

1

2

3

4

IDTA Carbon Footprint

5

- Working draft 2023-01-24 -

Contents

Contents	2
1 General	5
1.1 About this document	5
1.2 Scope of the Submodel	5
1.3 Relevant standards for the Submodel template	5
1.4 Use cases, requirements and design decisions	6
2 Submodel Product Carbon Footprint (PCF)	9
2.1 Approach.....	9
2.2 Carbon Footprint Submodel Template	10
2.3 SMC Product Carbon Footprint Calculation (PCF).....	10
2.4 SMC Transport Carbon Footprint Calculation (TCF)	13
2.5 SMC Address.....	14
2.6 SMC Reference To Data Source	15
Annex A. Explanations on used table formats	16
1. General	16
2. Tables on Submodels and SubmodelElements.....	16
Bibliography	17

26

Figures

27

Figure 1: Submodel template structure 9

28

29

30 **Tables**

31 Table 1: SM Carbon Footprint 10

32 Table 2: SMC Product Carbon Footprint 11

33 Table 3: Transport Carbon Footprint 13

34

1 General

1.1 About this document

This document is a part of a specification series. Each part specifies the contents of a Submodel template for the Asset Administration Shell (AAS). The AAS is described in [1], [2], [3] and [6]. First exemplary Submodel contents were described in [4], while the actual format of this document was derived by the "Administration Shell in Practice" [5]. The format aims to be very concise, giving only minimal necessary information for applying a Submodel template, while leaving deeper descriptions and specification of concepts, structures and mapping to the respective documents [1] to [6].

The target group of the specification are developers and editors of technical documentation and manufacturer information, which are describing assets in smart manufacturing 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.

1.2 Scope of the Submodel

This Submodel template provides the means to exchange an asset's Carbon Footprint (CF) between the partners along a value chain. The aim of this Submodel is to increase the interoperability between the parties, who are interested in documenting, exchanging, evaluating or optimizing the environmental footprint of their assets. These parties can for example be manufacturers, users/consumers or logistic partners. The CF might be part of larger initiatives such as the Digital Product Passport or the Product Environmental Footprint. It is not the scope of this Submodel template to provide the details of the CF-calculation and it does not substitute the relevant certificates.

1.3 Relevant standards for the Submodel template

ECLASS

ECLASS is a classification system for products and services maintained by the industry consortium ECLASS e.V. It supports the digital exchange of product descriptions and service descriptions, in the form of standardized data formats based on IEC 61360. As of ECLASS v13 a set of property definitions for PCF modelling is provided.

ISO 14067 - Greenhouse gases — Carbon footprint of products

This document specifies principles, requirements and guidelines for the quantification and reporting of the carbon footprint of a product, in a manner consistent with the standards on life cycle assessment (LCA). Requirements and guidelines for the quantification of a partial CF are also specified. This document is applicable to CF studies, the results of which provide the basis for different applications.

ISO 14040, 14044 - Environmental management — Life cycle assessment

These documents describe requirements, guidelines, principles and framework for life cycle assessment (LCA) including: definition of the goal and scope of the LCA, the life cycle inventory analysis (LCI) phase, the life cycle impact assessment (LCIA) phase, the life cycle interpretation phase, reporting and critical review of the LCA, limitations of the LCA, the relationship between the LCA phases, and conditions for use of value choices and optional elements.

78 **EN 15804 - Building Sustainability — Environmental Product Declarations — Basic Rules for the**
 79 **Product Category of Building Products**

80 The standard ensures that all EPDs for building products, building services, and building processes are
 81 derived, verified, and represented in a uniform manner. It stipulates the fundamental product category rules.

82

83 **EN 16258 - Methodology for calculation and declaration of energy consumption and GHG emissions**
 84 **of transport services (freight and passengers)**

85 This European Standard establishes a common methodology for the calculation and declaration of energy
 86 consumption and greenhouse gas (GHG) emissions related to any transport service (of freight, passengers
 87 or both)

88

89 **IEC TS 63058 - Switchgear and controlgear and their assemblies for low voltage - Environmental**
 90 **aspects**

91 This standard provides guidance to manufacturers of low-voltage switchgear and controlgear and their
 92 assemblies in evaluating and improving the environmental impact of their products, and in enabling effective
 93 communication using common references for environmental information throughout the supply chain.

94

95 **GHG Protocol - Greenhouse Gas Protocol**

96 GHG Protocol establishes comprehensive global standardized frameworks to measure and manage
 97 greenhouse gas (GHG) emissions from private and public sector operations, value chains and mitigation
 98 actions.

