IDTA 02035-4: Digital Battery Passport – Part 4 Technical Data

February 2026

SPECIFICATION

Submodel Template of the Asset Administration Shell

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

IDTA 02035-1 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 [19]. 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 [6].

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 specification was created following the "model based workflow" as defined in [18]. Additionally, Aspect Models were created [15,16].

1.2. Scope of the Submodel

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

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)
```

This specification is Part 4: Technical Data (IDTA-02035-4).

1.3. Relevant standards for the Submodel template

This submodel template fulfills the requirements for technical data attributes as defined in DIN DKE SPEC 99100 [14]. 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. [14]"

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

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 hierarchally organized by aggregation relations, these can be seen as "contains" relation.

For a further overview on UML diagrams please refer to [6, 19] and [10].

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

Chapter 2. Information set for Submodel ”TechnicalData”

2.1. General

The "Technical Data 1.0" Submodel Template is part of the specification series for the Battery Passport.

The Submodel template is an instance of the Submodel template "Generic Technical Data 2.0 Submodel Template (IDTA-02003-2-0)" with battery specific extensions in the GeneralInformation SMC. Another deviation: SML TechnicalPropertyAreas is modelled as SMC.

The submodel instance `Technical Data` is used to provide all static (model) technical based data attributes of a battery as declared in the DIN DKE SPEC 99100, exceptions are carbon footprint, materials, and circularity (each have their own submodels, see Section 1.2).

Property specification

See clause 3 "Information structures and attributes".

Figure 1 shows the UML-diagram defining the relevant properties which need to be set.

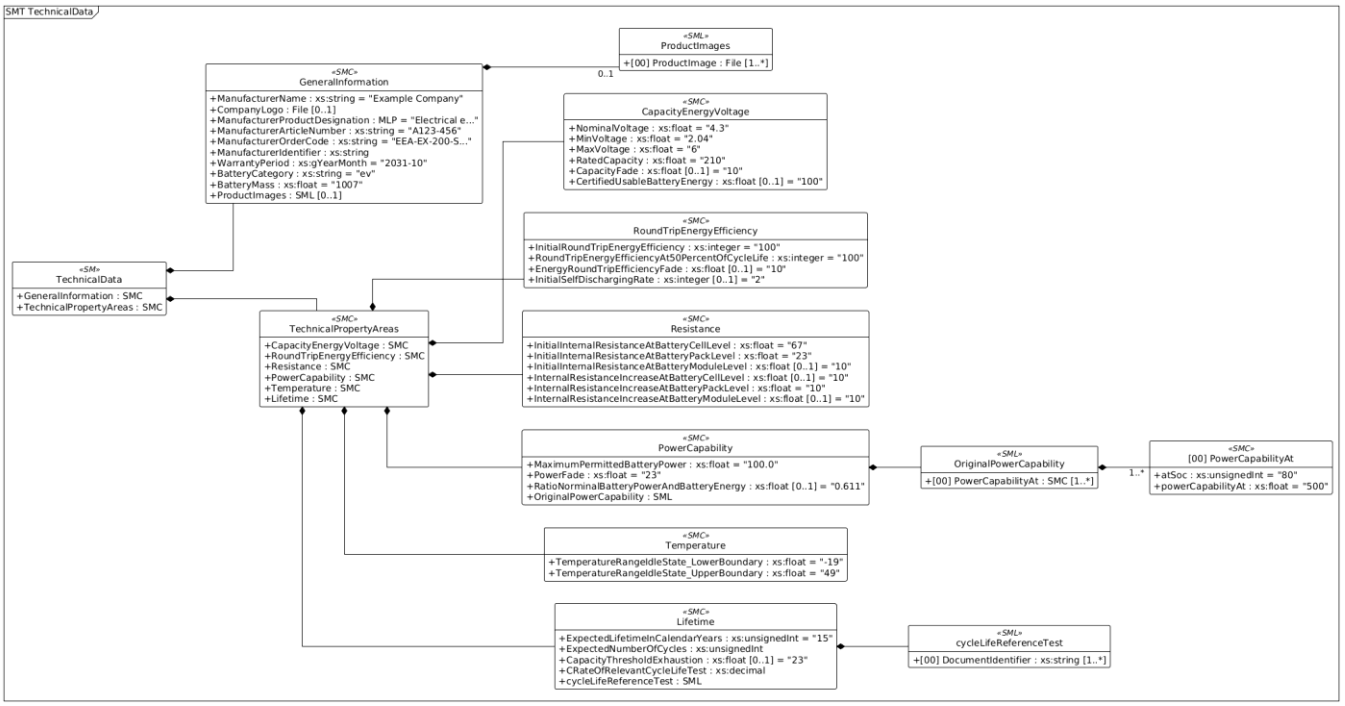

Figure 1. UML-Diagram for Submodel "Technical Data" for batteries

2.2. Submodel TechnicalData

The SubmodelElementCollection (SMC) “TechnicalData” contains general information around a battery. The table convention is explained in Annex A.2.

