

IDTA 02075

Factory Automation

Data for Plant

Planning

June 2026

SPECIFICATION

Submodel Template of the
Asset Administration Shell



Submodel Template

IDTA **approved**

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

Imprint

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1 General

1.1 About this document

This document is a part of a specification series. Each part specifies the contents of a Submodel template for the Asset Administration Shell (AAS). The AAS is described in [1], [2], [3] and [6]. First exemplary Submodel contents were described in [4], while the actual format of this document was derived by the "Administration Shell in Practice" [5]. The format aims to be very concise, giving only minimal necessary information for applying a Submodel template, while leaving deeper descriptions and specification of concepts, structures and mapping to the respective documents [1] to [6].

The target group of the specification are developers and editors of technical documentation and manufacturer information, which are describing assets in smart manufacturing 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.

1.2 Scope of the Submodel

The Submodel „Factory Automation Data for Plant Planning“ defines the scope and boundaries of the standardized representation of all engineering building services (TGA) data in the context of digital factory and plant planning. It is specifically designed for OEM planning tools as well as BIM/CAD systems that capture, transmit, and integrate this data as part of an Asset Administration Shell (AAS) and integrate it into further planning projects. To address the growing complexity, speed, and flexibility of production environments, the Submodel ensures that all relevant engineering building services data circulates seamlessly along the entire planning chain and enables automated workflows without the need for manual post-processing.

The focus of this Submodel is to provide a comprehensive representation of room and hall structures, including all geometric parameters such as coordinates, dimensions, area and volume specifications. Furthermore, media-carrying systems including conduits such as pipes and ducts, as well as functional components like valves, sensors, and media transfer points are semantically annotated, for example with manufacturer and supplier identifiers or standard references. Real-time sensor data and operational telemetry deliberately remain outside the scope of application in order to focus on static, preconfigured planning data.

This enables OEM tools to automatically export all TGA and hall data from authoring CAD tools to provide as input to simulation, analysis, and collaboration environments. As a result, a consistent and quality assured data foundation is established, which can be accessed equally by all systems involved in factory and plant planning to significantly increasing efficiency and reliability.

1.3 Relevant standards for the Submodel template

AutomationML, as defined in the current CAEX 3.0 specification, constitutes the central standard underlying the Submodel Factory Automation Data for Plant Planning. AutomationML defines an open, XML-based schema that enables the modeling and exchange of engineering data, and provides key structural elements such as RoleClassLib, AttributeTypeLib, and InterfaceClassLib, which are used to semantically model TGA components. The Application Recommendation for AAS–AML Mapping [7] describes how these CAEX structures can be transformed into AAS SubmodelElements, enabling AutomationML models to be integrated into AAS instances without loss of information and processed by OEM planning tools. Thus, AutomationML forms the technological foundation for seamless and lossless data exchange between CAD/BIM environments and AAS-based factory planning systems.

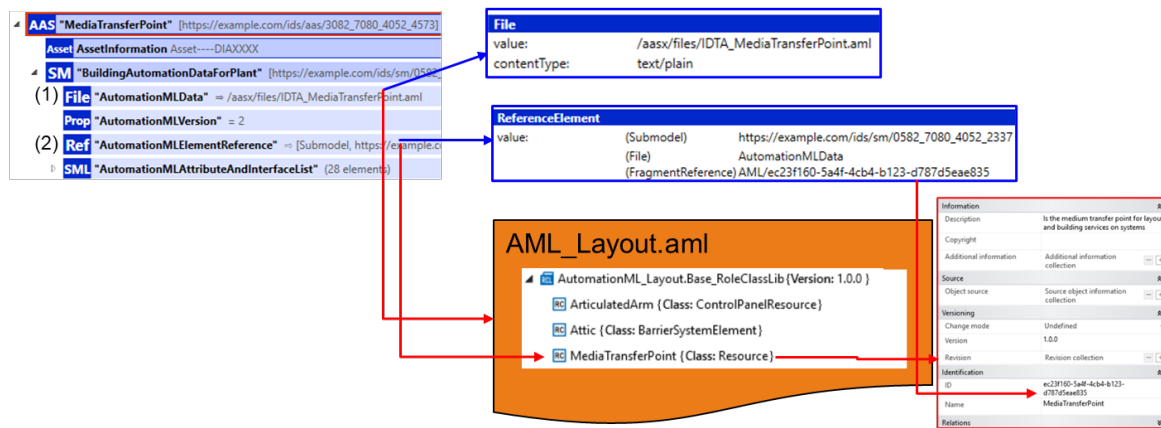


Figure 1: Integration structure

The integration structure depicted in *Figure 1* follows the application recommendation “AutomationML in Asset Administration Shells”. The SubmodelElement names are predefined, and the corresponding values from the AutomationML file are mapped into the AAS. Each Submodel (SM) is intended to cover information required for a certain use case/domain along the life cycle of the asset. In *Figure 1*, the AAS components are shown in blue, while the AutomationML file components are highlighted in red and orange.

(1) The File SubmodelElement is intended to give the reference to the AutomationML project:
`.../IDTA_MediaTransferPoint.aml`

(2) The ReferenceElement SubmodelElement provides a reference to the AutomationML element that contains the engineering information of the asset: `AML/ec23f160-5a4f-4cb4-b123-d787d5eae835` (Role Class Media TransferPoint). This reference corresponds to the example shown in *Figure 26*. It represents the unique AML-ID of the element, which differs for each individual element.

1.4 Use cases, requirements and design decisions

The Submodel “Factory Automation Data for Plant Planning” enables a consistent exchange of engineering building services (TGA) data between planning and production environments. For this purpose, the provision and transfer of the corresponding RoleClass Library is required. It defines the semantic meaning of relevant entities such as rooms, ducts, pipes, sensors, or valves. The exchange of this library as part of the planning data ensures that OEM tools, BIM/CAD systems, and AAS-based platforms can rely on a unified semantic foundation.

Through this approach, the Submodel provides a robust and semantically transparent basis for automated and quality-assured workflows across factory and plant planning processes.

To guarantee interoperability, all stakeholders must agree on the applicable RoleClasses and their identifiers before data exchange. This coordination ensures that each system interprets the SubmodelElements consistently.

