

IDTA 02102

Fire Protection on Railway Vehicles

Version 1.0

August 2026

SPECIFICATION

Submodel Template of the
Asset Administration Shell



Submodel Template

IDTA approved

- 100% AAS compliant
- Consistent & interoperable
- Released by the AAS experts

IDTA 02102 V1.0

Imprint

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Chapter 1. General

1.1. About this document

This document is a part of an overall specification series [4]. Each part specifies the contents of a Submodel Template (SMT). The specifications of the Asset Administration Shell (AAS) are the basis for the Submodel Template specifications, see [3].

The target audience of the specification are developers and editors of technical documentation and manufacturer information, which are describing assets by means of the Asset Administration Shell (AAS) and therefore need to create a Submodel instance with a hierarchy of SubmodelElements. This document especially details on the question, which SubmodelElements with which semantic identification shall be used for this purpose.

This SMT will only be fully supported as of metamodel V3.1. V3.1 allows to assign idShorts to Elements within a SubmodelElementList (SML).

1.2. Scope of the Submodel

The submodel Fire Protection on Railway Vehicles template provides a framework for creating the information required for fire protection on railway vehicles in accordance with the underlying standard.

Fire protection certificates are essential elements of the safety documentation for railway vehicles. These certificates are based on fire test and assessment reports according to EN 45545-2 [7] and are issued for individual materials or components, or for defined groupings of components.

Having such submodel enables harmonized data exchange between suppliers and railway manufacturers, while ensuring efficient maintenance and updating of fire protection data throughout its entire life cycle.

1.3. Relevant standards for the Submodel template

- EN 45545-2 [7]

1.4. Explanations on used UML diagrams

For clarity and an improved legibility readers suggested to go through this section at first before reading the following chapters.

UML diagrams feature box-like elements, called "classes". These classes, typically Submodels, SubmodelElementCollections or SubmodelElementLists, typically feature a set of Properties or further SubmodelElements. These elements can have specific cardinalities.

The single classes are hierarchically organized by aggregation relations, these can be seen as "contains" relation.

For a further overview on UML diagrams please refer to [6] and [10].

Further details about used table formats please refer to Annex A.

Chapter 2. Information set for Submodel "RailwayFireProtection "

2.1. General

The Railway Fire Protection submodel provides a standardized digital representation of fire protection–relevant information for railway assets. Its top-level structure, RailwayFireProtection, comprises three main sections: ManufacturerInformation, FireProtectionCertificates, and Material. These sections respectively describe manufacturer-related data, compliance-related fire classification information, and fire-relevant material properties.

FireProtectionCertificates constitutes the compliance core of the submodel and is structured into the subordinate elements RequirementsSets and Reports. RequirementsSets specifies the applicable fire protection requirements, while Reports contains the corresponding verification evidence, such as test reports and certificates. [UML_Submodel] shows the UML-diagram defining the relevant properties which need to be set.

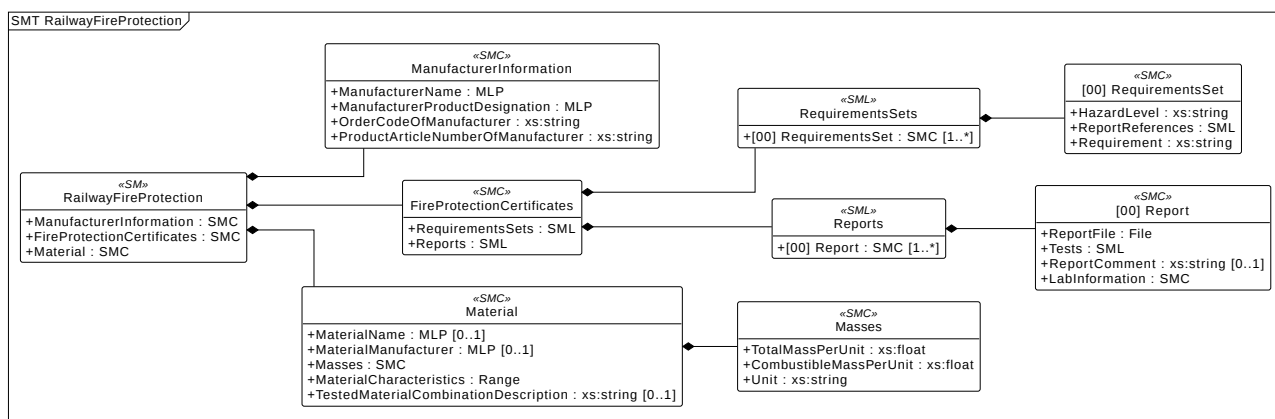


Figure 1. UML-Diagram for Submodel "RailwayFireProtection"

2.2. Submodel RailwayFireProtection

The SubmodelElements for this first level are described as follows.

