IDTA-02035-5 : Digital Battery Passport - Part 5

Product Condition

August 2025

SPECIFICATION

Submodel Template
IDTA approved
- 100% AAS compliant
- Consistent & interoperable
- Released by the AAS experts

Submodel Template of the
Asset Administration Shell

IDTA-02035-5 V1.0

Imprint

1. Publisher

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Version history

Date	Version	Comment
August 2025	1.0	First version. Result of the joint Model Expert Group from IDTA, Catena-X and the BatteryPass Consortium.
18.08.2025	1.0	Start of the official review period with IDTA, Catena-X and the BatteryPass Consortium.

Table of Contents

Chapter 1. General

1.1. About this document

2. 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].

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.

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

5. This specification was created following the "semantic-driven workflow" as defined in [5] based on Aspect Models [6]. There is no central dictionary or repository for Aspect Models. In this specification the following sources are used for defining semantics:

   - Aspect Models published at IDTA [7]: https://github.com/admin-shell-io/smt-semantic-models, models with namespace "io.admin-shell"
   - Aspect Models published by the BatteryPass Consortium (closed project) [8]: https://github.com/batterypass/BatteryPassDataModel, models with namespace "io.BatteryPass"
   - Aspect Models published at Tractus-X and used in standards published by Catena-X [9]: https://github.com/eclipse-tractusx/sldt-semantic-models, models with namespace "io.catenax"

6. Known Issues:

   - cardinality information is not available on all levels

     NOTE | when reviewing the document assume cardinality "1" in case cardinality is not explicitly defined

   - so far semanticIds for SMC are not contained

1.2. Scope of the Submodel

7. This Submodel template aims to define the dynamic data points of a Battery Passport conformant to DIN DKE SPEC 99100 and the corresponding EU regulations.

8. The battery passport consists of the following 7 parts:

```
Digital Battery Passport - Part 1: Digital Nameplate (IDTA-02035-1)
Digital Battery Passport - Part 2: Handover Documentation (IDTA-02035-2)
Digital Battery Passport - Part 3: Product Carbon Footprint (IDTA-02035-3)
Digital Battery Passport - Part 4: Technical Data (IDTA-02035-4)
Digital Battery Passport - Part 5: Product Condition (IDTA-02035-5)
Digital Battery Passport - Part 6: Material Composition (IDTA-02035-6)
Digital Battery Passport - Part 7: Circularity (IDTA-02035-7)
```

9. This specification is Part 5: Product Condition (IDTA_02035-5).

1.3. Relevant standards for the Submodel Template

10. This submodel template fulfills the requirements for dynamic data attributes as defined in DIN DKE SPEC 99100 [1]. DIN DKE 99100 "is based on the European Union and key Member States current regulatory requirements for battery passport information. Mandatory information for the battery passport as stated in the EU Battery Regulation (EU)2023/1542, Article77 and AnnexXIII, as well as the Ecodesign for Sustainable Products Regulation (ESPR), is supplemented by recommendations to increase sustainability and circularity. [1]"

11. This document is valid for all battery categories. Please be aware that for battery categories that have stronger requirements like industrial batteries with battery management systems etc. some of the data points are specified as optional although mandatory per regulation.

1.4. Explanations on used UML diagrams

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

13. 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.

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

15. For a further overview on UML diagrams please refer to [2] and [3].

16. Further details about used table formats please refer to [Annex_A_Explanations].

Chapter 2. Information set for Submodel “ProductCondition”

2.1. General

17. The "Product Condition" Submodel Template is part of the specification series for the Battery Passport.

18. **Property specification**

19. See clause 3 "Information structures and attributes".

2.2. Overview UML model

20. The SubmodelElements described in clause 3 "Information structures and attributes" are structured in the following way (see Figure 1):