Table 1. SubmodelElements of TechnicalData

idShort:	**TechnicalData**		
Class:	Submodel		
semanticId:	https://admin-shell.io/idta/digitalbatterypassport/TechnicalData/1/0		
Parent:	-		
Explanation:	Technical data of the battery.		
Element details:	-		
[SME type] idShort	semanticId Description@en	[valueType] example	card.
[SMC] GeneralInformation	0173-1#02-ABK161#002/0173-1#01-AHX838#002 supplementalSemanticId: urn:samm:io.admin-shell.idta.batterypass.technical_data:1.0.0#generalInformation General information, for example ordering and manufacturer information.	[] 10 elements	1
[SMC] TechnicalPropertyAreas	0173-1#02-ABK163#002 supplementalSemanticId: https://api.eclass-cdp.com/0173-1-02-ABK163-002, urn:samm:io.admin-shell.idta.batterypass.technical_data:1.0.0#technicalPropertyAreas Individual battery characteristics based on DIN DKE SPEC 99100.	[] 6 elements	1

2.3. SubmodelElements of GeneralInformation

The SubmodelElementCollection (SMC) “GeneralInformation” contains general information around a battery. The table convention is explained in Annex A.2.

Table 2. SubmodelElements of GeneralInformation

idShort:	**GeneralInformation**		
Class:	SubmodelElementCollection		
semanticId:	0173-1#02-ABK161#002/0173-1#01-AHX838#002		
Parent:	TechnicalData		
Explanation:			
Element details:	-		
[SME type] idShort	semanticId Description@en	[valueType] example	card.

[Prop] ManufacturerName	0173-1#02-AAO677#004 supplementalSemanticId: https://api.eclass-cdp.com/0173-1-02-AAO677-004, urn:samm:io.admin-shell.idta.generic.technical_data:2.0.0#manufacturerName Legally valid designation of the natural or judicial body which is directly responsible for the design, production, packaging and labeling of a product in respect to its being brought into the market. DIN DKE Spec 99100 chapter reference: 6.1.2.4 c)	[String] Example Company	1
[File] CompanyLogo	0173-1#02-ABI776#002 supplementalSemanticId: https://api.eclass-cdp.com/0173-1-02-ABI776-002, urn:samm:io.admin-shell.idta.generic.technical_data:2.0.0#companyLogo Imagefile for logo of manufacturer provided in common format (.png, .jpg).	[]	0..1
[MLP] ManufacturerProductDesignation	0173-1#02-AAW338#003 supplementalSemanticId: https://api.eclass-cdp.com/0173-1-02-AAW338-003, urn:samurn:samm:io.admin-shell.idta.generic.technical_data:2.0.0#manufacturerProductDesignation Product designation as given by the mnaufacturer. Short description of the product, product group or function (short text) in common language. DIN DKE Spec 99100 chapter reference: 6.1.2.2	[] Electrical energy accelerator@en	1
[Prop] ManufacturerArticleNumber	0173-1#02-AAO676#005 supplementalSemanticId: https://api.eclass-cdp.com/0173-1-02-AAO676-005, urn:samurn:samm:io.admin-shell.idta.generic.technical_data:2.0.0#manufacturerArticleNumber unique product identifier of the manufacturer DIN DKE Spec 99100 chapter reference: 6.1.2.2 (as part of)	[String] A123-456	1

[Prop] ManufacturerOrderCode	0173-1#02-AAO227#004 supplementalSemanticId: https://api.eclass-cdp.com/0173-1-02-AAO227-004, urn:samurn:samm:io.admin-shell.idta.generic.technical_data:2.0.0#manufacturerOrderCode By manufactures issued unique combination of numbers and letters used to identify the device for ordering DIN DKE Spec 99100 chapter reference: 6.1.2.2 (as part of)	[String] EEA-EX-200-S/47-Q3	1