99

100 **PEP Ecopassport - Product Environmental Profile Ecopassport**

101 The mission of the non profit P.E.P. Association is to develop internationally the Environmental declaration
 102 Program PEP ecopassport® concerning electrical, electronic and HVAC (heating, ventilation, air-
 103 conditioning, refrigeration) products. The Ecopassport provide a reference framework in compliance with the
 104 ISO 14025 and ISO 14040s standards

105

106 **World Business Council for Sustainable Development (WBCSD, Pathfinder Framework)**

107 WBCSD is a community of over 200 sustainable businesses working collectively to accelerate the system
 108 transformations needed for a net-zero, nature positive, and more equitable future. Among others the WBCSD
 109 creates technical specifications to enable the exchange of standardized greenhouse gas (GHG) data at
 110 product level across interoperable technology solutions.

111

112 **Catena-X**

113 Catena-X is an integrated, collaborative, open data ecosystem for the automotive industry. It connects all
 114 players to end-to-end value chains. As part of its standardization activities a semantic data model for the
 115 PCF will be proposed.

116

117 InterOpera

118

119 **1.4 Use cases, requirements and design decisions**

120 Different standards and proprietary methods for calculating PCF values exist with varying complexity and
 121 different approximation assumptions. Sometimes the overall PCF is of interest (“from cradle to grave”) and

144

145 Further Use-Cases

- 146 - Comparison of PCF Values based on standardized Product-Category Rules
- 147 o How does the User see, that two PCF Values are comparable? (Work Item 4 ZVEI, VDMA)
- 148 o Sourcing Decision
- 149 o Quality Indicator (Self Declaration, 3rd Part verification, ...)
- 150 o Documentation Quality
- 151 ▪ PCF Value Only (Information)
- 152 - (ZVEI Showcase) Passing PCF Values through the Value Chain for integrated and dynamic PCF
- 153 Calculation
- 154 o Does the Methodology fit in my own reporting standard?
- 155 o Documentation Quality
- 156 ▪ Documentation included and Handover for further Calculation (Customer only)
- 157 - Accelerate 3rd Party Verification based on standardized Datamodel for Input and Output Data
- 158 o Documentation Quality
- 159 ▪ Deep PCF Verification Documentation for 3rd Party verification

160

161

162 Methodology

163 Product Category Rules

164 Product Specific Rules

2 Submodel Product Carbon Footprint (PCF)

2.1 Approach

The basic design of the Submodel template is that an unlimited number of SubmodelElementCollections (SMC) can be listed. Thereby, each SMC can address the carbon footprint using a different standard, calculation method or assumption.

The first version of the Submodel specification focusses on the ECLASS model. The current draft of the ECLASS model distinguishes between the Product Carbon Footprint (PCF) and the Transport Carbon Footprint (TCF) calculation. It currently supports EN 15804, ISO 14040, ISO 14044, ISO 14067, IEC TS 63058, GHG Protocol, PEP Ecopassport for the PCF and EN 16258 for the TCF.