2 Submodel Factory Automation for Plant Planning

2.1 Approach

The overall approach is based on the AutomationML Application Recommendation: Building Services Engineering, which has been published within the AutomationML e.V. This recommendation defines the domain-specific engineering concepts, their attributes, and their semantic relationships as part of the standardized RoleClass Library. Furthermore, it identifies which of these attributes remain relevant beyond the initial engineering phase and therefore provide value across subsequent lifecycle phases. These lifecycle-relevant attributes constitute the primary candidates for integration into the AAS, ensuring that the Submodel supports consistent information availability throughout the asset lifecycle.

The Submodel template presented in this document adopts these predefined AutomationML structures and transfers them into the AAS context. As described in Section 1.3, the connection between the AutomationML model and the AAS is realized via dedicated SubmodelElements, in particular through references to the AutomationML file and the unique identifiers of the corresponding AutomationML elements.

The *MediaTransferPoint* concept has been selected as a representative example to demonstrate the general structure and modelling approach of how an AutomationML-defined engineering concept is transformed into a Submodel template. Based on the attributes and semantic definitions provided in the AutomationML Application Recommendation, the corresponding SubmodelElements and Properties have been defined according to the AAS metamodel and structured as shown in Figure 2.

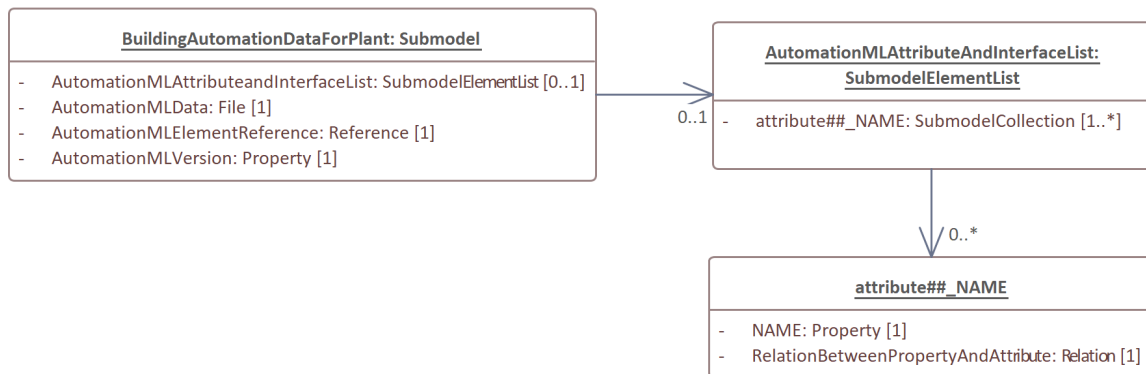


Figure 2: UML diagram for Submodel Template

The same mapping principles and structural patterns can be applied to other engineering concepts defined in the AutomationML Application Recommendation. By applying this standardized approach, additional AutomationML RoleClasses and their lifecycle-relevant attributes can be consistently integrated into the submodel template.

2.2 Attributes MediaTransferPoint

Table 1: Elements of SubmodelElementList AutomationMLAttributeAndInterfaceList

idShort:	AutomationMLAttributeAndInterfaceList		
Class:	SubmodelElementList		
semanticId:	https://www.automationml.org/AutomationML_AAS_SemanticIDs/General/AttributeAndInterfaceList		
Parent:	FactoryAutomationDataForPlant		
Explanation:	List of AutomationML attributes to be published.		
Element details:	orderRelevant=No, typeValueListElement=SubmodelElementCollection		
[SME type]	semanticId = [idType]value	[valueType]	card.
idShort	Description@en	example	
[SMC] attribute00_onOff	https://admin-shell.io/idta-aml/SubmodelTemplate/FactoryAutomation/onOff/1/0 supplementalSemanticId: https://www.automationml.org/AutomationML_AAS_SemanticIDs/FactoryAutomationDataForPlant/AttributeContainer Collection of AutomationML Attributes to be published as properties	2 elements	1
[SMC] attribute01_article Number	https://admin-shell.io/idta-aml/SubmodelTemplate/FactoryAutomation/articleNumber/1/0 supplementalSemanticId: https://www.automationml.org/AutomationML_AAS_SemanticIDs/FactoryAutomationDataForPlant/AttributeContainer Collection of AutomationML Attributes to be published as properties	2 elements	1
[SMC] attribute02_name OfSupplier	https://admin-shell.io/idta-aml/SubmodelTemplate/FactoryAutomation/nameofSupplier/1/0 supplementalSemanticId: https://www.automationml.org/AutomationML_AAS_SemanticIDs/FactoryAutomationDataForPlant/AttributeContainer Collection of AutomationML Attributes to be published as properties	2 elements	1
[SMC] attribute03_name	https://admin-shell.io/idta-aml/SubmodelTemplate/FactoryAutomation/Name/1/0	2 elements	1

	supplementalSemanticID: https://www.automationml.org/AutomationML_AAS_SemanticIDs/FactoryAutomationDataForPlant/AttributeContainer Collection of AutomationML Attributes to be published as properties		
[SMC] attribute04_description	https://admin-shell.io/idta-aml/SubmodelTemplate/FactoryAutomation/description/1/0 supplementalSemanticID: https://www.automationml.org/AutomationML_AAS_SemanticIDs/FactoryAutomationDataForPlant/AttributeContainer Collection of AutomationML Attributes to be published as properties	2 elements	1
[SMC] attribute05_medium	https://admin-shell.io/idta-aml/SubmodelTemplate/FactoryAutomation/medium/1/0 supplementalSemanticID: https://www.automationml.org/AutomationML_AAS_SemanticIDs/FactoryAutomationDataForPlant/AttributeContainer Collection of AutomationML Attributes to be published as properties	2 elements	1
[SMC] attribute06_comment	https://admin-shell.io/idta-aml/SubmodelTemplate/FactoryAutomation/comment/1/0 supplementalSemanticID: https://www.automationml.org/AutomationML_AAS_SemanticIDs/FactoryAutomationDataForPlant/AttributeContainer Collection of AutomationML Attributes to be published as properties	2 elements	1
[SMC] attribute07_plant	https://admin-shell.io/idta-aml/SubmodelTemplate/FactoryAutomation/plant/1/0 supplementalSemanticID: https://www.automationml.org/AutomationML_AAS_SemanticIDs/FactoryAutomationDataForPlant/AttributeContainer Collection of AutomationML Attributes to be published as properties	2 elements	1
[SMC] attribute08_diameter	https://admin-shell.io/idta-aml/SubmodelTemplate/FactoryAutomation/diameter/1/0 supplementalSemanticID: https://www.automationml.org/AutomationML_AAS_SemanticIDs/FactoryAutomationDataForPlant/AttributeContainer	2 elements	1