[Prop] ManufacturerIdentifier	urn:samm:io.admin-shell.idta.batterypass.technical_data:1.0.0#manufacturerIdentifier A battery passport must include information identifying the manufacturer. DIN DKE Spec 99100 chapter reference: 6.1.2.4	[String]	1
[Prop] WarrantyPeriod	urn:samm:io.admin-shell.idta.batterypass.technical_data:1.0.0#warrantyPeriod The battery passport must include information about the period for which the commercial warranty applies. DIN DKE Spec chapter reference: 6.1.3.4	[GYearMonth] 2031-10	1
[Prop] BatteryCategory	urn:samm:io.admin-shell.idta.batterypass.technical_data:1.0.0#batteryCategory supplementalSemanticId: 0173-1#02-AAR724#007 Categories relevant for the battery passport: LMT battery, electric vehicle battery, stationary or other industrial battery >2kWh. DIN DKE Spec chapter reference: 6.1.3.5 A battery passport must include the battery category. The battery category must be provided on the battery label. The battery must be categorised by its intended use in (string values): - "lmt" - "ev" - "industrial", or - "stationary" DIN DKE Spec 99100 chapter reference: 6.1.3.5	[String] ev	1

[Prop] BatteryMass	urn:samm:io.admin-shell.idta.batterypass.technical_data:1.0.0#batteryMass supplementalSemanticId: 0173-1#02-AAF040#010 Mass of the entire battery in kilograms. Voluntary: if the battery is defined on pack or module level: also weight of the modules and/or cells. DIN DKE Spec chapter reference: 6.1.3.6	[Float] 1007	1
[SML] ProductImages	0173-1#02-ABM220#001 supplementalSemanticId: https://api.eclass-cdp.com/0173-1-02-ABM220-001, urn:samm:io.admin-shell.idta.generic.technical_data:2.0.0#productImages List for image file(s) for associated product provided in common format (.png, .jpg).	[] 1 elements	0..1

Table 3. SubmodelElements of ProductImages

idShort:	**ProductImages**		
Class:	SubmodelElementList		
semanticId:	0173-1#02-ABM220#001		
Parent:	GeneralInformation		
Explanation:	List for image file(s) for associated product provided in common format (.png, .jpg).		
Element details:	orderRelevant=No, semanticIdListElement=[GlobalReference, 0173-1#02-ABM220#001/0173-1#01-AHY911#001], typeValueListElement=File		
[SME type] idShort	semanticId Description@en	[valueType] example	card.
[File] ProductImage	0173-1#02-ABM220#001/0173-1#01-AHY911#001 supplementalSemanticId: urn:samm:io.admin-shell.idta.shared:3.1.0#ResourceWithContentType Image file for associated product provided in common format (.png, .jpg).	[]	0..*

2.4. SubmodelElements of TechnicalPropertyAreas

The following attributes need to be set for the Submodel instance. The table convention is explained in Annex A.2.

The ECLASS IRDIs referenced in this Submodel are based on ECLASS Release 15. This version of the Submodel with these ECLASS IRDIs is also available in the download area of the ECLASS website: www.eclass.eu in form of the Asset.xml. The Asset.xml (Release 15) is the ECLASS file that contains Submodels. The use of these Submodels is free of charge.

Table 4. Attributes of the Submodel instance

idShort:	**TechnicalPropertyAreas**		
Class:	SubmodelElementCollection		
semanticId:	0173-1#02-ABK163#002		
Parent:	TechnicalData		
Explanation:			
Element details:	-		
[SME type] idShort	semanticId Description@en	[valueType] example	card.
