

IDTA-02035-1 : Digital Battery Passport - Part 4

Technical Data 1.0

August 2025

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

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.

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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>
 - Aspect Models published by the BatteryPass Consortium (closed project) [8]: <https://github.com/batterypass/BatteryPassDataModel>
 - Aspect Models published at Tractus-X and used in standards published by Catena-X [9]: <https://github.com/eclipse-tractusx/sldt-semantic-models>

1.2. Scope of the Submodel

6. 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.
7. 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)

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

1.3. Relevant standards for the Submodel template

9. 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]"

10. 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

11. For clarity and an improved legibility readers suggested to go through this section at first before reading the following chapters.
12. 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.
13. The single classes are hierarchally organized by aggregation relations, these can be seen as "contains" relation.
14. For a further overview on UML diagrams please refer to [6] and [10].
15. Further details about used table formats please refer to Annex A.

Chapter 2. Information set for Submodel "TechnicalData"

2.1. General

16. The "Technical Data 1.0" Submodel Template is part of the specification series for the Battery Passport.
17. The Submodel template is an instance of the Submodel template "Generic Technical Data 1.2 Submodel Template (IDTA-02003-1-2)" with battery specific extensions in the GeneralInformation SMC.
18. The submodel instance **Technical Data** is used to provide all static (model) technical based data attributes of a battery as declared in the DIN SPEC 99100, exceptions are carbon footprint, materials, and circularity (each have their own submodels, see Section 1.2).
19. **Property specification**
20. See [clause 3 "Information structures and attributes"](#).
21. [\[UML_Submodel\]](#) shows the UML-diagram defining the relevant properties which need to be set.