The general structure of the Submodel is given in

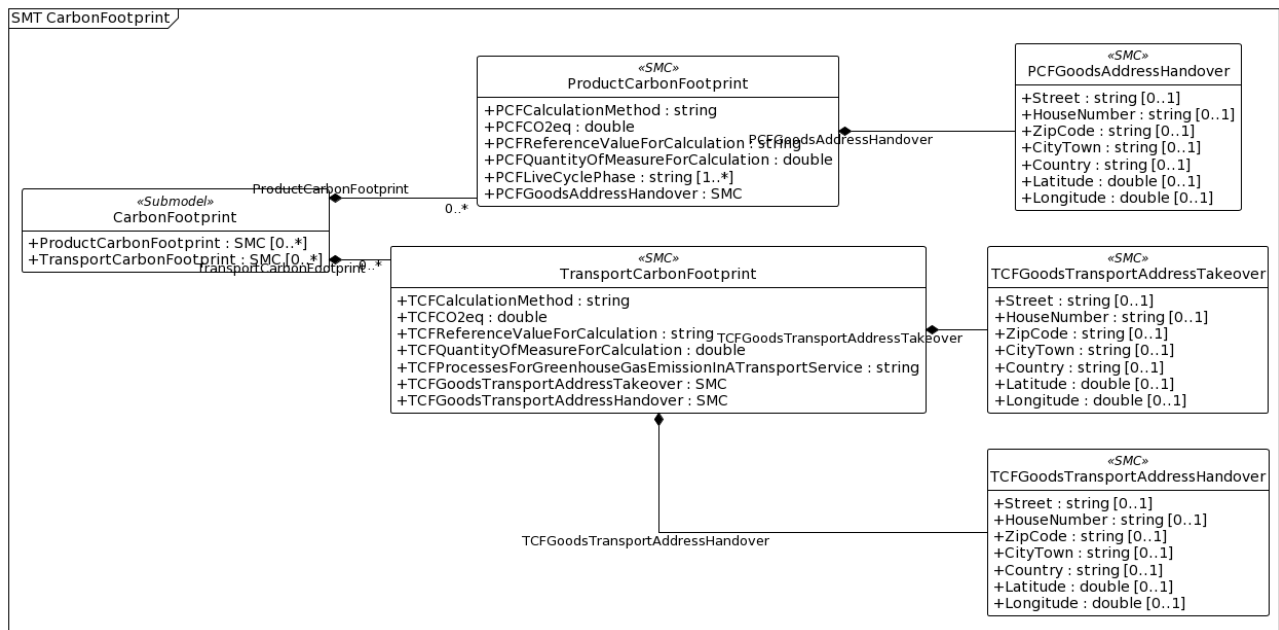


Figure 2.

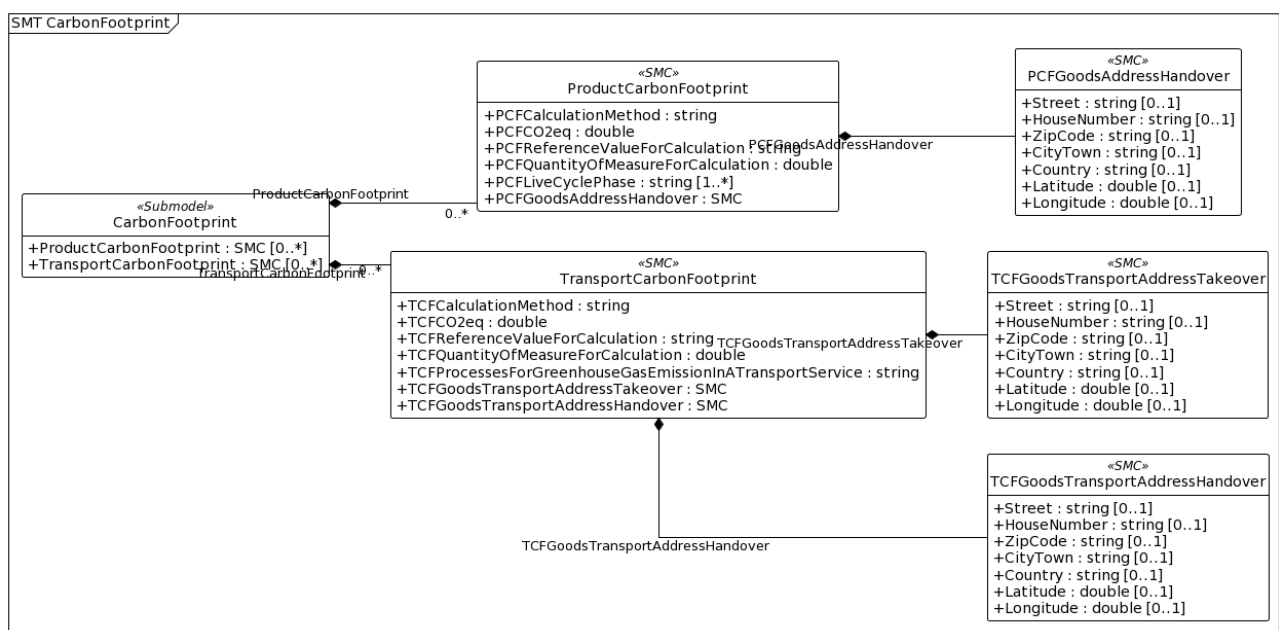


Figure 2: Submodel template overview

179

180 SMC Documentation with Link to Files (PDFs)

181 Indicator for primary and secondary data

182 Indicator which LCA-Databases were used for secondary data (e. g.)

183

184

2.2 Carbon Footprint Submodel Template

185

186 **Table 1: Carbon Footprint Submodel Template**

idShort:	CarbonFootprint Note: a different idShort might be used, as long as it is unique in the Asset Administration Shell.		
Class:	Submodel (SM)		
semanticId:	[IRDI] 0173-1#01-AHE712#001		
Parent:	Asset Administration Shell, to which the Carbon Footprint shall be associated to		
Explanation:	The Submodel provides the means to access the Carbon Footprint of the asset.		
[SME type]	semanticId = [idType]value	[valueType]	card.
idShort	Description@en	example	
[SMC]	[IRDI] 0173-1#01-AHE716#001	n/a	0..*
ProductCarbonFootprint{00}	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		
[SMC]	[IRDI] 0173-1#01-AHE717#001	n/a	0..*
TransportCarbonFootprint{00}	Balance of greenhouse gas emissions generated by a transport service of a product		

187

188

189

190

191

192

2.3 SMC Product Carbon Footprint Calculation (PCF)

193 This SMC provides the means to access the Product Carbon Footprint (PCF) of the asset. If several different
 194 calculation methods or lifecycle phases are to be supplied with the submodel, multiple instances of this SMC
 195 should be instantiated.