	Collection of AutomationML Attributes to be published as properties		
[SMC] attribute09_overallLength	https://admin-shell.io/idta-aml/SubmodelTemplate/FactoryAutomation/overallLength/1/0 supplementalSemanticID: https://www.automationml.org/AutomationML_AAS_SemanticIDs/FactoryAutomationDataForPlant/AttributeContainer Collection of AutomationML Attributes to be published as properties	2 elements	1
[SMC] attribute10_nominalVoltage	https://admin-shell.io/idta-aml/SubmodelTemplate/FactoryAutomation/nominalVoltage/1/0 supplementalSemanticID: https://www.automationml.org/AutomationML_AAS_SemanticIDs/FactoryServices/AttributeContainer Collection of AutomationML Attributes to be published as properties	2 elements	1
[SMC] attribute11_nominalPowerConsumption	https://admin-shell.io/idta-aml/SubmodelTemplate/FactoryAutomation/nominalPowerConsumption/1/0 supplementalSemanticID: https://www.automationml.org/AutomationML_AAS_SemanticIDs/FactoryAutomationDataForPlant/AttributeContainer Collection of AutomationML Attributes to be published as properties	2 elements	1
[SMC] attribute12_maximalPowerConsumption	https://admin-shell.io/idta-aml/SubmodelTemplate/FactoryAutomation/maximalPowerConsumption/1/0 supplementalSemanticID: https://www.automationml.org/AutomationML_AAS_SemanticIDs/FactoryAutomationDataForPlant/AttributeContainer Collection of AutomationML Attributes to be published as properties	2 elements	1
[SMC] attribute13_powerNominal	https://admin-shell.io/idta-aml/SubmodelTemplate/FactoryAutomation/powerNominal/1/0 supplementalSemanticID: https://www.automationml.org/AutomationML_AAS_SemanticIDs/FactoryAutomationDataForPlant/AttributeContainer Collection of AutomationML Attributes to be published as properties	2 elements	1

[SMC] attribute14_power Maximal	https://admin-shell.io/idta-aml/SubmodelTemplate/FactoryAutomation/powerMaximal/1/0 supplementalSemanticID: https://www.automationml.org/AutomationML_AAS_SemanticIDs/FactoryAutomationDataForPlant/AttributeContainer Collection of AutomationML Attributes to be published as properties	2 elements	1
[SMC] attribute15_xframe	https://admin-shell.io/idta-aml/SubmodelTemplate/FactoryAutomation/xframe/1/0 supplementalSemanticID: https://www.automationml.org/AutomationML_AAS_SemanticIDs/FactoryAutomationDataForPlant/AttributeContainer Collection of AutomationML Attributes to be published as properties	2 elements	1
[SMC] attribute16_yframe	https://admin-shell.io/idta-aml/SubmodelTemplate/FactoryAutomation/yframe/1/0 supplementalSemanticID: https://www.automationml.org/AutomationML_AAS_SemanticIDs/FactoryAutomationDataForPlant/AttributeContainer Collection of AutomationML Attributes to be published as properties	2 elements	1
[SMC] attribute17_zframe	https://admin-shell.io/idta-aml/SubmodelTemplate/FactoryAutomation/zframe/1/0 supplementalSemanticID: https://www.automationml.org/AutomationML_AAS_SemanticIDs/FactoryAutomationDataForPlant/AttributeContainer Collection of AutomationML Attributes to be published as properties	2 elements	1
[SMC] attribute18_rxframe	https://admin-shell.io/idta-aml/SubmodelTemplate/FactoryAutomation/rxframe/1/0 supplementalSemanticID: https://www.automationml.org/AutomationML_AAS_SemanticIDs/FactoryAutomationDataForPlant/AttributeContainer Collection of AutomationML Attributes to be published as properties	2 elements	1
[SMC] attribute19_ryframe	https://admin-shell.io/idta-aml/SubmodelTemplate/FactoryAutomation/ryframe/1/0 supplementalSemanticID:	2 elements	1

	https://www.automationml.org/AutomationML_AAS_SemanticIDs/FactoryAutomationDataForPlant/AttributeContainer Collection of AutomationML Attributes to be published as properties		
[SMC] attribute20_rzframe	https://admin-shell.io/idta-aml/SubmodelTemplate/FactoryAutomation/rzframe/1/0 supplementalSemanticID: https://www.automationml.org/AutomationML_AAS_SemanticIDs/FactoryAutomationDataForPlant/AttributeContainer Collection of AutomationML Attributes to be published as properties	2 elements	1

Table 2: Elements of SubmodelElementCollection onOff

idShort:	AutomationMLAttributeAndInterfaceList_00		
Class:	SubmodelElementCollection		
semanticId:	https://www.automationml.org/AutomationML_AAS_SemanticIDs/FactoryAutomationDataForPlant/AttributeContainer		
Parent:	AutomationMLAttributeAndInterfaceList		
Explanation:	Collection of AutomationML Attributes to be published as properties@en		
[SME type]	semanticId = [idType]value	[valueType]	card.
idShort	Description@en	example	
[Prop] onOff	https://admin-shell.io/idta-aml/SubmodelTemplate/FactoryAutomation/onOff/1/0 supplementalSemanticID: https://www.automationml.org/AutomationML_AAS_SemanticIDs/FactoryAutomationDataForPlant/AutomationMLAttribute On/Off is a binary state with only two possible values: 'On' (true/active) or 'Off' (false/inactive).	[boolean]	1
[Rel] RelationBetweenPropertyAndAttribute	https://www.automationml.org/AutomationML_AAS_SemanticIDs/FactoryAutomationDataForPlant/AttributeRelation Relation between related property SubmodelElements and corresponding AutomationML attribute.	Reference Example: [Submodel, https://example.com/ids/sm/9044_3140_3062_0301], [File, AutomationMLData], [FragmentReference, AML/6eb1965c-9a52-49ac-a19a-a4a32db75317.onOff] [Submodel, https://example.com/ids/sm/9044_3140_3062_0301], [SubmodelElementList, AutomationMLAttributeAndInterfaceList], [SubmodelElementCollection, 0], [Property, onOff]	1