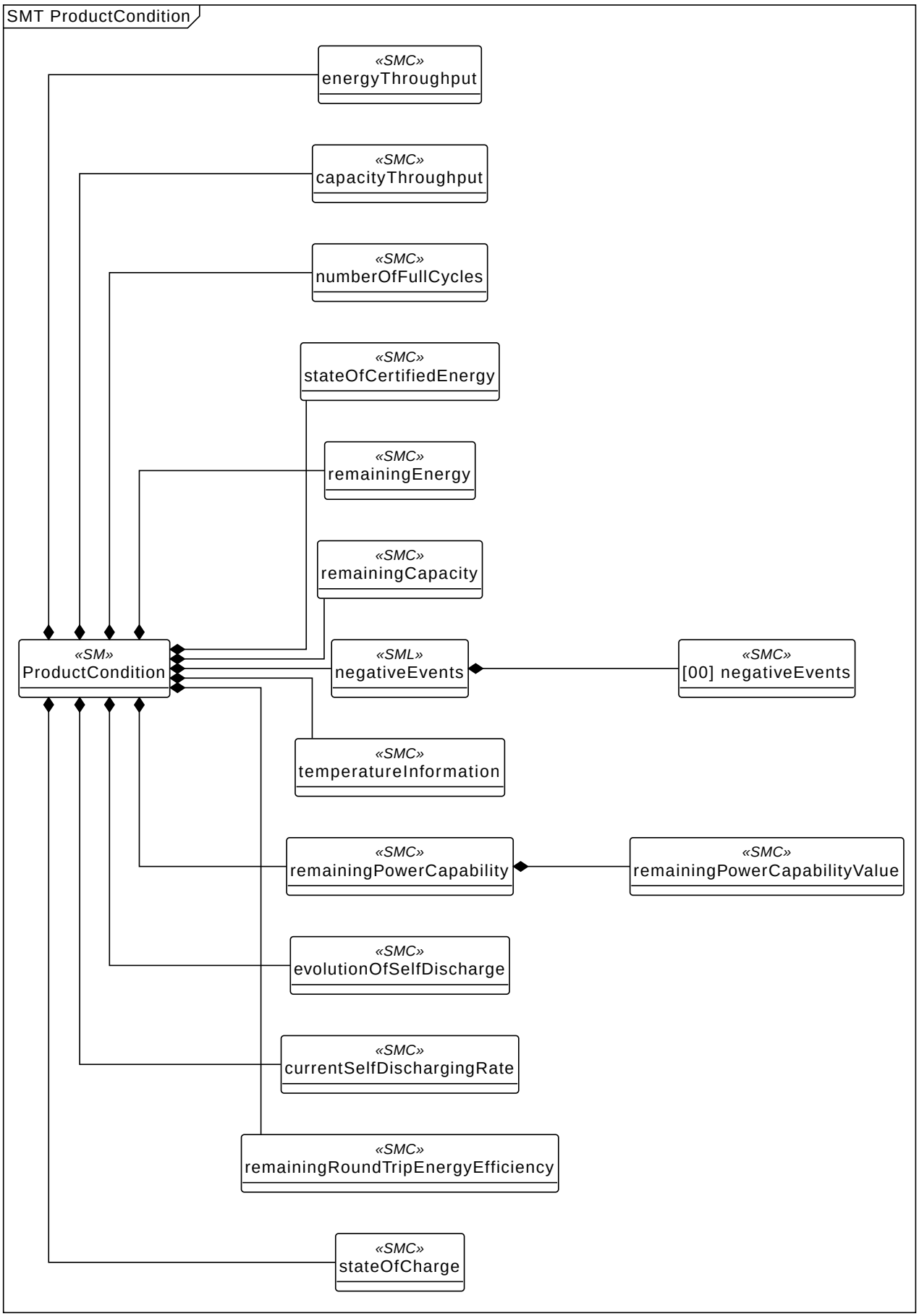

Figure 1. UML overview

21. The following design principles were followed:

- for all dynamic attributes there is an attribute "lastUpdate" showing the last update time