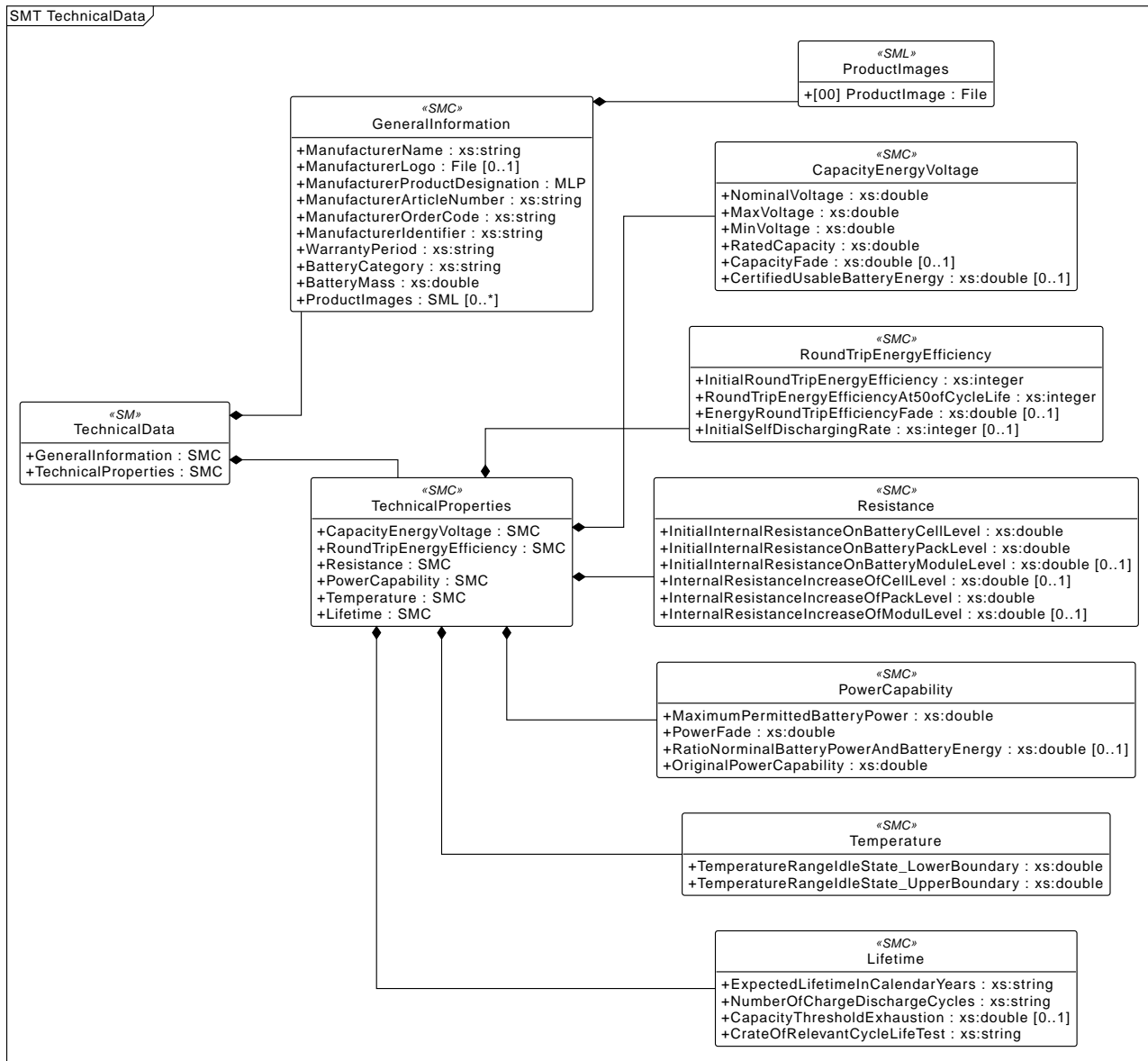


Figure 1. UML-Diagram for Submodel "Product Carbon Footprint" for batteries

2.2. Submodel TechnicalData

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

Table 1. SubmodelElements of GoodsAddressHandover

idShort:	TechnicalData
Class:	Submodel
semanticId:	https://admin-shell.io/ZVEI/TechnicalData/Submodel/1/2
Parent:	-
Explanation:	Submodel containing techical data of the asset and associated product classificatons.
Element details:	-

[SME type]	semanticId	[valueType]	card.
idShort	Description@en	example	
[SMC] GeneralInformation	https://admin-shell.io/ZVEI/TechnicalData/GeneralInformation/1/1 General information for a battery instance.	[] 10 elements	1
[SMC] TechnicalProperties	https://admin-shell.io/ZVEI/TechnicalData/TechnicalProperties/1/1 Individual battery characteristics based on DIN SPEC 99100.	[] 6 elements	1

2.3. SubmodelElements of GeneralInformation

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

Table 2. SubmodelElements of GoodsAddressHandover

idShort:	GeneralInformation		
Class:	SubmodelElementCollection		
semanticId:	https://admin-shell.io/ZVEI/TechnicalData/GeneralInformation/1/1		
Parent:	TechnicalData		
Explanation:	General information for a battery instance.		
Element details:	-		
[SME type]	semanticId	[valueType]	card.
idShort	Description@en	example	
[Prop] ManufacturerName	0173-1#02-AAO677#002 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.	[String]	1
[File] ManufacturerLogo	https://admin-shell.io/ZVEI/TechnicalData/ManufacturerLogo/1/1 Imagefile for logo of manufacturer provided in common format (.png, .jpg).	[]	0..1

[MLP]	0173-1#02-AAW338#001	[]	1
ManufacturerProductDesignation	Product designation as given by the manufacturer. Short description of the product, product group or function (short text) in common language.		
[Prop]	0173-1#02-AAO676#003	[String]	1
ManufacturerArticleNumber	unique product identifier of the manufacturer		
[Prop]	0173-1#02-AAO227#002	[String]	1
ManufacturerOrderCode	By manufacturers issued unique combination of numbers and letters used to identify the device for ordering		
[Prop]	+	[String]	1
ManufacturerIdentifier	A battery passport must include information identifying the manufacturer.		
[Prop]	+	[String]	1
WarrantyPeriod	The battery passport must include information about the period for which the commercial warranty applies.		
[Prop]	+	[String]	1
BatteryCategory	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 battery" - "electric vehicle battery" or - "industrial battery" (stationary battery energy storage system/other industrial batteries).	EV	
[Prop]	0173-1#02-AAF040#010	[Double]	1
BatteryMass	Net weight 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.	1007	
[SML]	+	[]	0..*
ProductImages	List for image file(s) for associated product provided in common format (.png, .jpg).	1 elements	

Table 3. SubmodelElements of GoodsAddressHandover

idShort:	ProductImages
Class:	SubmodelElementList
semanticId:	

Parent:	GeneralInformation		
Explanation:	List for image file(s) for associated product provided in common format (.png, .jpg).		
Element details:	orderRelevant=No, typeValueListElement=SubmodelElement		
[SME type]	semanticId	[valueType]	card.
idShort	Description@en	example	
[File] ProductImage	https://admin-shell.io/ZVEI/TechnicalData/ProductImage/1/1 Image file for associated product provided in common format (.png, .jpg).	[]	