Table 1. SubmodelElements of RailwayFireProtection

idShort:	RailwayFireProtection		
Class:	Submodel		
semanticId:	https://admin-shell.io/idta/cds/RailwayFireProtection/1		
Parent:	-		
Explanation:	Contains the fire protection information associated with the product or component.		
Element details:	-		
[SME type]	semanticId	[valueType]	card.
idShort	Description@en	example	

[SMC]	https://admin-shell.io/idta/cds/ManufacturerInformation/1	[]	1
ManufacturerInformation	identifies the material or component and its manufacturer, including product designation and reference identifiers, ensuring unambiguous attribution of the fire protection data.	4 elements	
[SMC]	https://admin-shell.io/idta/cds/FireProtectionCertificates/1	[]	1
FireProtectionCertificates	structures fire protection compliance by linking applicable requirements with their verification evidence, such as test reports and certificates in accordance with EN 45545-2.	2 elements	
[SMC]	https://admin-shell.io/idta/cds/Material/1	[]	1
Material	describes the fire-relevant characteristics of the materials used, providing the technical basis for fire behavior assessment and interpretation of test results.	5 elements	

2.3. SubmodelElements of ManufacturerInformation

The SubmodelElements are described as follows.

Table 2. SubmodelElements of ManufacturerInformation

idShort:	ManufacturerInformation		
Class:	SubmodelElementCollection		
semanticId:	https://admin-shell.io/idta/cds/ManufacturerInformation/1		
Parent:	RailwayFireProtection		
Explanation:	identifies the material or component and its manufacturer, including product designation and reference identifiers, ensuring unambiguous attribution of the fire protection data.		
Element details:	-		
[SME type]	semanticId	[valueType]	card.
idShort	Description@en	example	
[MLP]	https://admin-shell.io/idta/cds/ManufacturerName/1	[]	1
ManufacturerName	name of the organization legally responsible for manufacturing the product or component.	Generic Manufacturing Corp.@en	
[MLP]	https://admin-shell.io/idta/cds/ManufacturerProductDesignation/1	[]	1
ManufacturerProductDesignation	designation assigned by the manufacturer to identify the product or component within its product portfolio.	Modular FireSafe Component X100@en	

[Prop]	https://admin-shell.io/idta/cds/OrderCodeOfManufacturer/1	[String]	1
OrderCodeOfManufacturer	ordering identifier defined by the manufacturer to uniquely reference the product or component for purchasing purposes.	ORD-XS-000123	
[Prop]	https://admin-shell.io/idta/cds/ProductArticleNumberOfManufacturer/1	[String]	1
ProductArticleNumberOfManufacturer	article number used by the manufacturer to uniquely identify the product or component in catalogs and information systems	PAN-4587-AX9	

2.4. SubmodelElements of FireProtectionCertificates

The SubmodelElements are described as follows.

Table 3. SubmodelElements of FireProtectionCertificates

idShort:	FireProtectionCertificates		
Class:	SubmodelElementCollection		
semanticId:	https://admin-shell.io/idta/cds/FireProtectionCertificates/1		
Parent:	RailwayFireProtection		
Explanation:	structures fire protection compliance by linking applicable requirements with their verification evidence, such as test reports and certificates in accordance with EN 45545-2.		
Element details:	-		
[SME type]	semanticId	[valueType]	card.
idShort	Description@en	example	
[SML]	https://admin-shell.io/idta/cds/RequirementsSets/1	[]	1
Requirements Sets	list of requirement sets defining applicable fire protection requirements	1 elements	
[SML]	https://admin-shell.io/idta/cds/Reports/1	[]	1
Reports	list of reports providing verification evidence for fire protection compliance.	1 elements	

2.5. SubmodelElements of RequirementsSets

The SubmodelElements are described as follows.