[SMC] CapacityEnergyVoltage	urn:samm:io.admin-shell.idta.batterypass.technical_data:1.0.0#capacityEnergyVoltage Information on battery capacity, energy and voltage. DIN DKE Spec 99100 chapter reference: 6.7.2	[] 6 elements	1
[SMC] RoundTripEnergyEfficiency	urn:samm:io.admin-shell.idta.batterypass.technical_data:1.0.0#roundTripEnergyEfficiency Information regarding round trip energy efficiency. DIN DKE Spec 99100 chapter reference: 6.7.4	[] 4 elements	1
[SMC] Resistance	urn:samm:io.admin-shell.idta.batterypass.technical_data:1.0.0#resistance Data elements regarding internal resistance and electrochemical impedance. DIN DKE Spec 99100 chapter reference: 6.7.5	[] 6 elements	1
[SMC] PowerCapability	urn:samm:io.admin-shell.idta.batterypass.technical_data:1.0.0#powerCapability Information regarding power capability. DIN DKE Spec 99100 chapter reference: 6.7.3	[] 4 elements	1

[SMC] Temperature	urn:samm:io.admin-shell.idta.batterypass.technical_data:1.0.0#temperature Information regarding temperature conditions. DIN DKE Spec 99100 chapter reference: 6.7.7	[] 2 elements	1
[SMC] Lifetime	urn:samm:io.admin-shell.idta.batterypass.technical_data:1.0.0#lifetime Information regarding battery lifetime. DIN DKE Spec 99100 chapter reference: 6.7.6	[] 4 elements	1

2.5. SubmodelElements of CapacityEnergyVoltage

The SubmodelElementCollection (SMC) “CapacityEnergyVoltage” contains capacity, energy and voltage relevant data elements. The table convention is explained in Annex A.2.

Table 5. SubmodelElements of CapacityEnergyVoltage

idShort:	**CapacityEnergyVoltage**		
Class:	SubmodelElementCollection		
semanticId:	urn:samm:io.admin-shell.idta.batterypass.technical_data:1.0.0#capacityEnergyVoltage		
Parent:	TechnicalPropertyAreas		
Explanation:	Information on battery capacity, energy and voltage. DIN DKE Spec 99100 chapter reference: 6.7.2		
Element details:	-		
[SME type] idShort	semanticId Description@en	[valueType] example	card.
[Prop] NominalVoltage	0173-1#02-ABL588#001 supplementalSemanticId: urn:samm:io.admin-shell.idta.batterypass.technical_data:1.0.0#nominalVoltage voltage the battery is rated for - NOM voltage - NOM DIN DKE Spec 99100 chapter reference: 6.7.2.11	[Float] 4.3	1

[Prop] MinVoltage	0173-1#02-ABL587#001 supplementalSemanticId: urn:samm:io.admin-shell.idta.batterypass.technical_data:1.0.0#minimumVoltage voltage the battery is rated for - MIN voltage - MIN DIN DKE Spec 99100 chapter reference: 6.7.2.9	[Float] 2.04	1
[Prop] MaxVoltage	0173-1#02-ABL589#001 supplementalSemanticId: urn:samm:io.admin-shell.idta.batterypass.technical_data:1.0.0#maximumVoltage voltage the battery is rated for - MAX voltage - MAX DIN DKE Spec 99100 chapter reference: 6.7.2.10	[Float] 6	1
[Prop] RatedCapacity	0173-1#02-ABL869#002 supplementalSemanticId: urn:samm:io.admin-shell.idta.batterypass.technical_data:1.0.0#ratedCapacity total number of ampere-hours (Ah) that can be withdrawn from a fully charged battery under specific conditions rated capacity DIN DKE Spec 99100 chapter reference: 6.7.2.2	[Float] 210	1
[Prop] CapacityFade	0173-1#02-ABL828#002 supplementalSemanticId: urn:samm:io.admin-shell.idta.batterypass.technical_data:1.0.0#capacityFade decrease over time and upon usage in the amount of charge that a battery can deliver at the rated voltage, with respect to the original rated capacity declared by the manufacturer capacity fade DIN DKE Spec 99100 chapter reference: 6.7.2.4	[Float] 10	0..1
[Prop] CertifiedUsableBatteryEnergy	0173-1#02-ABL829#002 supplementalSemanticId: urn:samm:io.admin-shell.idta.batterypass.technical_data:1.0.0#ratedEnergy 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 Certified usable battery energy (UBE certified) DIN DKE Spec 99100 chapter reference: 6.7.2.5	[Float] 100	0..1

2.6. SubmodelElements of RoundTripEnergyEfficiency

The SubmodelElementCollection (SMC) “RoundTripEnergyEfficiency” contains round trip energy efficiency relevant data elements. The table convention is explained in Annex A.2.