Table 3: Elements of SubmodelElementCollection articleNumber

idShort:	AutomationMLAttributeAndInterfaceList_01		
Class:	SubmodelElementCollection		
semanticId:	https://www.automationml.org/AutomationML_AAS_SemanticIDs/FactoryAutomationDataForPlant/AttributeContainer		
Parent:	AutomationMLAttributeAndInterfaceList		
Explanation:	Collection of AutomationML Attributes to be published as properties@en		
[SME type]	semanticId = [idType]value	[valueType]	card.
idShort	Description@en	example	
[Prop] articleNumber	https://admin-shell.io/idta-aml/SubmodelTemplate/FactoryAutomation/articleNumber/1/0 supplementalSemanticID: https://www.automationml.org/AutomationML_AAS_SemanticIDs/FactoryAutomationDataForPlant/AutomationMLAttribute Unique product order identifier of the supplier	[string]	1
[Rel] RelationBetweenPropertyAndAttribute	https://www.automationml.org/AutomationML_AAS_SemanticIDs/FactoryAutomationDataForPlant/AttributeRelation Relation between related property SubmodelElements and corresponding AutomationML attribute.	Reference Example: [Submodel, https://example.com/ids/sm/9044_3140_3062_0301], [File, AutomatinMLData], [FragmentReference, AML/6eb1965c-9a52-49ac-a19a-a4a32db75317.articleNumber] [Submodel, https://example.com/ids/sm/9044_3140_3062_0301], [SubmodelElementList, AutomationMLAttributeAndInterfaceList], [SubmodelElementCollection, 1], [Property, articleNumber]	1

Table 4: Elements of SubmodelElementCollection nameOfSupplier

idShort:	AutomationMLAttributeAndInterfaceList_02		
Class:	SubmodelElementCollection		
semanticId:	https://www.automationml.org/AutomationML_AAS_SemanticIDs/FactoryAutomationDataForPlant/AttributeContainer		
Parent:	AutomationMLAttributeAndInterfaceList		
Explanation:	Collection of AutomationML Attributes to be published as properties@en		
[SME type]	semanticId = [idType]value	[valueType]	card.
idShort	Description@en	example	
[Prop] nameOfSupplier	https://admin-shell.io/idta-aml/SubmodelTemplate/FactoryAutomation/nameofSupplier/1/0 supplementalSemanticID: https://www.automationml.org/AutomationML_AAS_SemanticIDs/FactoryAutomationDataForPlant/AutomationMLAttribute Name of supplier which provides the customer with a product or a service	[string]	1
[Rel] RelationBetweenPropertyAndAttribute	https://www.automationml.org/AutomationML_AAS_SemanticIDs/FactoryAutomationDataForPlant/AttributeRelation Relation between related property SubmodelElements and corresponding AutomationML attribute.	Reference Example: [Submodel, https://example.com/ids/sm/9044_3140_3062_0301], [File, AutomatinMLData], [FragmentReference, AML/6eb1965c-9a52-49ac-a19a-a4a32db75317.nameOfSupplier] [Submodel, https://example.com/ids/sm/9044_3140_3062_0301], [SubmodelElementList, AutomationMLAttributeAndInterfaceList], [SubmodelElementCollection, 2], [Property, nameOfSupplier]	1

Table 5: Elements of SubmodelElementCollection name

idShort:	AutomationMLAttributeAndInterfaceList_03		
Class:	SubmodelElementCollection		
semanticId:	https://www.automationml.org/AutomationML_AAS_SemanticIDs/FactoryAutomationDataForPlant/AttributeContainer		
Parent:	AutomationMLAttributeAndInterfaceList		
Explanation:	Collection of AutomationML Attributes to be published as properties@en		
[SME type]	semanticId = [idType]value	[valueType]	card.
idShort	Description@en	example	
[Prop] name	https://admin-shell.io/idta-aml/SubmodelTemplate/FactoryAutomation/name/1/0 supplementalSemanticID: https://www.automationml.org/AutomationML_AAS_SemanticIDs/FactoryAutomationDataForPlant/AutomationMLAttribute Designation of the object	[string]	1
[Rel] RelationBetweenPropertyAndAttribute	https://www.automationml.org/AutomationML_AAS_SemanticIDs/FactoryAutomationDataForPlant/AttributeRelation Relation between related property SubmodelElements and corresponding AutomationML attribute.	Reference Example: [Submodel, https://example.com/ids/sm/9044_3140_3062_0301], [File, AutomatinMLData], [FragmentReference, AML/6eb1965c-9a52-49ac-a19a-a4a32db75317.name] [Submodel, https://example.com/ids/sm/9044_3140_3062_0301], [SubmodelElementList, AutomationMLAttributeAndInterfaceList], [SubmodelElementCollection, 3], [Property, name]	1

Table 6: Elements of SubmodelElementCollection Description

idShort:	AutomationMLAttributeAndInterfaceList_04		
Class:	SubmodelElementCollection		
semanticId:	https://www.automationml.org/AutomationML_AAS_SemanticIDs/FactoryAutomationDataForPlant/AttributeContainer		
Parent:	AutomationMLAttributeAndInterfaceList		
Explanation:	Collection of AutomationML Attributes to be published as properties@en		
[SME type]	semanticId = [idType]value	[valueType]	card.
idShort	Description@en	example	
[Prop] description	https://admin-shell.io/idta-aml/SubmodelTemplate/FactoryAutomation/description/1/0 supplementalSemanticID: https://www.automationml.org/AutomationML_AAS_SemanticIDs/FactoryAutomationDataForPlant/AutomationMLAttribute Describes the components.	[string]	1
[Rel] RelationBetweenPropertyAndAttribute	https://www.automationml.org/AutomationML_AAS_SemanticIDs/FactoryAutomationDataForPlant/AttributeRelation Relation between related property SubmodelElements and corresponding AutomationML attribute.	Reference Example: [Submodel, https://example.com/ids/sm/9044_3140_3062_0301], [File, AutomatinMLData], [FragmentReference, AML/6eb1965c-9a52-49ac-a19a-a4a32db75317.description] [Submodel, https://example.com/ids/sm/9044_3140_3062_0301], [SubmodelElementList, AutomationMLAttributeAndInterfaceList], [SubmodelElementCollection, 4], [Property, description]	1