Table 4. SubmodelElements of RequirementsSets

idShort:	RequirementsSets		
Class:	SubmodelElementList		
semanticId:	https://admin-shell.io/idta/cds/RequirementsSets/1		
Parent:	FireProtectionCertificates		
Explanation:	list of requirement sets defining applicable fire protection requirements		
Element details:	orderRelevant=No, typeValueListElement=SubmodelElementCollection		
[SME type]	semanticId	[valueType]	card.
idShort	Description@en	example	
[SMC]	https://admin-shell.io/idta/cds/RequirementsSet/1	□	1..*
Requirements Set	collection of fire protection requirements applicable to a specific product, component, or material.	3 elements	

2.6. SubmodelElements of RequirementsSet

The SubmodelElements are described as follows.

Table 5. SubmodelElements of RequirementsSet

idShort:	RequirementsSet		
Class:	SubmodelElementCollection		
semanticId:	https://admin-shell.io/idta/cds/RequirementsSet/1		
Parent:	RequirementsSets		
Explanation:	collection of fire protection requirements applicable to a specific product, component, or material.		
Element details:	-		
[SME type]	semanticId	[valueType]	card.
idShort	Description@en	example	

[Prop] HazardLevel	https://admin-shell.io/RailwayFireProtection/Submodel/1/HazardLevel hazard level indicating the achieved fire hazard classification of the product, component, or material according to the applicable fire protection standard. Following values can be assigned: "Compliant: Hazard Level 1" "Compliant: Hazard Level 2" "Compliant: Hazard Level 3" "Approved Functional Necessity Report" "Missing Test Results" "Not Compliant"	[String] Compliant: Hazard Level 3	1
[SML] ReportReferences	https://admin-shell.io/idta/cds/ReportReferences/1 list of references to reports providing evidence for compliance with requirements	[] 1 elements	1
[Prop] Requirement	https://admin-shell.io/idta/cds/Requirement/1 individual fire protection requirement to be fulfilled according to the applicable standard	[String] R1 requirement for hazard level HL3 according to EN 45545-2	1

Table 6. Hazard level values and their semanticIDs

Hazard level value	semanticId
Compliant: Hazard Level 1	https://admin-shell.io/idta/cds/HazardLevelValue/HL1/1
Compliant: Hazard Level 2	https://admin-shell.io/idta/cds/HazardLevelValue/HL2/1
Compliant: Hazard Level 3	https://admin-shell.io/idta/cds/HazardLevelValue/HL3/1
Approved Functional Necessity Report	https://admin-shell.io/idta/cds/HazardLevelValue/AFNR/1
Missing Test Results	https://admin-shell.io/idta/cds/HazardLevelValue/MTR/1
Not Compliant	https://admin-shell.io/idta/cds/HazardLevelValue/NC/1

2.7. SubmodelElements of ReportReferences

The SubmodelElements are described as follows.

Table 7. SubmodelElements of ReportReferences

idShort:	ReportReferences		
Class:	SubmodelElementList		
semanticId:	https://admin-shell.io/idta/cds/ReportReferences/1		
Parent:	RequirementsSet		
Explanation:	list of references to reports providing evidence for compliance with requirements		
Element details:	orderRelevant=No, typeValueListElement=ReferenceElement		
[SME type]	semanticId	[valueType]	card.
idShort	Description@en	example	
[Ref]	https://admin-shell.io/idta/cds/ReportReference/1	□	1..*
ReportReference	reference linking a requirement to the corresponding verification report or certificate	[GlobalReference, file://report.pdf]	

2.8. SubmodelElements of Reports

The SubmodelElements are described as follows.

Table 8. SubmodelElements of Reports

idShort:	Reports		
Class:	SubmodelElementList		
semanticId:	https://admin-shell.io/idta/cds/Reports/1		
Parent:	FireProtectionCertificates		
Explanation:	list of reports providing verification evidence for fire protection compliance.		
Element details:	orderRelevant=No, typeValueListElement=SubmodelElementCollection		
[SME type]	semanticId	[valueType]	card.
idShort	Description@en	example	
[SMC]	https://admin-shell.io/idta/cds/Report/1	□	1..*
Report	collection of a report providing verification evidence for fire protection compliance.	4 elements	

2.9. SubmodelElements of Report

The SubmodelElements are described as follows.