Table 6. SubmodelElements of RoundTripEnergyEfficiency

idShort:	**RoundTripEnergyEfficiency**		
Class:	SubmodelElementCollection		
semanticId:	urn:samm:io.admin-shell.idta.batterypass.technical_data:1.0.0#roundTripEnergyEfficiency		
Parent:	TechnicalPropertyAreas		
Explanation:	Information regarding round trip energy efficiency. DIN DKE Spec 99100 chapter reference: 6.7.4		
Element details:	-		
[SME type] idShort	semanticId Description@en	[valueType] example	card.
[Prop] InitialRoundTripEnergyEfficiency	0173-1#02-ABL833#002 supplementalSemanticId: urn:samm:io.admin-shell.idta.batterypass.technical_data:1.0.0#initialRoundTripEnergyEfficiency initial round trip energy efficiency means the ratio of the net energy delivered by a battery during a discharge test to the total energy required to restore the initial State of Charge by a standard charge initial round trip energy efficiency DIN DKE Spec 99100 chapter reference: 6.7.4.2	[Integer] 100	1
[Prop] RoundTripEnergyEfficiencyAt50PercentOfCycleLife	0173-1#02-ABL866#002 supplementalSemanticId: urn:samm:io.admin-shell.idta.batterypass.technical_data:1.0.0#roundTripEfficiencyAt50PercentCycleLife round trip energy efficiency at 50% of cycle-life and measured at 50% of cycle life as determined in a pre-use standardized measurement round trip energy efficiency at 50% of cycle life DIN DKE Spec 99100 chapter reference: 6.7.4.3	[Integer] 100	1

[Prop] EnergyRoundTripEfficiencyFade	0173-1#02-ABL827#002 supplementalSemanticId: urn:samm:io.admin-shell.idta.batterypass.technical_data:1.0.0#energyRoundTripEfficiencyFade decrease of round trip energy efficiency as percentage, calculated from remaining and initial round trip energy efficiency round trip energy efficiency fade DIN DKE Spec 99100 chapter reference: 6.7.4.5	[Float] 10	0..1
[Prop] InitialSelfDischargingRate	0173-1#02-ABL834#002 supplementalSemanticId: urn:samm:io.admin-shell.idta.batterypass.technical_data:1.0.0#initialSelfDischargingRate initial self-discharge in % of capacity per unit of time in defined conditions (temperature range etc) as pre-use metric initial self-discharging rate DIN DKE Spec 99100 chapter reference: 6.7.4.6	[Integer] 2	0..1

2.7. SubmodelElements of Resistance

The SubmodelElementCollection (SMC) “Resistance” contains resistance relevant data elements. The table convention is explained in Annex A.2.

Table 7. SubmodelElements of Resistance

idShort:	**Resistance**		
Class:	SubmodelElementCollection		
semanticId:	urn:samm:io.admin-shell.idta.batterypass.technical_data:1.0.0#resistance		
Parent:	TechnicalPropertyAreas		
Explanation:	Data elements regarding internal resistance and electrochemical impedance. DIN DKE Spec 99100 chapter reference: 6.7.5		
Element details:	-		
[SME type] idShort	semanticId Description@en	[valueType] example	card.