Chapter 3. Information structures and attributes

3.1. Properties of the Submodel “ProductCondition”

22. Figure 2 shows the UML-diagram defining the relevant properties which need to be set.

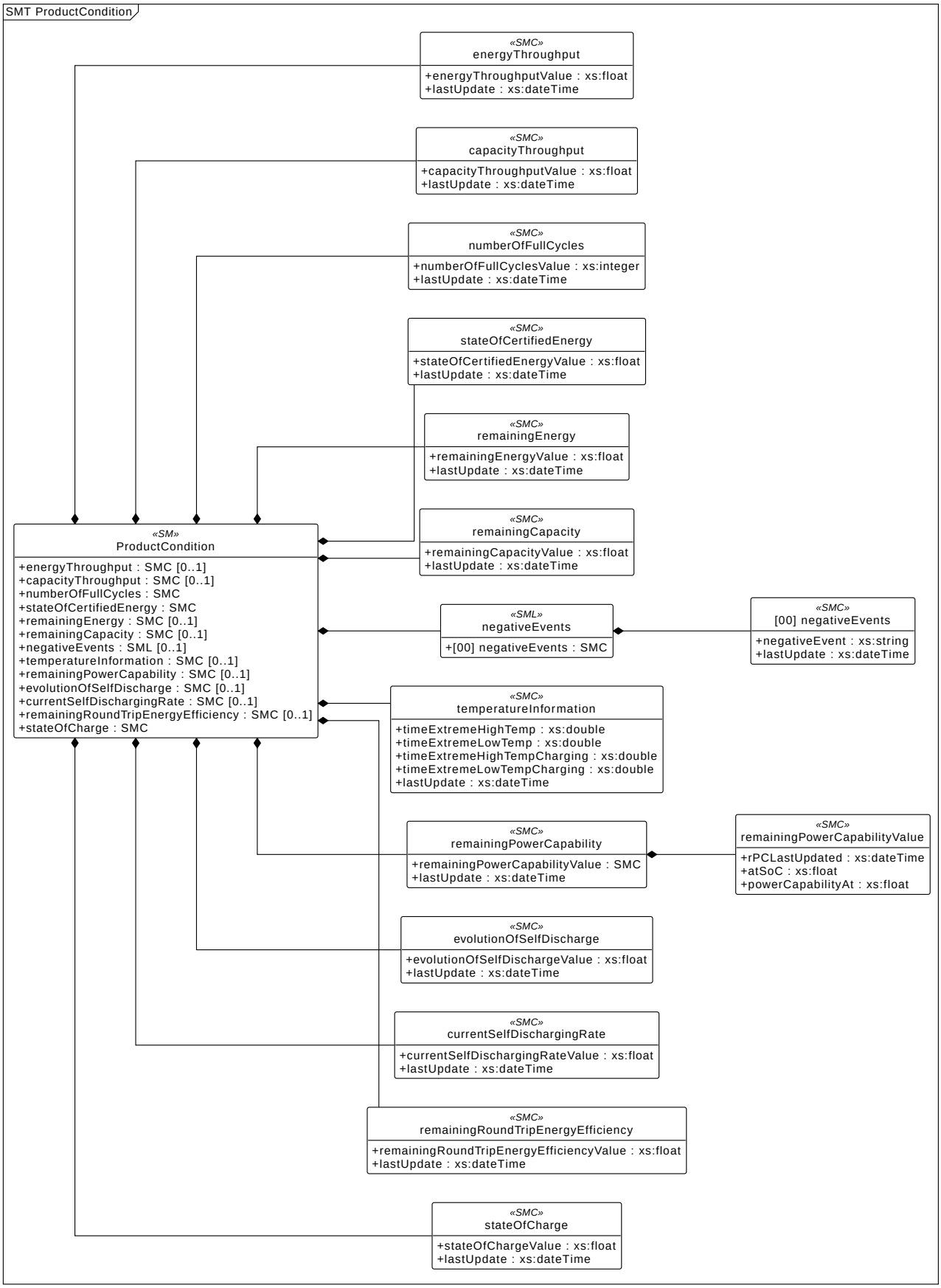

Figure 2. UML-Diagram for Submodel "ProductCondition"

idShort:	**ProductCondition**
Class:	Submodel
semanticId:	urn:samm:io.admin-shell.idta.batterypass.product_condition:1.0.0#ProductCondition

Parent:	-		
Explanation:	Covers all battery lifetime relevant properties.		
Element details:	-		
[SME type] idShort	semanticId Description@en	[valueType] example	card.
[SMC] energyThroughput	+ The data attribute should be reported as measured for further potential processing. In addition, the normalisation by capacity may add a further useful value that ensures comparability among battery sizes. DIN DKE Spec 99100 chapter reference: 6.7.6.7	[] 2 elements	0..1
[SMC] capacityThroughput	+ The data attribute should be reported as measured for further potential processing. In addition, the normalisation by capacity may add a further useful value that ensures comparability among battery sizes. DIN DKE Spec 99100 chapter reference: 6.7.6.8	[] 2 elements	0..1
[SMC] numberOfFullCycles	+ Number of (full) charging and discharging cycles. DIN DKE Spec 99100 chapter reference: 6.7.6.3	[] 2 elements	1
[SMC] stateOfCertifiedEnergy	+ Definition based on UNECE GTR 22: The measured or on-board UBE performance at a specific point in its lifetime, expressed as a percentage of the certified usable battery energy. DIN DKE Spec 99100 chapter reference: 6.7.2.7	[] 2 elements	1
[SMC] remainingEnergy	+ Definition from UNECE GTR 22, applicable only to EVs. The energy supplied by the battery from the beginning of the test procedure used for certification until the applicable break-off criterion of the test procedure used for certification is reached. DIN DKE Spec 99100 chapter reference: 6.7.2.6	[] 2 elements	0..1
[SMC] remainingCapacity	+ The in-use data attribute on capacity, corresponding with the definition of rated capacity. DIN DKE Spec 99100 chapter reference: 6.7.2.3	[] 2 elements	0..1

[SML] negativeEvents	urn:samm:io.BatteryPass.Performance:1.2.1#NegativeEvents	[] 1 elements	0..1
[SMC] temperatureInformation	+ The battery passport must include periodically recorded information on the operating environmental conditions, including temperature. DIN DKE Spec 99100 chapter reference: 6.7.7.5 - 8	[] 5 elements	0..1
[SMC] remainingPowerCapability	+ '- Original power capability (in Watts) and limits, with temperature range when relevant. - The amount of energy that a battery is capable to provide over a given period of time under reference conditions. - Power capability at 80% and 20% state of charge. DIN DKE Spec 99100 chapter reference: 6.7.3.3	[] 2 elements	0..1
[SMC] evolutionOfSelfDischarge	+ ¬Evolution of self-discharge rates¬ is the change of self-discharge over time and usage, as percentage calculated from the initial and current self-discharge rate. DIN DKE Spec 99100 chapter reference: 6.7.4.8	[] 2 elements	0..1
[SMC] currentSelfDischargingRate	+ The current self-discharge rate is the change of the self-discharge rate in an idle state of the battery in reference conditions (temperature etc.) at aging parameter x, e.g. after a certain amount of storage time or, number of cycles. DIN DKE Spec 99100 chapter reference: 6.7.4.7	[] 2 elements	0..1
[SMC] remainingRoundTripEnergyEfficiency	+ The battery passport shall include information, where possible, about the remaining round trip energy efficiency as information on the state of health of the battery The update frequency of remaining round trip energy efficiency should be aligned with the update frequency of round trip energy efficiency fade and should be provided upon change of the battery status. DIN DKE Spec 99100 chapter reference: 6.7.4.4	[] 2 elements	0..1

[SMC] stateOfCharge	+ The Battery Pass consortium proposes to change the definition to: "available capacity in a battery expressed as a percentage of remaining capacity" to reflect use of SoC in practice. DIN DKE Spec 99100 chapter reference: 6.7.2.8	[] 2 elements	1

3.2. Properties of the SMC "energyThroughput"

23. Figure 3 shows the UML-diagram for `SMC energyThroughput`.

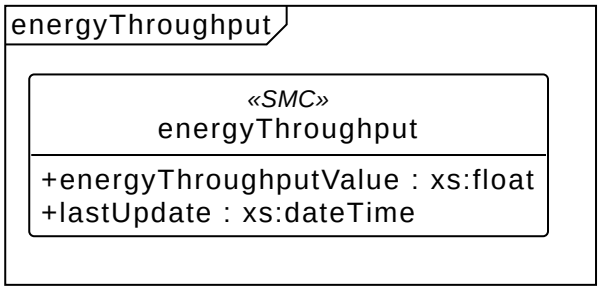

Figure 3. UML-Diagram for SMC "energyThroughput"