Table 7: Elements of SubmodelElementCollection medium

idShort:	AutomationMLAttributeAndInterfaceList_05		
Class:	SubmodelElementCollection		
semanticId:	https://www.automationml.org/AutomationML_AAS_SemanticIDs/FactoryAutomationDataForPlant/AttributeContainer		
Parent:	AutomationMLAttributeAndInterfaceList		
Explanation:	Collection of AutomationML Attributes to be published as properties@en		
[SME type]	semanticId = [idType]value	[valueType]	card.
idShort	Description@en	example	
[Prop] medium	https://admin-shell.io/idta-aml/SubmodelTemplate/FactoryAutomation/medium/1/0 supplementalSemanticID: https://www.automationml.org/AutomationML_AAS_SemanticIDs/FactoryAutomationDataForPlant/AutomationMLAttribute Designation of medium or air type name	[string]	1
[Rel] RelationBetweenPropertyAndAttribute	https://www.automationml.org/AutomationML_AAS_SemanticIDs/FactoryAutomationDataForPlant/AttributeRelation Relation between related property SubmodelElements and corresponding AutomationML attribute.	Reference Example: [Submodel, https://example.com/ids/sm/9044_3140_3062_0301], [File, AutomatinMLData], [FragmentReference, AML/6eb1965c-9a52-49ac-a19a-a4a32db75317.medium] [Submodel, https://example.com/ids/sm/9044_3140_3062_0301], [SubmodelElementList, AutomationMLAttributeAndInterfaceList], [SubmodelElementCollection, 5], [Property, medium]	1

Table 8: Elements of SubmodelElementCollection comment

idShort:	AutomationMLAttributeAndInterfaceList_06		
Class:	SubmodelElementCollection		
semanticId:	https://www.automationml.org/AutomationML_AAS_SemanticIDs/FactoryAutomationDataForPlant/AttributeContainer		
Parent:	AutomationMLAttributeAndInterfaceList		
Explanation:	Collection of AutomationML Attributes to be published as properties@en		
[SME type]	semanticId = [idType]value	[valueType]	card.
idShort	Description@en	example	
[Prop] comment	https://admin-shell.io/idta-aml/SubmodelTemplate/FactoryAutomation/comment/1/0 supplementalSemanticID: https://www.automationml.org/AutomationML_AAS_SemanticIDs/FactoryAutomationDataForPlant/AutomationMLAttribute A feature is generally a recognizable property	[string]	1
[Rel] RelationBetweenPropertyAndAttribute	https://www.automationml.org/AutomationML_AAS_SemanticIDs/FactoryAutomationDataForPlant/AttributeRelation Relation between related property SubmodelElements and corresponding AutomationML attribute.	Reference Example: [Submodel, https://example.com/ids/sm/9044_3140_3062_0301], [File, AutomatinMLData], [FragmentReference, AML/6eb1965c-9a52-49ac-a19a-a4a32db75317.comment] [Submodel, https://example.com/ids/sm/9044_3140_3062_0301], [SubmodelElementList, AutomationMLAttributeAndInterfaceList], [SubmodelElementCollection, 6], [Property, comment]	1

Table 9: Elements of SubmodelElementCollection plant

idShort:	AutomationMLAttributeAndInterfaceList_07		
Class:	SubmodelElementCollection		
semanticId:	https://www.automationml.org/AutomationML_AAS_SemanticIDs/FactoryAutomationDataForPlant/AttributeContainer		
Parent:	AutomationMLAttributeAndInterfaceList		
Explanation:	Collection of AutomationML Attributes to be published as properties@en		
[SME type]	semanticId = [idType]value	[valueType]	card.
idShort	Description@en	example	
[Prop] plant	https://admin-shell.io/idta-aml/SubmodelTemplate/FactoryAutomation/plant/1/0 supplementalSemanticID: https://www.automationml.org/AutomationML_AAS_SemanticIDs/FactoryAutomationDataForPlant/AutomationMLAttribute Identifier of the plant	[string]	1
[Rel] RelationBetweenPropertyAndAttribute	https://www.automationml.org/AutomationML_AAS_SemanticIDs/FactoryAutomationDataForPlant/AttributeRelation Relation between related property SubmodelElements and corresponding AutomationML attribute.	Reference Example: [Submodel, https://example.com/ids/sm/9044_3140_3062_0301], [File, AutomatinMLData], [FragmentReference, AML/6eb1965c-9a52-49ac-a19a-a4a32db75317.plant] [Submodel, https://example.com/ids/sm/9044_3140_3062_0301], [SubmodelElementList, AutomationMLAttributeAndInterfaceList], [SubmodelElementCollection, 7], [Property, plant]	1

Table 10: Elements of SubmodelElementCollection diameter

idShort:	AutomationMLAttributeAndInterfaceList_08		
Class:	SubmodelElementCollection		
semanticId:	https://www.automationml.org/AutomationML_AAS_SemanticIDs/FactoryAutomationDataForPlant/AttributeContainer		
Parent:	AutomationMLAttributeAndInterfaceList		
Explanation:	Collection of AutomationML Attributes to be published as properties@en		
[SME type]	semanticId = [idType]value	[valueType]	card.
idShort	Description@en	example	
[Prop] diameter	https://admin-shell.io/idta-aml/SubmodelTemplate/FactoryAutomation/diameter/1/0 supplementalSemanticID: https://www.automationml.org/AutomationML_AAS_SemanticIDs/FactoryAutomationDataForPlant/AutomationMLAttribute The diameter is a straight line that passes through the center of a circle or sphere and connects two points on its boundary. It is the longest distance across the shape and is twice the length of the radius.	[double]	1
[Rel] RelationBetweenPropertyAndAttribute	https://www.automationml.org/AutomationML_AAS_SemanticIDs/FactoryAutomationDataForPlant/AttributeRelation Relation between related property SubmodelElements and corresponding AutomationML attribute.	Reference Example: [Submodel, https://example.com/ids/sm/9044_3140_3062_0301], [File, AutomatinMLData], [FragmentReference, AML/6eb1965c-9a52-49ac-a19a-a4a32db75317.diameter] [Submodel, https://example.com/ids/sm/9044_3140_3062_0301], [SubmodelElementList, AutomationMLAttributeAndInterfaceList], [SubmodelElementCollection, 8], [Property, diameter]	1

