

IDTA-02035-1 : Digital Battery Passport - Part 3

Product Carbon Footprint 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 3: Product Carbon Footprint 1.0 (IDTA-02035-3).

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 "CarbonFootprint"

2.1. General

16. The "Product Carbon Footprint 1.0" Submodel Template is part of the specification series for the Battery Passport.
17. The Submodel template is a subset of the Submodel template "Product Carbon Footprint 1.0 (IDTA-02023)".
18. The submodel instance **Product Carbon Footprint** is used to declared in terms of kg of carbon dioxide equivalent per one kWh of the total energy provided by the battery over its expected service life. This submodel is relevant to the corresponding attributes of the DIN SPEC 99100:
- Battery carbon footprint per Functional Unit
 - Contribution of raw material acquisition and pre-processing lifecycle stage
 - Contribution of main product production/manufacturing lifecycle stage
 - Contribution of distribution lifecycle stage
 - Contribution of end of life and recycling lifecycle stage
 - Carbon footprint performance class
 - Web link to public carbon footprint study
 - General battery and manufacturer information
 - Absolute battery carbon footprint

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.

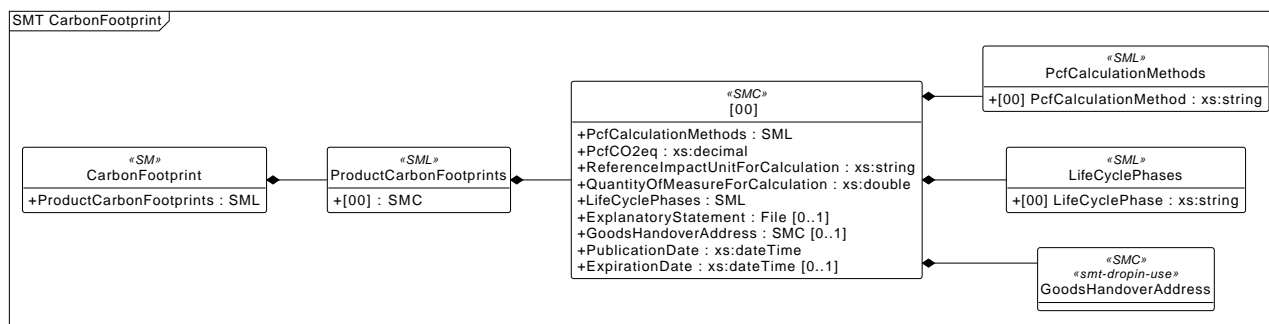


Figure 1. UML-Diagram for Submodel "Product Carbon Footprint" for batteries

2.2. Attributes of the Submodel instance

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

idShort:			
Class:	SubmodelElementCollection		
semanticId:	https://admin-shell.io/idta/CarbonFootprint/ProductCarbonFootprint/1/0		
Parent:	ProductCarbonFootprints		
Explanation:	Balance of greenhouse gas emissions along the entire life cycle of a product in a defined application and in relation to a defined unit of use.		
Element details:	-		
[SME type]	semanticId	[valueType]	card.
idShort	Description@en	example	
[SML] PcfCalculation Methods	https://admin-shell.io/idta/CarbonFootprint/PcfCalculationMethods/1/0 Standards, methods for determining the greenhouse gas emissions of a product.	[] 1 elements	1
[Prop] PcfCO2eq	0173-1#02-ABG855#003 sum of all greenhouse gas emissions of a product according to the quantification requirements of the standard Sum of all greenhouse gas emissions of a product according to the quantification requirements of the standard.	[Decimal]	1
[Prop] ReferenceImp actUnitForCalc ulation	0173-1#02-ABG856#003 Quantity unit of the product to which the PCF information on the CO2 footprint refers Quantity unit of the product to which the PCF information on the CO2 footprint refers.	[String]	1
[Prop] QuantityOfMea sureForCalcul ation	0173-1#02-ABG857#003 provides the quantity number of pieces or mass or volume to compute the impact of climate change or product carbon footprint provides the quantity number of pieces or mass or volume to compute the impact of climate change or product carbon footprint.	[Double]	1
[SML] LifeCyclePhas es	https://admin-shell.io/idta/CarbonFootprint/LifeCyclePhases/1/0 List of life cycle stages of the product according to the quantification requirements of the standard to which the PCF carbon footprint statement refers	[] 1 elements	1