[Prop] InitialInternalResistanceAtBatteryCellLevel	0173-1#02-ABL844#002 supplementalSemanticId: urn:samm:io.admin-shell.idta.batterypass.technical_data:1.0.0#initialInternalResistanceAtBatteryCellLevel measure of a battery cell’s opposition to current flow at the beginning of its operational life, affecting its performance, efficiency, and heat generation (internal resistance means the absolute value of the quotient of the voltage drop between the terminals by the electric current increase in the battery circuit during a current pulse) Internal battery cell and pack resistance - Internal resistance (in Ohm) DIN DKE Spec 99100 chapter reference: 6.7.5.2	[Float] 67	1
[Prop] InitialInternalResistanceAtBatteryPackLevel	0173-1#02-ABL846#002 supplementalSemanticId: urn:samm:io.admin-shell.idta.batterypass.technical_data:1.0.0#initialInternalResistanceAtBatteryPackLevel measure of opposition to current flow in an entire battery pack at the start of its operational life, affecting overall performance, efficiency, and heat generation (internal resistance means the absolute value of the quotient of the voltage drop between the terminals by the electric current increase in the battery circuit during a current pulse) Initial (Pre-Use) internal resistance on battery pack level. DIN DKE Spec 99100 chapter reference: 6.7.5.2	[Float] 23	1
[Prop] InitialInternalResistanceAtBatteryModuleLevel	0173-1#02-ABL832#002 supplementalSemanticId: urn:samm:io.admin-shell.idta.batterypass.technical_data:1.0.0#initialInternalResistanceAtBatteryModuleLevel initial internal resistance means the absolute beginning value of the quotient of the voltage drop between the terminals by the electric current increase in the battery circuit during a current pulse Initial internal resistance on battery module level DIN DKE Spec 99100 chapter reference: 6.7.5.2	[Float] 10	0..1
[Prop] InternalResistanceIncreaseAtBatteryCellLevel	urn:samm:io.admin-shell.idta.batterypass.technical_data:1.0.0#internalResistanceIncreaseAtBatteryCellLevel supplementalSemanticId: 0173-1#02-ABL831#002 Internal resistance increase at battery cell level. initial internal resistance on battery cell level DIN DKE Spec 99100 chapter reference: 6.7.5.3	[Float] 10	0..1

[Prop] InternalResistanceIncreaseAtBatteryPackLevel	urn:samm:io.admin-shell.idta.batterypass.technical_data:1.0.0#internalResistanceIncreaseAtBatteryPackLevel supplementalSemanticId: 0173-1#02-ABL831#001 increase of internal resistance in % as calculated from current and initial values (calculated from initial and current internal resistance on battery pack level) initial internal resistance on battery pack level DIN DKE Spec 99100 chapter reference: 6.7.5.3	[Float] 10	1
[Prop] InternalResistanceIncreaseAtBatteryModuleLevel	urn:samm:io.admin-shell.idta.batterypass.technical_data:1.0.0#initialInternalResistanceAtBatteryModuleLevel supplementalSemanticId: 0173-1#02-ABL836#001 Internal resistance increase at battery module level.	[Float] 10	0..1

2.8. SubmodelElements of PowerCapability

The SubmodelElementCollection (SMC) “PowerCapability” contains power capability relevant data elements. The table convention is explained in Annex A.2.

Table 8. SubmodelElements of PowerCapability

idShort:	**PowerCapability**		
Class:	SubmodelElementCollection		
semanticId:	urn:samm:io.admin-shell.idta.batterypass.technical_data:1.0.0#powerCapability		
Parent:	TechnicalPropertyAreas		
Explanation:	Information regarding power capability. DIN DKE Spec 99100 chapter reference: 6.7.3		
Element details:	-		
[SME type] idShort	semanticId Description@en	[valueType] example	card.
[Prop] MaximumPermittedBatteryPower	0173-1#02-ABL843#002 supplementalSemanticId: urn:samm:io.admin-shell.idta.batterypass.technical_data:1.0.0#maximumPermittedBatteryPower maximum permitted power the battery is rated for, includes the data relevant for power limits maximum permitted battery power DIN DKE Spec 99100 chapter reference: 6.7.3.5	[Float] 100.0	1

[Prop] PowerFade	0173-1#02-ABL852#002 supplementalSemanticId: urn:samm:io.admin-shell.idta.batterypass.technical_data:1.0.0#powerFade power capability at 80% and 20% state of charge (as defined in Battery Regulation Annex IV Part B) Power fade DIN DKE Spec 99100 chapter reference: 6.7.3.4	[Float] 23	1
[Prop] RatioNorminalBatteryPowerAndBatteryEnergy	urn:samm:io.admin-shell.idta.batterypass.technical_data:1.0.0#powerCapabilityRatio The nominal battery power is the suitable approximate value of the power capability used to designate or identify the battery, while the battery energy is determined in reference conditions to be defined. DIN DKE Spec 99100 chapter reference: 6.7.3.6	[Float] 0.611	0..1
[SML] OriginalPowerCapability	0173-1#02-ABL853#002 supplementalSemanticId: urn:samm:io.admin-shell.idta.batterypass.technical_data:1.0.0#originalPowerCapability List of pre-use power capabilities (definition of power capability as given in Battery Regulation). Power capability shall be measured at reference conditions, which must include measurements at 80% and 20% state of charge for EV and industrial batteries. DIN DKE Spec 99100 chapter reference: 6.7.3.2	[] 1 elements	1

Table 9. SubmodelElements of PowerCapability

idShort:	**OriginalPowerCapability**		
Class:	SubmodelElementList		
semanticId:	0173-1#02-ABL853#002		
Parent:	PowerCapability		
Explanation:			
Element details:	orderRelevant=No, semanticIdListElement=[GlobalReference, urn:samm:io.admin-shell.idta.batterypass.technical_data:1.0.0#PowerCapabilityAt], typeValueListElement=SubmodelElementCollection		
[SME type] idShort	semanticId Description@en	[valueType] example	card.