2.4. SubmodelElements of TechnicalProperties

24. The following attributes need to be set for the Submodel instance. The table convention is explained in Annex A.2.
25. 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:	TechnicalProperties		
Class:	SubmodelElementCollection		
semanticId:	https://admin-shell.io/ZVEI/TechnicalData/TechnicalProperties/1/1		
Parent:	TechnicalData		
Explanation:	Individual battery characteristics based on DIN SPEC 99100.		
Element details:	-		
[SME type]	semanticId	[valueType]	card.
idShort	Description@en	example	
[SMC]	+	[]	
CapacityEnergyVoltage	SMC of data elements with regard to battery capacity, energy and voltage	6 elements	
[SMC]	+	[]	
RoundTripEnergyEfficiency	SMC of data elements regarding round trip energy efficiency	4 elements	
[SMC]	+	[]	
Resistance	SMC of data elements regarding internal resistance and electrochemical impedance	6 elements	

[SMC]	+	[]	
PowerCapability	SMC of data elements regarding power capability	4 elements	
[SMC]	+	[]	
Temperature	SMC of data elements regarding temperature conditions	2 elements	
[SMC]	+	[]	
Lifetime	SMC of data elements regarding battery lifetime	4 elements	

2.5. SubmodelElements of CapacityEnergyVoltage

26. 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 GoodsAddressHandover

idShort:	CapacityEnergyVoltage		
Class:	SubmodelElementCollection		
semanticId:			
Parent:	TechnicalProperties		
Explanation:	SMC of data elements with regard to battery capacity, energy and voltage		
Element details:	-		
[SME type]	semanticId	[valueType]	card.
idShort	Description@en	example	
[Prop]	0173-1#02-ABL588#001	[Double]	1
NominalVoltage	voltage the battery is rated for - NOM	4.3	
[Prop]	0173-1#02-ABL589#001	[Double]	1
MaxVoltage	voltage the battery is rated for - MAX	6	
[Prop]	0173-1#02-ABL587#001	[Double]	1
MinVoltage	voltage the battery is rated for - MIN	2.04	
[Prop]	0173-1#02-ABL869#002	[Double]	1
RatedCapacity	total number of ampere-hours (Ah) that can be withdrawn from a fully charged battery under specific conditions	210	
[Prop]	0173-1#02-ABL828#002	[Double]	0..1
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	10	

[Prop]	0173-1#02-ABL829#002	[Double]	0..1
CertifiedUsableBatteryEnergy	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	100	

2.6. SubmodelElements of RoundTripEnergyEfficiency

27. 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 GoodsAddressHandover

idShort:	RoundTripEnergyEfficiency		
Class:	SubmodelElementCollection		
semanticId:			
Parent:	TechnicalProperties		
Explanation:	SMC of data elements regarding round trip energy efficiency		
Element details:	-		
[SME type]	semanticId	[valueType]	card.
idShort	Description@en	example	
[Prop]	0173-1#02-ABL833#002	[Integer]	1
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	100	
[Prop]	0173-1#02-ABL866#002	[Integer]	1
RoundTripEnergyEfficiencyAt50ofCycleLife	round trip energy efficiency at 50% of cycle-life and measured at 50% of cycle life as determined in a pre-use standardized measurement	100	
[Prop]	0173-1#02-ABL827#002	[Double]	0..1
EnergyRoundTripEfficiencyFade	decrease of round trip energy efficiency as percentage, calculated from remaining and initial round trip energy efficiency	10	
[Prop]	0173-1#02-ABL834#002	[Integer]	0..1
InitialSelfDischargingRate	initial self-discharge in % of capacity per unit of time in defined conditions (temperature range etc) as pre-use metric	2	

2.7. SubmodelElements of Resistance

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

Table 7. SubmodelElements of GoodsAddressHandover

idShort:	Resistance		
Class:	SubmodelElementCollection		
semanticId:			
Parent:	TechnicalProperties		
Explanation:	SMC of data elements regarding internal resistance and electrochemical impedance		
Element details:	-		
[SME type]	semanticId	[valueType]	card.
idShort	Description@en	example	
[Prop]	0173-1#02-ABL844#002	[Double]	1
InitialInternalResistanceOnBatteryCellLevel	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 -)	67	
[Prop]	0173-1#02-ABL846#002	[Double]	1
InitialInternalResistanceOnBatteryPackLevel	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.	23	
[Prop]	0173-1#02-ABL832#002	[Double]	0..1
InitialInternalResistanceOnBatteryModuleLevel	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 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	10	

