



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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| 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 hierarchically 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 detailed 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.

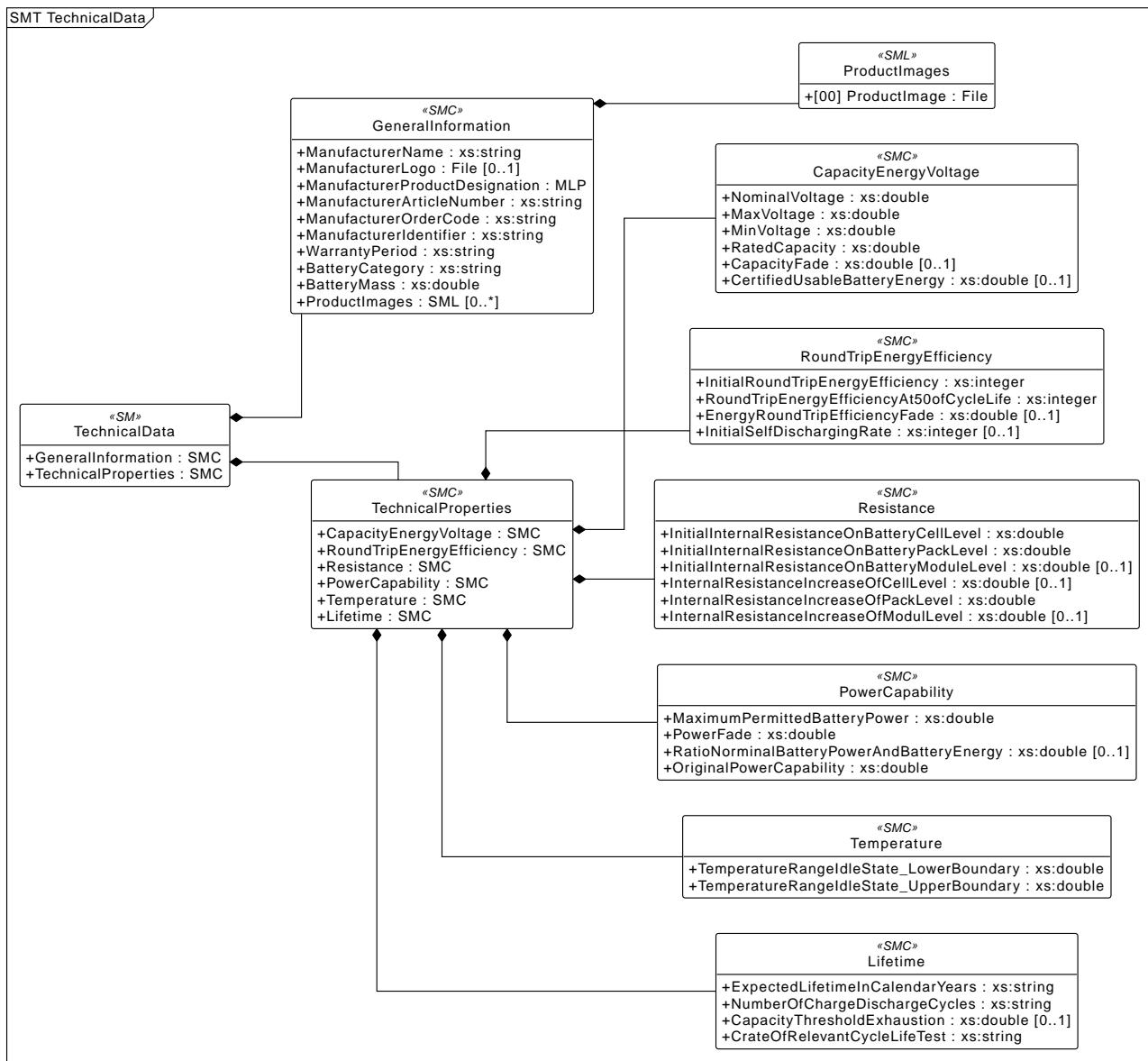


Figure 1. UML-Diagram for Submodel "Product Carbon Footprint" for batteries

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 technical data of the asset and associated product classifications. |
| 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 manufacturer 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.eclasse.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] | + | [] | |
| PowerCapabilit y | 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] NominalVoltage | 0173-1#02-ABL588#001 voltage the battery is rated for - NOM | [Double] 4.3 | 1 |
| [Prop] MaxVoltage | 0173-1#02-ABL589#001 voltage the battery is rated for - MAX | [Double] 6 | 1 |
| [Prop] MinVoltage | 0173-1#02-ABL587#001 voltage the battery is rated for - MIN | [Double] 2.04 | 1 |
| [Prop] RatedCapacity | 0173-1#02-ABL869#002 total number of ampere-hours (Ah) that can be withdrawn from a fully charged battery under specific conditions | [Double] 210 | 1 |
| [Prop] CapacityFade | 0173-1#02-ABL828#002 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 | [Double] 10 | 0..1 |