[SMC] PowerCapabilityAt	urn:samm:io.admin-shell.idta.batterypass.technical_data:1.0.0#PowerCapabilityAt Power capability measured at a reference condition, for example at 80% or 20% state of charge (SoC). DIN DKE Spec 99100 chapter reference: 6.7.3.2	[] 2 elements	1..*

Table 10. SubmodelElements of PowerCapability

idShort:	**PowerCapabilityAt**		
Class:	SubmodelElementCollection		
semanticId:	urn:samm:io.admin-shell.idta.batterypass.technical_data:1.0.0#PowerCapabilityAt		
Parent:	OriginalPowerCapability		
Explanation:	Power capability measured at a reference condition, for example at 80% or 20% state of charge (SoC). DIN DKE Spec 99100 chapter reference: 6.7.3.2		
Element details:	-		
[SME type] idShort	semanticId Description@en	[valueType] example	card.
[Prop] atSoc	urn:samm:io.admin-shell.idta.batterypass.technical_data:1.0.0#atSoC supplementalSemanticId: 0173-1#02-ABL821#001 Power capability shall be measured at reference conditions, which must include measurements at 80% and 20% state of charge for EV and industrial batteries.	[UnsignedInt] 80	1
[Prop] powerCapabilityAt	urn:samm:io.admin-shell.idta.batterypass.technical_data:1.0.0#powerCapabilityAt supplementalSemanticId: 0173-1#02-ABL853#001 Power capability.	[Float] 500	1

2.9. SubmodelElements of Temperature

The SubmodelElementCollection (SMC) “Temperature” contains temperature relevant data elements. The table convention is explained in Annex A.2.

Table 11. SubmodelElements of Temperature

idShort:	**Temperature**
Class:	SubmodelElementCollection

semanticId:	urn:samm:io.admin-shell.idta.batterypass.technical_data:1.0.0#temperature		
Parent:	TechnicalPropertyAreas		
Explanation:	Information regarding temperature conditions. DIN DKE Spec 99100 chapter reference: 6.7.7		
Element details:	-		
[SME type] idShort	semanticId Description@en	[valueType] example	card.
[Prop] TemperatureRangeIdleState_LowerBoundary	0173-1#02-ABL842#002 supplementalSemanticId: urn:samm:io.admin-shell.idta.batterypass.technical_data:1.0.0#temperatureRangeIdleStateLowerBoundary lower boundary of the surrounding temperature range, which the battery can safely withstand temperature range idle state (lower boundary) DIN DKE Spec 99100 chapter reference: 6.7.7.3	[Float] -19	1
[Prop] TemperatureRangeIdleState_UpperBoundary	0173-1#02-ABL871#002 supplementalSemanticId: urn:samm:io.admin-shell.idta.batterypass.technical_data:1.0.0#temperatureRangeIdleStateUpperBoundary upper boundary of the surrounding temperature range, which the battery can safely withstand temperature range idle state (upper boundary) DIN DKE Spec 99100 chapter reference: 6.7.7.4	[Float] 49	1

2.10. SubmodelElements of Lifetime

The SubmodelElementCollection (SMC) “Lifetime ” contains lifetime relevant data elements. Some other lifetime relvant information will be provided in the • Digital Battery Passport - Part 2: Handover Documentation 1.0 (IDTA-02035-2). The table convention is explained in Annex A.2.