[Prop]	0173-1#02-ABL831#002	[Double]	0..1
InternalResistanceIncreaseOfCellLevel	increase of internal resistance in % as calculated from current and initial values (calculated from initial and current internal resistance on battery pack level) Increase of internal resistance in % as calculated from current and initial values. Calculated from initial and current internal resistance on battery pack level.	10	
[Prop]	0173-1#02-ABL831#002	[Double]	1
InternalResistanceIncreaseOfPackLevel	increase of internal resistance in % as calculated from current and initial values (calculated from initial and current internal resistance on battery pack level) Increase of internal resistance in % as calculated from current and initial values. Calculated from initial and current internal resistance on battery pack level.	10	
[Prop]	0173-1#02-ABL831#002	[Double]	0..1
InternalResistanceIncreaseOfModulLevel	increase of internal resistance in % as calculated from current and initial values (calculated from initial and current internal resistance on battery pack level) Increase of internal resistance in % as calculated from current and initial values. Calculated from initial and current internal resistance on battery pack level.	10	

2.8. SubmodelElements of PowerCapability

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

Table 8. SubmodelElements of GoodsAddressHandover

idShort:	PowerCapability		
Class:	SubmodelElementCollection		
semanticId:			
Parent:	TechnicalProperties		
Explanation:	SMC of data elements regarding power capability		
Element details:	-		
[SME type]	semanticId	[valueType]	card.
idShort	Description@en	example	
[Prop]	0173-1#02-ABL843#002	[Double]	1
MaximumPermittedBatteryPower	maximum permitted power the battery is rated for, includes the data relevant for power limits maximum permitted power the battery is rated for, includes the data relevant for power limits	-1.7976931348623157e+308	

[Prop]	0173-1#02-ABL852#002	[Double]	1
PowerFade	power capability at 80% and 20% state of charge (as defined in Battery Regulation Annex IV Part B)	23	
[Prop]	+	[Double]	0..1
RatioNominal BatteryPowerAndBatteryEnergy	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.	0.611	
[Prop]	0173-1#02-ABL853#002	[Double]	1
OriginalPower Capability	pre-use power capability (definition of power capability as given in Battery Regulation) pre-use power capability (definition of power capability as given in Battery Regulation)	-1.7976931348 623157e+308	

2.9. SubmodelElements of Temperature

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

Table 9. SubmodelElements of GoodsAddressHandover

idShort:	Temperature		
Class:	SubmodelElementCollection		
semanticId:			
Parent:	TechnicalProperties		
Explanation:	SMC of data elements regarding temperature conditions		
Element details:	-		
[SME type]	semanticId	[valueType]	card.
idShort	Description@en	example	
[Prop]	0173-1#02-ABL842#002	[Double]	1
TemperatureRangeIdleState_LowerBoundary	lower boundary of the surrounding temperature range, which the battery can safely withstand Lower boundary of the surrounding temperature range, which the battery can safely withstand	-19	
[Prop]	0173-1#02-ABL871#002	[Double]	1
TemperatureRangeIdleState_UpperBoundary	upper boundary of the surrounding temperature range, which the battery can safely withstand Upper boundary of the surrounding temperature range, which the battery can safely withstand	49	

2.10. SubmodelElements of Lifetime

31. The SubmodelElementCollection (SMC) “Lifetime ” contains lifetime relevant data elements. Some other lifetime relevant 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 10. SubmodelElements of GoodsAddressHandover

idShort:	Lifetime		
Class:	SubmodelElementCollection		
semanticId:			
Parent:	TechnicalProperties		
Explanation:	SMC of data elements regarding battery lifetime		
Element details:	-		
[SME type]	semanticId	[valueType]	card.
idShort	Description@en	example	
[Prop]	+	[String]	1
ExpectedLifetimeInCalendarYears	This data attribute refers to “the expected life-time under the reference conditions for which they have been designed in terms of cycles, except for non-cycle applications, and calendar years.”	15	
[Prop]	+	[String]	1
NumberOfChargeDischargeCycles	This data attribute refers to “the expected life-time under the reference conditions for which they have been designed in terms of cycles, except for non-cycle applications, and calendar years.” (see BattReg AnnexIVA(5)).		
[Prop]	0173-1#02-ABL838#002	[Double]	0..1
CapacityThresholdExhaustion	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.	23	

[Prop]	+	[String]	1
CrateOfRelevantCycleLifeTest	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.		

Annex A. Explanations on used table formats

1. General

32. 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

33. For clarity and brevity, a set of rules is used for the tables for describing Submodels and SubmodelElements.
- The tables follow in principle the same conventions as in [5].
 - The table heads abbreviate 'cardinality' with 'card'.
 - The tables often place two informations in different rows of the same table cell. In this case, the first information is marked out by sharp brackets [] from the second information. A special case are the semanticIds, which are marked out by the format: (type)(local)[idType]value.
 - The types of SubmodelElements are abbreviated (see Table 11):

Table 11. Abbreviations for SubmodelElements

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

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

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

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

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