196 In this SMC the PCF requires that the appropriate lifecycle phase for which the CO₂-equivalent has been
 197 calculated is stated. Since not all standards support all life cycle phases it is possible to create an
 198 inconsistent model by stating standard and lifecycle phases that do not match. (The template does not
 199 contain a cross-check.) It is assumed that the creator of the respective model instances is knowledgeable in
 200 the field.

201

202 **Table 2: SMC Product Carbon Footprint**

idShort:	ProductCarbonFootprint{00} Note: a different idShort might be used, as long as it is unique in the Submodel.																										
Class:	SubmodelElementCollection (SMC)																										
semanticId:	[IRDI] 0173-1#01-AHE716#001																										
Parent:	SM CarbonFootprint (0173-1#01-AHE689#001)																										
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																										
[SME type]	semanticId = [idType]value	[valueType]	card.																								
idShort	Description@en	example																									
[property] PCFCalculation Method	[IRDI] 0173-1#02-ABG854#001 Standard, method for determining the greenhouse gas emissions of a product Value List (0173-1#09-AAO115#001): <table><tr><th>Value Code</th><th>Value</th><th>valueId</th></tr><tr><td>1</td><td>EN 15804</td><td>0173-1#07-ABU223#001</td></tr><tr><td>2</td><td>GHG Protocol</td><td>0173-1#07-ABU221#001</td></tr><tr><td>3</td><td>IEC TS 63058</td><td>0173-1#07-ABU222#001</td></tr><tr><td>4</td><td>ISO 14040</td><td>0173-1#07-ABV505#001</td></tr><tr><td>5</td><td>ISO 14044</td><td>0173-1#07-ABV506#001</td></tr><tr><td>6</td><td>ISO 14067</td><td>0173-1#07-ABU218#001</td></tr></table>	Value Code	Value	valueId	1	EN 15804	0173-1#07-ABU223#001	2	GHG Protocol	0173-1#07-ABU221#001	3	IEC TS 63058	0173-1#07-ABU222#001	4	ISO 14040	0173-1#07-ABV505#001	5	ISO 14044	0173-1#07-ABV506#001	6	ISO 14067	0173-1#07-ABU218#001	String "ISO 14067"	1			
Value Code	Value	valueId																									
1	EN 15804	0173-1#07-ABU223#001																									
2	GHG Protocol	0173-1#07-ABU221#001																									
3	IEC TS 63058	0173-1#07-ABU222#001																									
4	ISO 14040	0173-1#07-ABV505#001																									
5	ISO 14044	0173-1#07-ABV506#001																									
6	ISO 14067	0173-1#07-ABU218#001																									
[property] PCFCO2eq	[IRDI] 0173-1#02-ABG855#001 Sum of all greenhouse gas emissions of a product according to the quantification requirements of the standard	Double [kg] 17.2	1																								
[property] PCFReferenceV alueForCalculati on	[IRDI] 0173-1#02-ABG856#001 Quantity unit of the product to which the PCF information on the CO2 footprint refers Value List (0173-1#09-AAO323#001): <table><tr><th>Value Code</th><th>Value</th><th>valueId</th></tr><tr><td>1</td><td>g</td><td>0173-1#07-ABZ596#001</td></tr><tr><td>2</td><td>kg</td><td>0173-1#07-ABZ597#001</td></tr><tr><td>3</td><td>t</td><td>0173-1#07-ABZ598#001</td></tr><tr><td>4</td><td>ml</td><td>0173-1#07-ABZ599#001</td></tr><tr><td>5</td><td>l</td><td>0173-1#07-ABZ600#001</td></tr><tr><td>6</td><td>cbm</td><td>0173-1#07-ABZ601#001</td></tr><tr><td>7</td><td>qm</td><td>0173-1#07-ABZ602#001</td></tr></table>	Value Code	Value	valueId	1	g	0173-1#07-ABZ596#001	2	kg	0173-1#07-ABZ597#001	3	t	0173-1#07-ABZ598#001	4	ml	0173-1#07-ABZ599#001	5	l	0173-1#07-ABZ600#001	6	cbm	0173-1#07-ABZ601#001	7	qm	0173-1#07-ABZ602#001	String "piece"	1
Value Code	Value	valueId																									
1	g	0173-1#07-ABZ596#001																									
2	kg	0173-1#07-ABZ597#001																									
3	t	0173-1#07-ABZ598#001																									
4	ml	0173-1#07-ABZ599#001																									
5	l	0173-1#07-ABZ600#001																									
6	cbm	0173-1#07-ABZ601#001																									
7	qm	0173-1#07-ABZ602#001																									