Table 9. SubmodelElements of Report

idShort:	Report		
Class:	SubmodelElementCollection		
semanticId:	https://admin-shell.io/idta/cds/Report/1		
Parent:	Reports		
Explanation:	collection of a report providing verification evidence for fire protection compliance.		
Element details:	-		
[SME type]	semanticId	[valueType]	card.
idShort	Description@en	example	
[File]	https://admin-shell.io/idta/cds/ReportFile/1	[]	1
ReportFile	digital file containing the report document, such as a test report or certificate	/aasx/files/data sheet_en.pdf	
[SML]	https://admin-shell.io/idta/cds/Tests/1	[]	1
Tests	list of tests performed to verify conformity with specified fire protection requirements.	1 elements	
[Prop]	https://admin-shell.io/idta/cds/ReportComment/1	[String]	0..1
ReportComment	additional remarks or notes related to the report and its content	test results demonstrate compliance with EN 45545-2 requirements for the intended application	
[SMC]	https://admin-shell.io/idta/cds/LabInformation/1	[]	1
LabInformation	collection of information describing the laboratory responsible for performing the tests	4 elements	

2.10. SubmodelElements of Tests

The SubmodelElements are described as follows.

Table 10. SubmodelElements of Tests

idShort:	Tests
-----------------	--------------

Class:	SubmodelElementList		
semanticId:	https://admin-shell.io/idta/cds/Tests/1		
Parent:	Report		
Explanation:	list of tests performed to verify conformity with specified fire protection requirements.		
Element details:	orderRelevant=No, typeValueListElement=SubmodelElementCollection		
[SME type]	semanticId	[valueType]	card.
idShort	Description@en	example	
[SMC]	https://admin-shell.io/idta/cds/Test/1	[]	1..*
Test	collection of test-related information	5 elements	

2.11. SubmodelElements of Test

The SubmodelElements are described as follows.

Table 11. SubmodelElements of Test

idShort:	Test		
Class:	SubmodelElementCollection		
semanticId:	https://admin-shell.io/idta/cds/Test/1		
Parent:	Tests		
Explanation:	collection of test-related information		
Element details:	-		
[SME type]	semanticId	[valueType]	card.
idShort	Description@en	example	
[Prop]	https://admin-shell.io/idta/cds/TestProcedure/1	[String]	1
TestProcedure	description of the test method or procedure applied to verify fire protection requirements	cone calorimeter test according to EN ISO 5660-1	
[Prop]	https://admin-shell.io/idta/cds/TestResult/1	[String]	1
TestResult	outcome of the performed fire protection test, indicating conformity or non-conformity	requirement R1 fulfilled for hazard level HL3	

[Prop] TestDate	https://admin-shell.io/idta/cds/TestDate/1 date on which the fire protection test was performed	[Date] 2026-07-22	1
[Prop] TestComment	https://admin-shell.io/idta/cds/TestComment/1 additional remarks or observations related to the performed test	[String] measured heat release rate and MARHE values within specified limits	0..1
[Prop] TestReportNumber	https://admin-shell.io/idta/cds/TestReportNumber/1 unique identifier assigned to the fire protection test report by the issuing body	[String] FR-TEST-2026-00123	1

2.12. SubmodelElements of LabInformation

The SubmodelElements are described as follows.

Table 12. SubmodelElements of LabInformation

idShort:	LabInformation		
Class:	SubmodelElementCollection		
semanticId:	https://admin-shell.io/idta/cds/LabInformation/1		
Parent:	Report		
Explanation:	collection of information describing the laboratory responsible for performing the tests		
Element details:	-		
[SME type]	semanticId	[valueType]	card.
idShort	Description@en	example	
[Prop] LabName	https://admin-shell.io/idta/cds/LabName/1 name of the laboratory that carried out the fire protection test	[String] Independent Fire Testing Laboratory Ltd.	1

[SMC]	https://admin-shell.io/idta/cds/LabAddress/1	[]	1
LabAddress	supplementalSemanticId: https://admin-shell.io/smt-dropin/smt-dropin-use/1/0 reference to the address or contact information of the testing laboratory drop-in definition of the Contact Information 1.0 Submodel; all or a subset of the defined elements of the Contact Information 1.0 Submodel may be used within this SMC.	0 elements	
[Prop]	https://admin-shell.io/idta/cds/LabAccreditation/1	[String]	0..1
LabAccreditation	information about the laboratory's accreditation according to relevant standards or schemes	accredited according to ISO/IEC 17025 for fire testing methods (EN ISO 5660-1, EN ISO 5659-2)	
[Prop]	https://admin-shell.io/idta/cds/ReportAuthor/1	[String]	0..1
ReportAuthor	name of the person or organization responsible for creating or issuing the report	Fire Testing Laboratory Certification Body	

2.13. SubmodelElements of Material

The SubmodelElements are described as follows.