| | | | |
|------------------------------|---|----------|------|
| [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] InitialInternalResistanceOnBatteryCellLevel | 0173-1#02-ABL844#002 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 →) | [Double] 67 | 1 |
| [Prop] InitialInternalResistanceOnBatteryPackLevel | 0173-1#02-ABL846#002 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. | [Double] 23 | 1 |
| [Prop] InitialInternalResistanceOnBatteryModuleLevel | 0173-1#02-ABL832#002 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 | [Double] 10 | 0..1 |

| | | | |
|--|--|----------|------|
| [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 | -1.7976931348 623157e+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 |
| RatioNormalBatteryPowerAndBatteryEnergy | 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 |
| OriginalPowerCapability | 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] 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." | [String] 15 | 1 |
| [Prop] 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)). | [String] | 1 |
| [Prop] CapacityThresholdExhaustion | 0173-1#02-ABL838#002 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. | [Double] 23 | 0..1 |

| | | | |
|------------------------------|---|----------|---|
| [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.

Bibliography

- [1] "Recommendations for implementing the strategic initiative INDUSTRIE 4.0", acatech, April 2013. [Online]. Available: <https://en.acatech.de/publication/recommendations-for-implementing-the-strategic-initiative-industrie-4-0-final-report-of-the-industrie-4-0-working-group/>
- [2] "Implementation Strategy Industrie 4.0: Report on the results of the Industrie 4.0 Platform"; BITKOM e.V. / VDMA e.V., /ZVEI e.V., April 2015. [Online]. Available: <https://www.bitkom.org/sites/main/files/file/import/2016-01-Implementation-Strategy-Industrie40.pdf>
- [3] "The Structure of the Administration Shell: TRILATERAL PERSPECTIVES from France, Italy and Germany", March 2018, [Online]. Available: <https://www.plattform-i40.de/I40/Redaktion/EN/Downloads/Publikation/hm-2018-trilaterale-coop.html>
- [4] "Examples of the Asset Administration Shell for Industrie 4.0 Components – Basic Part"; ZVEI e.V., Whitepaper, April 2017. [Online]. Available: <https://www.zvei.org/en/press-media/publications/examples-of-the-asset-administration-shell-for-industrie-4-0-components-basic-part>
- [5] "Verwaltungsschale in der Praxis. Wie definiere ich Teilmodelle, beispielhafte Teilmodelle und Interaktion zwischen Verwaltungsschalen (in German)", Version 1.0, April 2019, Plattform Industrie 4.0 in Kooperation mit VDE GMA Fachausschuss 7.20, Federal Ministry for Economic Affairs and Energy (BMWi), Available: <https://www.plattform-i40.de/PI40/Redaktion/DE/Downloads/Publikation/2019-verwaltungsschale-in-der-praxis.html>
- [6] "Details of the Asset Administration Shell; Part 1 - The exchange of information between partners in the value chain of Industrie 4.0 (Version 3.0RC01)", November 2020, [Online]. Available: https://industrialdigitaltwin.org/wp-content/uploads/2021/09/07_details_of_the_asset_administration_shell_part1_v3_en_2020.pdf
- [7] "Semantic interoperability: challenges in the digital transformation age"; IEC, International Electreronical Commission; 2019. [Online]. Available: https://www.iec.ch/system/files/2020-03/content/media/files/iec_wp_semantic_interoperability.pdf
- [8] "E DIN VDE V 0170-100 VDE V 0170-100:2019-10 Digitales Typenschild - Teil 100: Digitale Produktkennzeichnung", October 2019, VDE VERLAG.
- [9] "IEC 61406-1:2022-09 Identification link - Part 1: General requirements", September 2022.
- [10] "OMG Unified Modeling Language (OMG UML)", Formal/2017-12-05, Version 2.5.1. December 2018. [Online] Available: <https://www.omg.org/spec/UML/>
- [11] "IDTA 02002-1-0 Submodel for Contact Information", 24 May 2022, Industrial Digital Twin Association, [Online]. Available: https://github.com/admin-shell-io/submodel-templates/blob/main/published/Contact%20Information/1/IDTA%2002002-1-0_Submodel_ContactInformation.pdf
- [12] "IDTA 02057-1-0 Submodel for Explosion Safety", *in development*
- [13] "The 'Blue Guide' on the implementation of EU product rules 2022", June 2022. [Online]. Available: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv:OJ.C_.2022.247.01.0001.01.ENG