Table 12. SubmodelElements of Lifetime

idShort:	**Lifetime**
Class:	SubmodelElementCollection
semanticId:	urn:samm:io.admin-shell.idta.batterypass.technical_data:1.0.0#lifetime
Parent:	TechnicalPropertyAreas
Explanation:	Information regarding battery lifetime. DIN DKE Spec 99100 chapter reference: 6.7.6

Element details:	-		
[SME type] idShort	semanticId Description@en	[valueType] example	card.
[Prop] ExpectedLifetimeInCalendarYears	urn:samm:io.admin-shell.idta.batterypass.technical_data:1.0.0#expectedLifetime The battery passport must include information about the expected battery lifetime in calendar years. The update interval must be upon placement on the market and upon change of the battery status. DIN DKE Spec 99100 chapter reference: 6.7.6.2	[UnsignedInt] 15	1
[Prop] ExpectedNumberOfCycles	urn:samm:io.admin-shell.idta.batterypass.technical_data:1.0.0#expectedNumberOfCycles supplementalSemanticId: 0173-1#02-ABL830#001 Expected battery lifetime expressed in cycles. The exception for non-cycle applications in Article 10 appears sensible, but is not included in the Annex XIII provision. The data attribute is defined by measurement conditions of the cycle-life test such as the C-Rate (see below) and the depth of discharge in the cycle-life test DIN DKE Spec 99100 chapter reference: 6.7.6.3	[UnsignedInt]	1
[Prop] CapacityThresholdExhaustion	0173-1#02-ABL838#002 supplementalSemanticId: urn:samm:io.admin-shell.idta.batterypass.technical_data:1.0.0#capacityThresholdForExhaustion interpreted as minimum percentage of rated capacity, above which the battery is still considered operational as EV battery in its current life. The value has to be provided by the economic operator. This metric may serve as indicator for a necessary end of current life as EV and may be understood in the context of warranty. interpreted as minimum percentage of rated capacity, above which the battery is still considered operational as EV battery in its current life. The value has to be provided by the economic operator. This metric may serve as indicator for a necessary end of current life as EV and may be understood in the context of warranty. DIN DKE Spec 99100 chapter reference: 6.7.6.9	[Float] 23	0..1

[Prop] CRateOfRelevantCycleLifeTest	urn:samm:io.admin-shell.idta.batterypass.technical_data:1.0.0#cRateLifeCycleTest The C-rate should be provided separately for both the charge and discharge of the battery, if applicable. The exception for non-cycle applications as mentioned in "Expected lifetime: Number of charge-discharge cycles" should apply to this data attribute as well. DIN DKE Spec 99100 chapter reference: 6.7.6.6 This data attribute is a measurement parameter for “Expected lifetime: Number of charge-discharge cycles”: Applied charge and discharge rate in terms of rated capacity (C-rate) of relevant cycle-life reference test. DIN DKE Spec 99100 chapter reference: 6.7.6.6	[Decimal]	1
[SML] cyclLifeReferenceTest	urn:samm:io.admin-shell.idta.batterypass.technical_data:1.0.0#cycleLifeReferenceTest The battery passport must include information about the expected battery lifetime expressed in cycles, and reference test used. DIN DKE Spec 99100 chapter reference: 6.7.6.5	[] 1 elements	1

Table 13. SubmodelElements of cyclLifeReferenceTest

idShort:	cyclLifeReferenceTest		
Class:	SubmodelElementList		
semanticId:	urn:samm:io.admin-shell.idta.batterypass.technical_data:1.0.0#cycleLifeReferenceTest		
Parent:	Lifetime		
Explanation:	The battery passport must include information about the expected battery lifetime expressed in cycles, and reference test used. DIN DKE Spec 99100 chapter reference: 6.7.6.5		
Element details:	-		
[SME type] idShort	semanticId Description@en	[valueType] example	card.
[Prop] DocumentIdentifier	0173-1#02-ABI501#003/0173-1#01-AHF580#003 Documen Identifier	[String]	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 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. 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 13):

Table 13. 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 choosen, 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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