24. Data points related to energy throughput.

idShort:	**energyThroughput**		
Class:	SubmodelElementCollection		
semanticId:			
Parent:	ProductCondition		
Explanation:	The data attribute should be reported as measured for further potential processing. In addition, the normalisation by capacity may add a further useful value that ensures comparability among battery sizes. DIN DKE Spec 99100 chapter reference: 6.7.6.7		
Element details:	-		
[SME type] idShort	semanticId Description@en	[valueType] example	card.
[Prop] energyThroughputValue	urn:samm:io.BatteryPass.Performance:1.2.1#energyThroughputValue	[Float]	
[Prop] lastUpdate	urn:samm:io.BatteryPass.Performance:1.2.1#lastUpdate Timestamp for dynamic data attributes show the last update time.	[DateTime]	

3.3. Properties of the SMC "capacityThroughput"

25. Figure 4 shows the UML-diagram for `SMC capacityThroughput`.

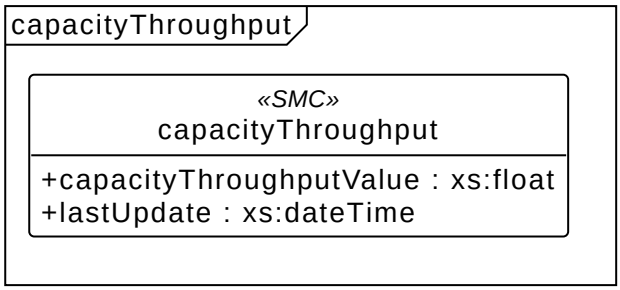

Figure 4. UML-Diagram for SMC "capacityThroughput"

26. Data points related to capacity throughput.

idShort:	**capacityThroughput**		
Class:	SubmodelElementCollection		
semanticId:			
Parent:	ProductCondition		
Explanation:	The data attribute should be reported as measured for further potential processing. In addition, the normalisation by capacity may add a further useful value that ensures comparability among battery sizes. DIN DKE Spec 99100 chapter reference: 6.7.6.8		
Element details:	-		
[SME type] idShort	semanticId Description@en	[valueType] example	card.
[Prop] capacityThroughputValue	urn:samm:io.BatteryPass.Performance:1.2.1#capacityThroughputValue	[Float]	
[Prop] lastUpdate	urn:samm:io.BatteryPass.Performance:1.2.1#lastUpdate Timestamp for dynamic data attributes show the last update time.	[DateTime]	

3.4. Properties of the SMC "numberOfFullCycles"

27. Figure 5 shows the UML-diagram for `SMC numberOfFullCycles`.

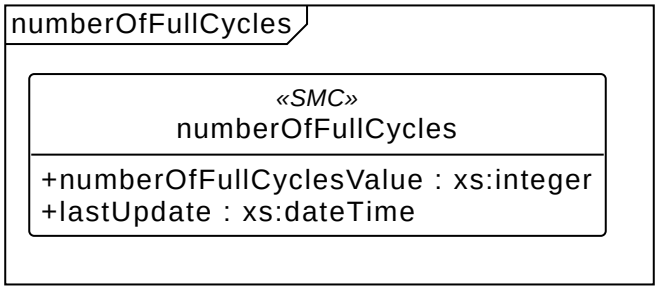

Figure 5. UML-Diagram for SMC "numberOfFullCycles"

28. Data points related to number of full charging and discharging cycles.

idShort:	**numberOfFullCycles**		
Class:	SubmodelElementCollection		
semanticId:			
Parent:	ProductCondition		
Explanation:	Number of (full) charging and discharging cycles. DIN DKE Spec 99100 chapter reference: 6.7.6.3		
Element details:	-		
[SME type] idShort	semanticId Description@en	[valueType] example	card.
[Prop] numberOfFullCyclesValue	urn:samm:io.BatteryPass.Performance:1.2.1#numberOfFullCyclesValue	[Integer]	
[Prop] lastUpdate	urn:samm:io.BatteryPass.Performance:1.2.1#lastUpdate Timestamp for dynamic data attributes show the last update time.	[DateTime]	

3.5. Properties of the SMC "stateOfCertifiedEnergy"

29. Figure 6 shows the UML-diagram for `SMC stateOfCertifiedEnergy`.

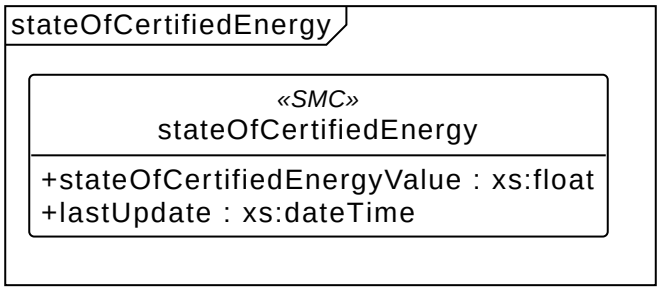

Figure 6. UML-Diagram for SMC "stateOfCertifiedEnergy"