Table 11: Elements of SubmodelElementCollection overallLength

idShort:	AutomationMLAttributeAndInterfaceList_09		
Class:	SubmodelElementCollection		
semanticId:	https://www.automationml.org/AutomationML_AAS_SemanticIDs/FactoryAutomationDataForPlant/AttributeContainer		
Parent:	AutomationMLAttributeAndInterfaceList		
Explanation:	Collection of AutomationML Attributes to be published as properties@en		
[SME type]	semanticId = [idType]value	[valueType]	card.
idShort	Description@en	example	
[Prop] overallLength	https://admin-shell.io/idta-aml/SubmodelTemplate/FactoryAutomation/overallLength/1/0 supplementalSemanticID: https://www.automationml.org/AutomationML_AAS_SemanticIDs/FactoryAutomationDataForPlant/AutomationMLAttribute Maximum length-wise expansion of the object	[double]	1
[Rel] RelationBetweenPropertyAndAttribute	https://www.automationml.org/AutomationML_AAS_SemanticIDs/FactoryAutomationDataForPlant/AttributeRelation Relation between related property SubmodelElements and corresponding AutomationML attribute.	Reference Example: [Submodel, https://example.com/ids/sm/9044_3140_3062_0301], [File, AutomatinMLData], [FragmentReference, AML/6eb1965c-9a52-49ac-a19a-a4a32db75317.overallLength] [Submodel, https://example.com/ids/sm/9044_3140_3062_0301], [SubmodelElementList, AutomationMLAttributeAndInterfaceList], [SubmodelElementCollection, 9], [Property, overallLength]	1

Table 12: Elements of SubmodelElementCollection nominalVoltage

idShort:	AutomationMLAttributeAndInterfaceList_10		
Class:	SubmodelElementCollection		
semanticId:	https://www.automationml.org/AutomationML_AAS_SemanticIDs/FactoryAutomationDataForPlant/AttributeContainer		
Parent:	AutomationMLAttributeAndInterfaceList		
Explanation:	Collection of AutomationML Attributes to be published as properties@en		
[SME type]	semanticId = [idType]value	[valueType]	card.
idShort	Description@en	example	
[Prop] NominalVoltage	https://admin-shell.io/idta-aml/SubmodelTemplate/FactoryAutomation/NominalVoltage/1/0 supplementalSemanticID: https://www.automationml.org/AutomationML_AAS_SemanticIDs/FactoryAutomationDataForPlant/AutomationMLAttribute Describes the nominal voltage U	[real]	1
[Rel] RelationBetweenPropertyAndAttribute	https://www.automationml.org/AutomationML_AAS_SemanticIDs/FactoryAutomationDataForPlant/AttributeRelation Relation between related property SubmodelElements and corresponding AutomationML attribute.	Reference Example: [Submodel, https://example.com/ids/sm/9044_3140_3062_0301], [File, AutomatinMLData], [FragmentReference, AML/6eb1965c-9a52-49ac-a19a-a4a32db75317.nominalVoltage] [Submodel, https://example.com/ids/sm/9044_3140_3062_0301], [SubmodelElementList, AutomationMLAttributeAndInterfaceList], [SubmodelElementCollection, 10], [Property, nominalVoltage]	1

Table 13: Elements of SubmodelElementCollection nominalPowerConsumption

idShort:	AutomationMLAttributeAndInterfaceList_11		
Class:	SubmodelElementCollection		
semanticId:	https://www.automationml.org/AutomationML_AAS_SemanticIDs/FactoryAutomationDataForPlant/AttributeContainer		
Parent:	AutomationMLAttributeAndInterfaceList		
Explanation:	Collection of AutomationML Attributes to be published as properties@en		
[SME type]	semanticId = [idType]value	[valueType]	card.
idShort	Description@en	example	
[Prop] nominalPowerConsumption	https://admin-shell.io/idta-aml/SubmodelTemplate/FactoryAutomation/nominalPowerConsumption/1/0 supplementalSemanticID: https://www.automationml.org/AutomationML_AAS_SemanticIDs/FactoryAutomationDataForPlant/AutomationMLAttribute Describes the nominal power consumption	[double]	1
[Rel] RelationBetweenPropertyAndAttribute	https://www.automationml.org/AutomationML_AAS_SemanticIDs/FactoryAutomationDataForPlant/AttributeRelation Relation between related property SubmodelElements and corresponding AutomationML attribute.	Reference Example: [Submodel, https://example.com/ids/sm/9044_3140_3062_0301], [File, AutomatinMLData], [FragmentReference, AML/6eb1965c-9a52-49ac-a19a-a4a32db75317.nominalPowerConsumption] [Submodel, https://example.com/ids/sm/9044_3140_3062_0301], [SubmodelElementList, AutomationMLAttributeAndInterfaceList], [SubmodelElementCollection, 11], [Property, nominalPowerConsumption]	1

Table 14: Elements of SubmodelElementCollection maximalPowerConsumption

idShort:	AutomationMLAttributeAndInterfaceList_12		
Class:	SubmodelElementCollection		
semanticId:	https://www.automationml.org/AutomationML_AAS_SemanticIDs/FactoryAutomationDataForPlant/AttributeContainer		
Parent:	AutomationMLAttributeAndInterfaceList		
Explanation:	Collection of AutomationML Attributes to be published as properties@en		
[SME type]	semanticId = [idType]value	[valueType]	card.
idShort	Description@en	example	
[Prop] maximalPowerConsumption	https://admin-shell.io/idta-aml/SubmodelTemplate/FactoryAutomation/maximalPowerConsumption/1/0 supplementalSemanticID: https://www.automationml.org/AutomationML_AAS_SemanticIDs/FactoryAutomationDataForPlant/AutomationMLAttribute Highest instantaneous power requirement of the device or component	[double]	1
[Rel] RelationBetweenPropertyAndAttribute	https://www.automationml.org/AutomationML_AAS_SemanticIDs/FactoryAutomationDataForPlant/AttributeRelation Relation between related property SubmodelElements and corresponding AutomationML attribute.	Reference Example: [Submodel, https://example.com/ids/sm/9044_3140_3062_0301], [File, AutomatinMLData], [FragmentReference, AML/6eb1965c-9a52-49ac-a19a-a4a32db75317.maximalPowerConsumption] [Submodel, https://example.com/ids/sm/9044_3140_3062_0301], [SubmodelElementList, AutomationMLAttributeAndInterfaceList], [SubmodelElementCollection, 12], [Property, maximalPowerConsumption]	1