Table 13. SubmodelElements of Material

idShort:	Material		
Class:	SubmodelElementCollection		
semanticId:	https://admin-shell.io/idta/cds/Material/1		
Parent:	RailwayFireProtection		
Explanation:	describes the fire-relevant characteristics of the materials used, providing the technical basis for fire behavior assessment and interpretation of test results.		
Element details:	-		
[SME type]	semanticId	[valueType]	card.
idShort	Description@en	example	

[MLP]	https://admin-shell.io/idta/cds/MaterialName/1	[]	0..1
MaterialName	name of the material used	flame-retardant polymer composite@en	
[MLP]	https://admin-shell.io/idta/cds/MaterialManufacturer/1	[]	0..1
MaterialManufacturer	name of the organization responsible for producing the	Advanced Materials Solutions Ltd.@en	
[SMC]	https://admin-shell.io/idta/cds/Masses/1	[]	1
Masses	mass-related characteristics of the material, used for fire behavior assessment	3 elements	
[Range]	https://admin-shell.io/idta/cds/MaterialCharacteristics/1	[]	1
MaterialCharacteristics	normalized index (0–100) derived from fire performance parameters according to EN-45545-2	0 .. 100	
[Prop]	https://admin-shell.io/idta/cds/TestedMaterialCombinationDescription/1	[String]	0..1
TestedMaterialCombinationDescription	description of the material combination as tested in fire protection assessments	multi-layer assembly consisting of polymer composite panel with surface coating and insulation substrate	

2.14. SubmodelElements of Masses

The SubmodelElements are described as follows.

Table 14. SubmodelElements of Masses

idShort:	Masses
Class:	SubmodelElementCollection
semanticId:	https://admin-shell.io/idta/cds/Masses/1
Parent:	Material
Explanation:	mass-related characteristics of the material, used for fire behavior assessment
Element details:	-

[SME type]	semanticId	[valueType]	card.
idShort	Description@en	example	
[Prop]	https://admin-shell.io/idta/cds/TotalMassPerUnit/1	[Float]	1
TotalMassPerUnit	total mass of the material per defined unit, used for fire behavior assessment	12.324	
[Prop]	https://admin-shell.io/idta/cds/CombustibleMassPerUnit/1	[Float]	1
CombustibleMassPerUnit	portion of the material mass per unit that is combustible	1.543	
[Prop]	https://admin-shell.io/idta/cds/Unit/1	[String]	1
Unit	unit of measure for the stated masses; should be one of kg, kg/m, kg/m ² or kg/m ³	kg/m ²	

Annex A. Explanations on used table formats

1. General

The used tables in this document try to outline information as concise as possible. They do not convey all information on Submodels and SubmodelElements. For this purpose, the definitive definitions are given by a separate file in form of an AASX file of the Submodel template and its elements.

2. Tables on Submodels and SubmodelElements

For clarity and brevity, a set of rules is used for the tables for describing Submodels and SubmodelElements.

- The tables follow in principle the same conventions as in [5].
- The table heads abbreviate 'cardinality' with 'card'.
- The tables often place two informations in different rows of the same table cell. In this case, the first information is marked out by sharp brackets [] from the second information. A special case are the semanticIds, which are marked out by the format: (type)(local)[idType]value.
- The types of SubmodelElements are abbreviated (see Table 6):

Table 15. Abbreviations for SubmodelElements

SME type	SubmodelElement type
Blob	Blob
Cap	Capability
Ent	Entity
Evt	Event
File	File
MLP	MultiLanguageProperty
Opr	Operation
Prop	Property
Range	Range
Ref	ReferenceElement
Rel	RelationshipElement
RelA	AnnotatedRelationshipElement
SMC	SubmodelElementCollection
SME	SubmodelElement type
SML	SubmodelElementList

- If an idShort ends with '___00__', this indicates a suffix of the respective length (here: 2) of decimal digits, in order to make the idShort unique. A different idShort might be chosen, as long as it is unique in the parent's context.
- The Keys of semanticId in the main section feature only idType and value, such as: <https://admin-shell.io/vdi/2770/1/0/DocumentId/Id>. The attribute "type" (typically "ConceptDescription" and "(local)" or

"GlobalReference") need to be set accordingly; see [6].

- If a table does not contain a column with "parent" heading, all represented attributes share the same parent. This parent is denoted in the head of the table.
- Multi-language strings are represented by the text value, followed by '@'-character and the ISO 639 language code: example@EN.
- The [valueType] is only given for Properties.

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