30. Data points related to the state of certified energy.

idShort:	**stateOfCertifiedEnergy**		
Class:	SubmodelElementCollection		
semanticId:			
Parent:	ProductCondition		
Explanation:	Definition based on UNECE GTR 22: The measured or on-board UBE performance at a specific point in its lifetime, expressed as a percentage of the certified usable battery energy. DIN DKE Spec 99100 chapter reference: 6.7.2.7		
Element details:	-		
[SME type] idShort	semanticId Description@en	[valueType] example	card.
[Prop] stateOfCertifiedEnergyValue	urn:samm:io.BatteryPass.Performance:1.2.1#stateOfCertifiedEnergyValue	[Float]	
[Prop] lastUpdate	urn:samm:io.BatteryPass.Performance:1.2.1#lastUpdate Timestamp for dynamic data attributes show the last update time.	[DateTime]	

3.6. Properties of the SMC "remainingEnergy"

31. Figure 7 shows the UML-diagram for `SMC remainingEnergy`.

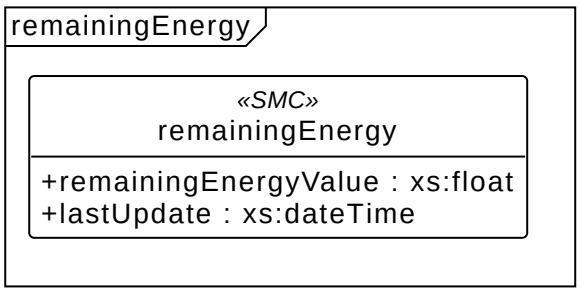

Figure 7. UML-Diagram for SMC "remainingEnergy"

32. Data points related to remaining energy.

idShort:	**remainingEnergy**
Class:	SubmodelElementCollection
semanticId:	
Parent:	ProductCondition

Explanation:	Definition from UNECE GTR 22, applicable only to EVs. The energy supplied by the battery from the beginning of the test procedure used for certification until the applicable break-off criterion of the test procedure used for certification is reached. DIN DKE Spec 99100 chapter reference: 6.7.2.6		
Element details:	-		
[SME type] idShort	semanticId Description@en	[valueType] example	card.
[Prop] remainingEnergyValue	urn:samm:io.BatteryPass.Performance:1.2.1#remainingEnergyValue	[Float]	
[Prop] lastUpdate	urn:samm:io.BatteryPass.Performance:1.2.1#lastUpdate Timestamp for dynamic data attributes show the last update time.	[DateTime]	

3.7. Properties of the SMC "remainingCapacity"

33. Figure 8 shows the UML-diagram for `SMC remainingCapacity`.

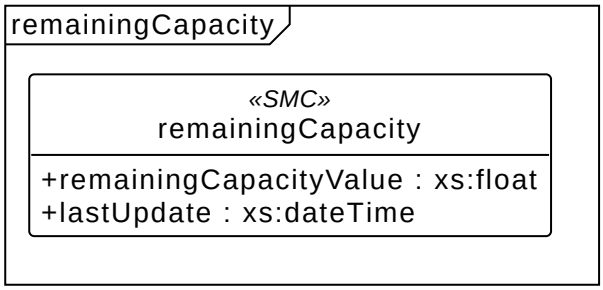

Figure 8. UML-Diagram for SMC "remainingCapacity"

34. Data points related to remaining capacity.

idShort:	**remainingCapacity**		
Class:	SubmodelElementCollection		
semanticId:			
Parent:	ProductCondition		
Explanation:	The in-use data attribute on capacity, corresponding with the definition of rated capacity. DIN DKE Spec 99100 chapter reference: 6.7.2.3		
Element details:	-		
[SME type] idShort	semanticId Description@en	[valueType] example	card.

[Prop] remainingCapacityValue	urn:samm:io.BatteryPass.Performance:1.2.1#remainingCapacityValue	[Float]	
[Prop] lastUpdate	urn:samm:io.BatteryPass.Performance:1.2.1#lastUpdate Timestamp for dynamic data attributes show the last update time.	[DateTime]	

3.8. Properties of the SML "negativeEvents"

35. Figure 16 shows the UML-diagram for `SML negativeEvents`.

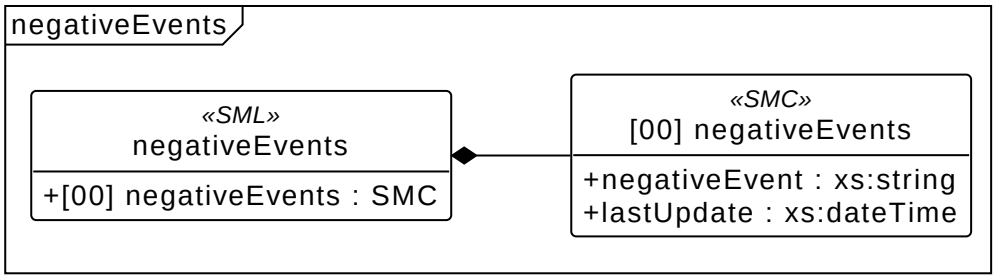

Figure 9. UML-Diagram for SML "negativeEvents"

36. Data points related to negative events.

idShort:	**negativeEvents**		
Class:	SubmodelElementList		
semanticId:	urn:samm:io.BatteryPass.Performance:1.2.1#NegativeEvents		
Parent:	ProductCondition		
Explanation:			
Element details:	orderRelevant=No, typeValueListElement=SubmodelElementCollection		
[SME type] idShort	semanticId Description@en	[valueType] example	card.
[SMC] negativeEvents	+	[] 2 elements	