Table 15: Elements of SubmodelElementCollection powerNominal

idShort:	AutomationMLAttributeAndInterfaceList_13		
Class:	SubmodelElementCollection		
semanticId:	https://www.automationml.org/AutomationML_AAS_SemanticIDs/FactoryAutomationDataForPlant/AttributeContainer		
Parent:	AutomationMLAttributeAndInterfaceList		
Explanation:	Collection of AutomationML Attributes to be published as properties@en		
[SME type]	semanticId = [idType]value	[valueType]	card.
idShort	Description@en	example	
[Prop] powerNominal	https://admin-shell.io/idta-aml/SubmodelTemplate/FactoryAutomation/powerNominal/1/0 supplementalSemanticID: https://www.automationml.org/AutomationML_AAS_SemanticIDs/FactoryAutomationDataForPlant/AutomationMLAttribute Motor power in kW	[double]	1
[Rel] RelationBetweenPropertyAndAttribute	https://www.automationml.org/AutomationML_AAS_SemanticIDs/FactoryAutomationDataForPlant/AttributeRelation Relation between related property SubmodelElements and corresponding AutomationML attribute.	Reference Example: [Submodel, https://example.com/ids/sm/9044_3140_3062_0301], [File, AutomatinMLData], [FragmentReference, AML/6eb1965c-9a52-49ac-a19a-a4a32db75317.powerNominal] [Submodel, https://example.com/ids/sm/9044_3140_3062_0301], [SubmodelElementList, AutomationMLAttributeAndInterfaceList], [SubmodelElementCollection, 13], [Property, powerNominal]	1

Table 16: Elements of SubmodelElementCollection powerMaximal

idShort:	AutomationMLAttributeAndInterfaceList_14		
Class:	SubmodelElementCollection		
semanticId:	https://www.automationml.org/AutomationML_AAS_SemanticIDs/FactoryAutomationDataForPlant/AttributeContainer		
Parent:	AutomationMLAttributeAndInterfaceList		
Explanation:	Collection of AutomationML Attributes to be published as properties@en		
[SME type]	semanticId = [idType]value	[valueType]	card.
idShort	Description@en	example	
[Prop] powerMaximal	https://admin-shell.io/idta-aml/SubmodelTemplate/FactoryAutomation/powerMaximal/1/0 supplementalSemanticID: https://www.automationml.org/AutomationML_AAS_SemanticIDs/FactoryAutomationDataForPlant/AutomationMLAttribute Motor power in kW	[double]	1
[Rel] RelationBetweenPropertyAndAttribute	https://www.automationml.org/AutomationML_AAS_SemanticIDs/FactoryAutomationDataForPlant/AttributeRelation Relation between related property SubmodelElements and corresponding AutomationML attribute.	Reference Example: [Submodel, https://example.com/ids/sm/9044_3140_3062_0301], [File, AutomatinMLData], [FragmentReference, AML/6eb1965c-9a52-49ac-a19a-a4a32db75317.powerMaximal] [Submodel, https://example.com/ids/sm/9044_3140_3062_0301], [SubmodelElementList, AutomationMLAttributeAndInterfaceList], [SubmodelElementCollection, 14], [Property, powerMaximal]	1

Table 17: Elements of SubmodelElementCollection xframe

idShort:	AutomationMLAttributeAndInterfaceList_15		
Class:	SubmodelElementCollection		
semanticId:	https://www.automationml.org/AutomationML_AAS_SemanticIDs/FactoryAutomationDataForPlant/AttributeContainer		
Parent:	AutomationMLAttributeAndInterfaceList		
Explanation:	Collection of AutomationML Attributes to be published as properties@en		
[SME type]	semanticId = [idType]value	[valueType]	card.
idShort	Description@en	example	
[Prop] xframe	https://admin-shell.io/idta-aml/SubmodelTemplate/FactoryAutomation/xframe/1/0 supplementalSemanticID: https://www.automationml.org/AutomationML_AAS_SemanticIDs/FactoryAutomationDataForPlant/AutomationMLAttribute X-Position along the X-axis	[string]	1
[Rel] RelationBetweenPropertyAndAttribute	https://www.automationml.org/AutomationML_AAS_SemanticIDs/FactoryAutomationDataForPlant/AttributeRelation Relation between related property SubmodelElements and corresponding AutomationML attribute.	Reference Example: [Submodel, https://example.com/ids/sm/9044_3140_3062_0301], [File, AutomatinMLData], [FragmentReference, AML/6eb1965c-9a52-49ac-a19a-a4a32db75317.xframe] [Submodel, https://example.com/ids/sm/9044_3140_3062_0301], [SubmodelElementList, AutomationMLAttributeAndInterfaceList], [SubmodelElementCollection, 15], [Property, xframe]	1

Table 18: Elements of SubmodelElementCollection yframe

idShort:	AutomationMLAttributeAndInterfaceList_16		
Class:	SubmodelElementCollection		
semanticId:	https://www.automationml.org/AutomationML_AAS_SemanticIDs/FactoryAutomationDataForPlant/AttributeContainer		
Parent:	AutomationMLAttributeAndInterfaceList		
Explanation:	Collection of AutomationML Attributes to be published as properties@en		
[SME type]	semanticId = [idType]value	[valueType]	card.
idShort	Description@en	example	
[Prop] yframe	https://admin-shell.io/idta-aml/SubmodelTemplate/FactoryAutomation/yframe/1/0 supplementalSemanticID: https://www.automationml.org/AutomationML_AAS_SemanticIDs/FactoryAutomationDataForPlant/AutomationMLAttribute Y-Position along the Y-axis	[string]	1
[Rel] RelationBetweenPropertyAndAttribute	https://www.automationml.org/AutomationML_AAS_SemanticIDs/FactoryAutomationDataForPlant/AttributeRelation Relation between related property SubmodelElements and corresponding AutomationML attribute.	Reference Example: [Submodel, https://example.com/ids/sm/9044_3140_3062_0301], [File, AutomatinMLData], [FragmentReference, AML/6eb1965c-9a52-49ac-a19a-a4a32db75317.yframe] [Submodel, https://example.com/ids/sm/9044_3140_3062_0301], [SubmodelElementList, AutomationMLAttributeAndInterfaceList], [SubmodelElementCollection, 16], [Property, yframe]	1