[File] ExplanatoryStatement	https://admin-shell.io/idta/CarbonFootprint/ExplanatoryStatement/1/0 Explanation required or provided to ensure that a footprint communication can be properly understood by a purchaser, potential purchaser, or user of the product. Explanation required or provided to ensure that a footprint communication can be properly understood by a purchaser, potential purchaser, or user of the product.	[]	0..1
[SMC] GoodsHandoverAddress	https://admin-shell.io/zvei/nameplate/1/0/ContactInformations/AddressInformation supplementalSemanticId: https://admin-shell.io/smt-dropin/smt-dropin-use/1/0 , 0112/2///61360_7#AAS002#001, 0173-1#02-AAQ837#008 Indicates the hand-over address of the goods transport	[] 0 elements	0..1
[Prop] PublicationDate	https://admin-shell.io/idta/CarbonFootprint/PublicationDate/1/0 Time at which something was first published or made available The UTC timestamp on which a Product Carbon Footprint (PCF) - a calculation of a product's total greenhouse gas emissions - was created and published	[DateTime]	1
[Prop] ExpirationDate	https://admin-shell.io/idta/CarbonFootprint/ExpirationDate/1/0 End date up to which a study or data collection for calculating an ecological footprint is considered current and valid before an update or new calculation is required. End date up to which a study or data collection for calculating an ecological footprint is considered current and valid before an update or new calculation is required.	[DateTime]	0..1

Table 2. Attributes of the Submodel instance

idShort:	PcfCalculationMethods		
Class:	SubmodelElementList		
semanticId:	https://admin-shell.io/idta/CarbonFootprint/PcfCalculationMethods/1/0		
Parent:	-		
Explanation:	Standards, methods for determining the greenhouse gas emissions of a product.		
Element details:	orderRelevant=No, semanticIdListElement=[GlobalReference, 0173-1#02-ABG854#003], typeValueListElement=Property, valueTypeListElement=xs:string		
[SME type]	semanticId	[valueType]	card.
idShort	Description@en	example	

[Prop]	0173-1#02-ABG854#003	[String]	1
PcfCalculation Method	standard, method for determining the greenhouse gas emissions of a product Standard, method for determining the greenhouse gas emissions of a product.		

Table 3. Attributes of the Submodel instance

idShort:	LifeCyclePhases		
Class:	SubmodelElementList		
semanticId:	https://admin-shell.io/idta/CarbonFootprint/LifeCyclePhases/1/0		
Parent:	-		
Explanation:	List of life cycle stages of the product according to the quantification requirements of the standard to which the PCF carbon footprint statement refers		
Element details:	orderRelevant=No, semanticIdListElement=[GlobalReference, 0173-1#02-ABG858#003], typeValueListElement=Property, valueTypeListElement=xs:string		
[SME type]	semanticId	[valueType]	card.
idShort	Description@en	example	
[Prop]	0173-1#02-ABG858#003	[String]	1
LifeCyclePhase	life cycle stages of the product according to the quantification requirements of the standard to which the PCF carbon footprint statement refers Life cycle stages of the product according to the quantification requirements of the standard to which the PCF carbon footprint statement refers		

2.3. Value List PcfCalculationMethods

24. This Value List is based on ECLASS 15 with IRDI 0173-1#09-AAO115#003. The full list can be found in Section 2.5 in "Product Carbon Footprint 1.0 (IDTA-02023)".

2.4. Value List PCFReferenceValueForCalculation

25. This Value List is based on ECLASS 15 with IRDI 0173-1#09-AAO323#003. The full list can be found in Section 2.6 in "Product Carbon Footprint 1.0 (IDTA-02023)".

2.5. Value List LifeCyclePhase

26. This Value List is based on ECLASS 15 with IRDI 0173-1#09-AAO113#003. The full list can be found in Section 2.7 in "Product Carbon Footprint 1.0 (IDTA-02023)".

Annex A. Explanations on used table formats

1. General

27. 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

28. 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 4):

Table 4. 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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