3.9. Properties of the SMC "temperatureInformation"

37. Figure 10 shows the UML-diagram for `SMC temperatureInformation`.

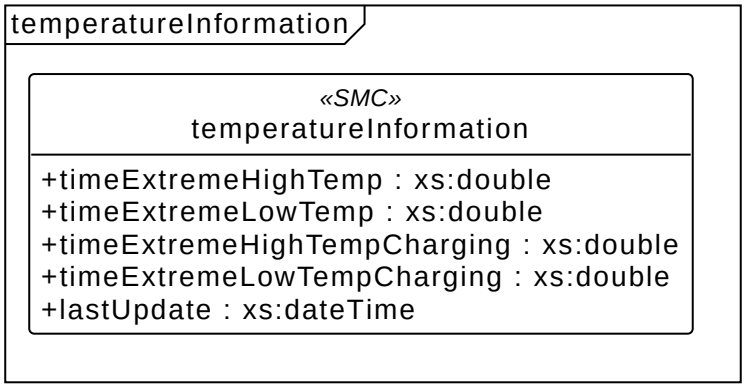

Figure 10. UML-Diagram for SMC "temperatureInformation"

38. Data points related to temperature.

idShort:	**temperatureInformation**		
Class:	SubmodelElementCollection		
semanticId:			
Parent:	ProductCondition		
Explanation:	The battery passport must include periodically recorded information on the operating environmental conditions, including temperature. DIN DKE Spec 99100 chapter reference: 6.7.7.5 - 8		
Element details:	-		
[SME type] idShort	semanticId Description@en	[valueType] example	card.
[Prop] timeExtremeHighTemp	urn:samm:io.BatteryPass.Performance:1.2.1#timeExtremeHighTemp Cumulated time spent above the given upper boundary of temperature.	[Double]	
[Prop] timeExtremeLowTemp	urn:samm:io.BatteryPass.Performance:1.2.1#timeExtremeLowTemp Cumulated time spent below the given lower boundary of temperature.	[Double]	
[Prop] timeExtremeHighTempCharging	urn:samm:io.BatteryPass.Performance:1.2.1#timeExtremeHighTempCharging Cumulated time spent above the given upper boundary of temperature during Charging.	[Double]	
[Prop] timeExtremeLowTempCharging	urn:samm:io.BatteryPass.Performance:1.2.1#timeExtremeLowTempCharging Cumulated time spent below the given lower boundary of temperature during charging.	[Double]	

[Prop] lastUpdate	urn:samm:io.BatteryPass.Performance:1.2.1#lastUpdate Timestamp for dynamic data attributes show the last update time.	[DateTime]	

3.10. Properties of the SML "remainingPowerCapability"

39. [UML_for_SMC_remainingPowerCapability] shows the UML-diagram for SML `remainingPowerCapability`.

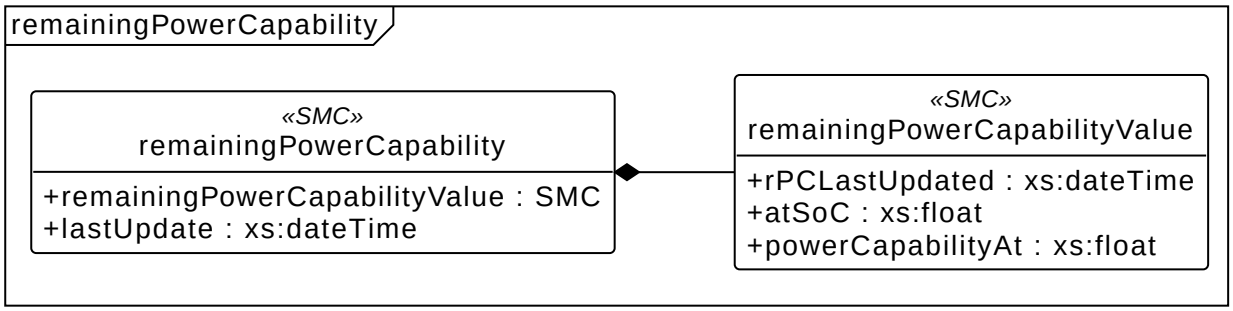

Figure 11. UML-Diagram for SML "remainingPowerCapability"

40. Data points related to remaining power capability.

idShort:	**remainingPowerCapability**		
Class:	SubmodelElementCollection		
semanticId:			
Parent:	ProductCondition		
Explanation:	'- Original power capability (in Watts) and limits, with temperature range when relevant. - The amount of energy that a battery is capable to provide over a given period of time under reference conditions. - Power capability at 80% and 20% state of charge. DIN DKE Spec 99100 chapter reference: 6.7.3.3		
Element details:	-		
[SME type] idShort	semanticId Description@en	[valueType] example	card.
[SMC] remainingPowerCapabilityValue	+	[] 3 elements	
[Prop] lastUpdate	urn:samm:io.BatteryPass.Performance:1.2.1#lastUpdate Timestamp for dynamic data attributes show the last update time.	[DateTime]	