Table 19: Elements of SubmodelElementCollection zframe

idShort:	AutomationMLAttributeAndInterfaceList_17		
Class:	SubmodelElementCollection		
semanticId:	https://www.automationml.org/AutomationML_AAS_SemanticIDs/FactoryAutomationDataForPlant/AttributeContainer		
Parent:	AutomationMLAttributeAndInterfaceList		
Explanation:	Collection of AutomationML Attributes to be published as properties@en		
[SME type]	semanticId = [idType]value	[valueType]	card.
idShort	Description@en	example	
[Prop] zframe	https://admin-shell.io/idta-aml/SubmodelTemplate/FactoryAutomation/zframe/1/0 supplementalSemanticID: https://www.automationml.org/AutomationML_AAS_SemanticIDs/FactoryAutomationDataForPlant/AutomationMLAttribute Z-Position along the Z-axis	[string]	1
[Rel] RelationBetweenPropertyAndAttribute	https://www.automationml.org/AutomationML_AAS_SemanticIDs/FactoryAutomationDataForPlant/AttributeRelation Relation between related property SubmodelElements and corresponding AutomationML attribute.	Reference Example: [Submodel, https://example.com/ids/sm/9044_3140_3062_0301], [File, AutomatinMLData], [FragmentReference, AML/6eb1965c-9a52-49ac-a19a-a4a32db75317.zframe] [Submodel, https://example.com/ids/sm/9044_3140_3062_0301], [SubmodelElementList, AutomationMLAttributeAndInterfaceList], [SubmodelElementCollection, 17], [Property, zframe]	1

Table 20: Elements of SubmodelElementCollection rxframe

idShort:	AutomationMLAttributeAndInterfaceList_18		
Class:	SubmodelElementCollection		
semanticId:	https://www.automationml.org/AutomationML_AAS_SemanticIDs/FactoryAutomationDataForPlant/AttributeContainer		
Parent:	AutomationMLAttributeAndInterfaceList		
Explanation:	Collection of AutomationML Attributes to be published as properties@en		
[SME type]	semanticId = [idType]value	[valueType]	card.
idShort	Description@en	example	
[Prop] rxframe	https://admin-shell.io/idta-aml/SubmodelTemplate/FactoryAutomation/rxframe/1/0 supplementalSemanticID: https://www.automationml.org/AutomationML_AAS_SemanticIDs/FactoryAutomationDataForPlant/AutomationMLAttribute RX-rotation over the X-axis	[string]	1
[Rel] RelationBetweenPropertyAndAttribute	https://www.automationml.org/AutomationML_AAS_SemanticIDs/FactoryAutomationDataForPlant/AttributeRelation Relation between related property SubmodelElements and corresponding AutomationML attribute.	Reference Example: [Submodel, https://example.com/ids/sm/9044_3140_3062_0301], [File, AutomatinMLData], [FragmentReference, AML/6eb1965c-9a52-49ac-a19a-a4a32db75317.rxframe] [Submodel, https://example.com/ids/sm/9044_3140_3062_0301], [SubmodelElementList, AutomationMLAttributeAndInterfaceList], [SubmodelElementCollection, 18], [Property, rxframe]	1

Table 21: Elements of SubmodelElementCollection ryframe

idShort:	AutomationMLAttributeAndInterfaceList_19		
Class:	SubmodelElementCollection		
semanticId:	https://www.automationml.org/AutomationML_AAS_SemanticIDs/FactoryAutomationDataForPlant/AttributeContainer		
Parent:	AutomationMLAttributeAndInterfaceList		
Explanation:	Collection of AutomationML Attributes to be published as properties@en		
[SME type]	semanticId = [idType]value	[valueType]	card.
idShort	Description@en	example	
[Prop] ryframe	https://admin-shell.io/idta-aml/SubmodelTemplate/FactoryAutomation/ryframe/1/0 supplementalSemanticID: https://www.automationml.org/AutomationML_AAS_SemanticIDs/FactoryAutomationDataForPlant/AutomationMLAttribute RY-rotation along the Y-axis	[string]	1
[Rel] RelationBetweenPropertyAndAttribute	https://www.automationml.org/AutomationML_AAS_SemanticIDs/FactoryAutomationDataForPlant/AttributeRelation Relation between related property SubmodelElements and corresponding AutomationML attribute.	Reference Example: [Submodel, https://example.com/ids/sm/9044_3140_3062_0301], [File, AutomatinMLData], [FragmentReference, AML/6eb1965c-9a52-49ac-a19a-a4a32db75317.ryframe] [Submodel, https://example.com/ids/sm/9044_3140_3062_0301], [SubmodelElementList, AutomationMLAttributeAndInterfaceList], [SubmodelElementCollection, 19], [Property, ryframe]	1

Table 22: Elements of SubmodelElementCollection rzframe

idShort:	AutomationMLAttributeAndInterfaceList_20		
Class:	SubmodelElementCollection		
semanticId:	https://www.automationml.org/AutomationML_AAS_SemanticIDs/FactoryAutomationDataForPlant/AttributeContainer		
Parent:	AutomationMLAttributeAndInterfaceList		
Explanation:	Collection of AutomationML Attributes to be published as properties@en		
[SME type]	semanticId = [idType]value	[valueType]	card.
idShort	Description@en	example	
[Prop] rzframe	https://admin-shell.io/idta-aml/SubmodelTemplate/FactoryAutomation/rzframe/1/0 supplementalSemanticID: https://www.automationml.org/AutomationML_AAS_SemanticIDs/FactoryAutomationDataForPlant/AutomationMLAttribute Z-rotation along the Z-axis	[string]	1
[Rel] RelationBetweenPropertyAndAttribute	https://www.automationml.org/AutomationML_AAS_SemanticIDs/FactoryAutomationDataForPlant/AttributeRelation Relation between related property SubmodelElements and corresponding AutomationML attribute.	Reference Example: [Submodel, https://example.com/ids/sm/9044_3140_3062_0301], [File, AutomatinMLData], [FragmentReference, AML/6eb1965c-9a52-49ac-a19a-a4a32db75317.rzframe] [Submodel, https://example.com/ids/sm/9044_3140_3062_0301], [SubmodelElementList, AutomationMLAttributeAndInterfaceList], [SubmodelElementCollection, 20], [Property, rzframe]	1

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 information 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:

SME type	SubmodelElement type
Property	Property
MLP	MultiLanguageProperty
Range	Range
File	File
Blob	Blob
Ref	ReferenceElement
Rel	RelationshipElement
SMC	SubmodelElementCollection

- 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: [IRI]https://admin-shell.io/vdi/2770/1/0/DocumentId/Id. The attributes "type" and "local" (typically "ConceptDescription" and "(local)" or "GlobalReference" and "(no-local)") 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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