement period; e.g. vehicles detected entering but not exiting the detection zone.	0..1	NonNegativeInteger
	numberOfInputValuesUsed	Number of input values used	The number of input values used in the sampling or measurement period to determine the data value.	0..1	NonNegativeInteger
	reasonForDataError	Reason for data error	The reason why the value is deemed to be erroneous by the supplier.	0..1	MultilingualString
	smoothingFactor	Smoothing factor	Coefficient required when a moving average is computed to give specific weights to the former average and the new data. A typical formula is, F being the smoothing factor: New average = (old average) F + (new data) (1 - F).	0..1	Float
	standardDeviation	Standard deviation	The standard deviation of the sample of input values from which this value was derived, measured in the units of the data value.	0..1	Float
	supplierCalculatedDataQuality	Supplier calculated data quality	A measure of data quality assigned to the value by the supplier. 100 % equates to ideal/perfect quality. The method of calculation is supplier specific and needs to be agreed between supplier and client.	0..1	Percentage
DirectionBearingValue	directionBearing	Direction bearing	A value of direction expressed in terms of a bearing measured in whole degrees. Unless otherwise specified the reference direction corresponding to 0 degrees is North.	1..1	AngleInDegrees

Class name	Attribute name	Designation	Definition	Multiplicity	Type
DirectionCompassValue	directionCompass	Direction compass	A value of direction expressed in terms of points of the compass.	1..1	DirectionCompassEnum
FloatingPointMetreDistanceValue	distance	Distance	A value of distance expressed in metres in a floating-point format.	1..1	MetresAsFloat
FrictionValue	friction	Friction	Friction, usually a value between 0 and 1.	1..1	Float
IntegerMetreDistanceValue	integerMetreDistance	Integer distance metre	A value of distance expressed in metres in a non-negative integer format.	1..1	MetresAsNonNegativeInteger
KilogramsConcentrationValue	kilogramsConcentration	Kilograms concentration	A value defining the amount of a substance in a given volume (concentration) expressed in kilograms per cubic metre.	1..1	ConcentrationKilogramsPerCubicMetre
MicrogramsConcentrationValue	microgramsConcentration	Micrograms concentration	A value of the amount of a substance in a given volume (concentration) expressed in µg/m ³ (micrograms/cubic metre).	1..1	ConcentrationMicrogramsPerCubicMetre
PercentageValue	percentage	Percentage	A value expressed as a percentage.	1..1	Percentage
PrecipitationIntensityValue	millimetresPerHourIntensity	Millimetres per hour intensity	A value of precipitation intensity expressed in units of millimetres per hour.	1..1	IntensityMillimetresPerHour
PressureValue	pressure	Pressure	Atmospheric pressure.	1..1	Hectopascal
SpeedValue	speed	Speed	A value of speed expressed in kilometres per hour.	1..1	KilometresPerHour
TemperatureValue	temperature	Temperature	A value of temperature expressed in degrees Celsius.	1..1	TemperatureCelsius
VehicleFlowValue	vehicleFlowRate	Vehicle flow rate	A value of vehicle flow rate expressed in vehicles per hour.	1..1	VehiclesPerHour
WindSpeedValue	windSpeed	Wind speed	A value of wind speed expressed in metres per second.	1..1	MetresPerSecond

A.2.3 “Fault” package

A.2.3.1 General

D2Payload/Common/Classes/Fault

A.2.3.2 “Fault” package classes

Table A.6— Classes of the “Fault” package

Class name	Designation	Definition	Stereotype	Abstract
Fault	Fault	Information about a fault relating to a specific piece of equipment or process.	D2Class	no

A.2.3.3 Associations of “Fault” package

There are no defined associations in the “Fault” package.