3.11. Properties of the SMC "evolutionOfSelfDischarge"

41. Figure 12 shows the UML-diagram for `SMC evolutionOfSelfDischarge`.

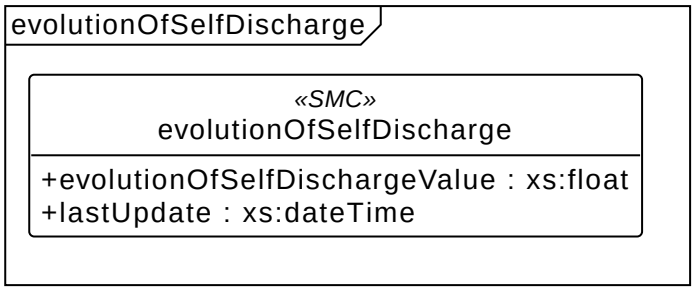

Figure 12. UML-Diagram for SMC "evolutionOfSelfDischarge"

42. Data points related to evolution of self discharge.

idShort:	**evolutionOfSelfDischarge**		
Class:	SubmodelElementCollection		
semanticId:			
Parent:	ProductCondition		
Explanation:	¬Evolution of self-discharge rates¬ is the change of self-discharge over time and usage, as percentage calculated from the initial and current self-discharge rate. DIN DKE Spec 99100 chapter reference: 6.7.4.8		
Element details:	-		
[SME type] idShort	semanticId Description@en	[valueType] example	card.
[Prop] evolutionOfSelfDischargeValue	urn:samm:io.BatteryPass.Performance:1.2.1#evolutionOfSelfDischargeValue	[Float]	
[Prop] lastUpdate	urn:samm:io.BatteryPass.Performance:1.2.1#lastUpdate Timestamp for dynamic data attributes show the last update time.	[DateTime]	

3.12. Properties of the SMC "currentSelfDischargingRate"

43. Figure 13 shows the UML-diagram for `SMC currentSelfDischargingRate`.

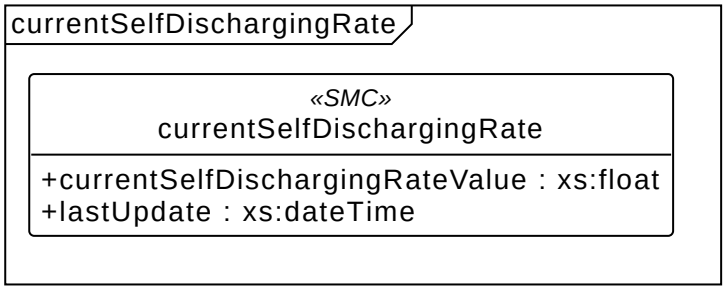

Figure 13. UML-Diagram for SMC "currentSelfDischargingRate"

44. Data points related to current self discharging rate.

idShort:	**currentSelfDischargingRate**		
Class:	SubmodelElementCollection		
semanticId:			
Parent:	ProductCondition		
Explanation:	The current self-discharge rate is the change of the self-discharge rate in an idle state of the battery in reference conditions (temperature etc.) at aging parameter x, e.g. after a certain amount of storage time or, number of cycles. DIN DKE Spec 99100 chapter reference: 6.7.4.7		
Element details:	-		
[SME type] idShort	semanticId Description@en	[valueType] example	card.
[Prop] currentSelfDischargingRateValue	urn:samm:io.BatteryPass.Performance:1.2.1#currentSelfDischargingRateValue	[Float]	
[Prop] lastUpdate	urn:samm:io.BatteryPass.Performance:1.2.1#lastUpdate Timestamp for dynamic data attributes show the last update time.	[DateTime]	

3.13. Properties of the SMC "remainingRoundTripEnergyEfficiency"

45. Figure 14 shows the UML-diagram for `SMC remainingRoundTripEnergyEfficiency`.

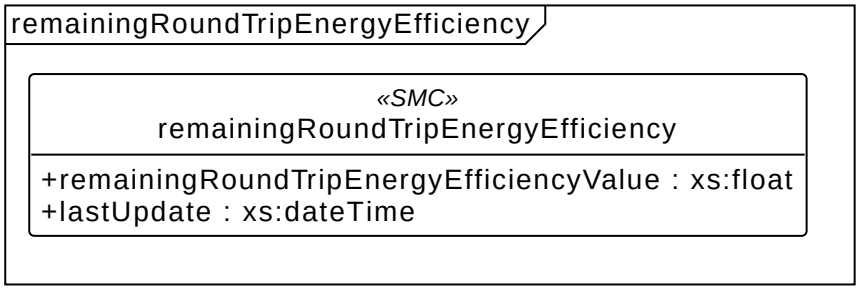

Figure 14. UML-Diagram for SMC "currentSelfDischargingRate"

46. Data points related to remaining round trip energy efficiency.

idShort:	**remainingRoundTripEnergyEfficiency**		
Class:	SubmodelElementCollection		
semanticId:			
Parent:	ProductCondition		
Explanation:	The battery passport shall include information, where possible, about the remaining round trip energy efficiency as information on the state of health of the battery The update frequency of remaining round trip energy efficiency should be aligned with the update frequency of round trip energy efficiency fade and should be provided upon change of the battery status. DIN DKE Spec 99100 chapter reference: 6.7.4.4		
Element details:	-		
[SME type] idShort	semanticId Description@en	[valueType] example	card.
[Prop] remainingRoundTripEnergyEfficiencyValue	urn:samm:io.BatteryPass.Performance:1.2.1#remainingRoundTripEnergyEfficiencyValue	[Float]	
[Prop] lastUpdate	urn:samm:io.BatteryPass.Performance:1.2.1#lastUpdate Timestamp for dynamic data attributes show the last update time.	[DateTime]	

3.14. Properties of the SMC "stateOfCharge"

47. Figure 15 shows the UML-diagram for `SMC stateOfCharge`.

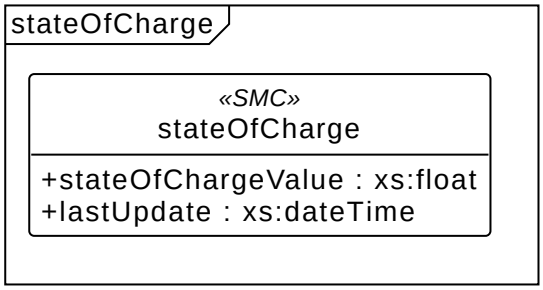

Figure 15. UML-Diagram for SMC "stateOfCharge"

48. Data points related to state of charge.

idShort:	**stateOfCharge**		
Class:	SubmodelElementCollection		
semanticId:			
Parent:	ProductCondition		
Explanation:	The Battery Pass consortium proposes to change the definition to: "available capacity in a battery expressed as a percentage of remaining capacity" to reflect use of SoC in practice. DIN DKE Spec 99100 chapter reference: 6.7.2.8		
Element details:	-		
[SME type] idShort	semanticId Description@en	[valueType] example	card.
[Prop] stateOfChargeValue	urn:samm:io.BatteryPass.Performance:1.2.1#stateOfChargeValue	[Float]	
[Prop] lastUpdate	urn:samm:io.BatteryPass.Performance:1.2.1#lastUpdate Timestamp for dynamic data attributes show the last update time.	[DateTime]	

3.15. Properties of the SMC "negativeEvents"

49. Figure 16 shows the UML-diagram for `SMC negativeEvents`.

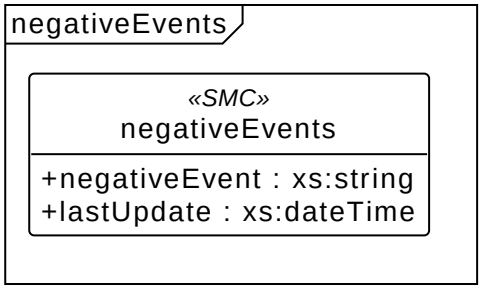

Figure 16. UML-Diagram for SMC "negativeEvents"

Data points related to negative events.

idShort:	**negativeEvents**		
Class:	SubmodelElementCollection		
semanticId:			
Parent:	negativeEvents		
Explanation:			
Element details:	-		
[SME type] idShort	semanticId Description@en	[valueType] example	card.
[Prop] negativeEvent	urn:samm:io.BatteryPass.Performance:1.2.1#negativeEvent	[String]	
[Prop] lastUpdate	urn:samm:io.BatteryPass.Performance:1.2.1#lastUpdate Timestamp for dynamic data attributes show the last update time.	[DateTime]	

3.16. Properties of the SMC "remainingPowerCapability"

51. [UML_for_SMC_remainingPowerCapability] shows the UML-diagram for `SMC remainingPowerCapability`. Data points related to remaining power capability.

3.17. Properties of the SMC "remainingPowerCapabilityValue"

52. [UML_for_SMC_remainingPowerCapabilityValue] shows the UML-diagram for `SMC remainingPowerCapabilityValue`. Data points of remaining power capability.

Annex A. Explanations on used table formats

1. General

53. 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

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

- 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 [] form the second information.
- The types of SubmodelElements are abbreviated (see Table 1):

Table 1. 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
SML	SubmodelElementList

- 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.

Annex B. Changes to the submodel template

General

55. This annex lists the changes from version to version of the Submodel, together with major changes in the overall document.

Changes Version 1.0

- First Version conformant to DIN SPEC 99100

Bibliography

[1] DIN DKE SPEC 99100, "Requirements for data attributes of the battery passport". February 2025.

[2] “OMG Unified Modeling Language (OMG UML)”, Formal/2017-12-05, Version 2.5.1. December 2018. [Online] Available: https://www.omg.org/spec/UML/

[3] “Specification of the Asset Administration Shell", Publisher: Industrial Digital Twin Assocation (IDTA). [Online]. Available: https://industrialdigitaltwin.org/en/content-hub/aasspecifications

[4] “Submodel Templates", Publisher: Industrial Digital Twin Assocation (IDTA). [Online]. Available: https://industrialdigitaltwin.org/en/content-hub/submodels

[5] “How-to create a Submodel Template Specification", Publisher: Industrial Digital Twin Assocation (IDTA). June 2025. V1.1. [Online]. Available: https://industrialdigitaltwin.org/en/wp-content/uploads/sites/2/2025/06/IDTA_How-to-write-a-SMT-v1.1.pdf

[6] "Semantic Aspect Meta Model (SAMM)", V2.2.0. [Online]. Available: https://eclipse-esmf.github.io/samm-specification/2.2.0/index.html

[7] "Semantic Aspect Models - smt-semantic-models", Publisher: Industrial Digital Twin Assocation (IDTA). [Online]. Available: https://github.com/admin-shell-io/smt-semantic-models

[8] "Semantic Aspect Models - BatteryPassDataModel", Publisher: BatteryPass Consortium. [Online]. Available: https://github.com/batterypass/BatteryPassDataModel

[9] "Semantic Aspect Models - Tractus-X - sldt-semantic-models", [Online]. Available: https://github.com/eclipse-tractusx/sldt-semantic-modelsl