	8	piece	0173-1#07-ABZ603#001																																																					
[property] PCFQuantityOf MeasureForCalc ulation	[IRDI] 0173-1#02-ABG857#001 Quantity of the product to which the PCF information on the CO2 footprint refers			Double 5.0	1																																																			
[property] PCFLiveCycleP hase	[IRDI] 0173-1#02-ABG858#001 Life cycle stages of the product according to the quantification requirements of the standard to which the PCF carbon footprint statement refers Value List (0173-1#09-AAO113#001): <table><tr><th>Value Code</th><th>Value</th><th>valueId</th></tr><tr><td>1</td><td>A1 – raw material supply (and upstream production)</td><td>0173-1#07-ABU208#001</td></tr><tr><td>2</td><td>A2 - cradle-to-gate transport to factory</td><td>0173-1#07-ABU209#001</td></tr><tr><td>3</td><td>A3 - production</td><td>0173-1#07-ABU210#001</td></tr><tr><td>4</td><td>A4 - transport to final destination</td><td>0173-1#07-ABU211#001</td></tr><tr><td>5</td><td>B1 – usage phase</td><td>0173-1#07-ABU212#001</td></tr><tr><td>6</td><td>B2 – maintenance</td><td>0173-1#07-ABV498#001</td></tr><tr><td>15</td><td>B3 - repair</td><td>0173-1#07-ABV497#001</td></tr><tr><td>7</td><td>B5 – update/upgrade, refurbishing</td><td>0173-1#07-ABV499#001</td></tr><tr><td>8</td><td>B6 – usage energy consumption</td><td>0173-1#07-ABV500#001</td></tr><tr><td>9</td><td>B7 – usage water consumption</td><td>0173-1#07-ABV501#001</td></tr><tr><td>10</td><td>C1 – reassembly</td><td>0173-1#07-ABV502#001</td></tr><tr><td>11</td><td>C2 – transport to recycler</td><td>0173-1#07-ABU213#001</td></tr><tr><td>12</td><td>C3 – recycling, waste treatment</td><td>0173-1#07-ABV503#001</td></tr><tr><td>13</td><td>C4 – landfill</td><td>0173-1#07-ABV504#001</td></tr><tr><td>14</td><td>D - reuse</td><td>0173-1#07-ABU214#001</td></tr><tr><td>16</td><td>A1-A3</td><td>0173-1#07-ABZ789#001</td></tr></table>			Value Code	Value	valueId	1	A1 – raw material supply (and upstream production)	0173-1#07-ABU208#001	2	A2 - cradle-to-gate transport to factory	0173-1#07-ABU209#001	3	A3 - production	0173-1#07-ABU210#001	4	A4 - transport to final destination	0173-1#07-ABU211#001	5	B1 – usage phase	0173-1#07-ABU212#001	6	B2 – maintenance	0173-1#07-ABV498#001	15	B3 - repair	0173-1#07-ABV497#001	7	B5 – update/upgrade, refurbishing	0173-1#07-ABV499#001	8	B6 – usage energy consumption	0173-1#07-ABV500#001	9	B7 – usage water consumption	0173-1#07-ABV501#001	10	C1 – reassembly	0173-1#07-ABV502#001	11	C2 – transport to recycler	0173-1#07-ABU213#001	12	C3 – recycling, waste treatment	0173-1#07-ABV503#001	13	C4 – landfill	0173-1#07-ABV504#001	14	D - reuse	0173-1#07-ABU214#001	16	A1-A3	0173-1#07-ABZ789#001	String “C4 - landfill”	1..*
Value Code	Value	valueId																																																						
1	A1 – raw material supply (and upstream production)	0173-1#07-ABU208#001																																																						
2	A2 - cradle-to-gate transport to factory	0173-1#07-ABU209#001																																																						
3	A3 - production	0173-1#07-ABU210#001																																																						
4	A4 - transport to final destination	0173-1#07-ABU211#001																																																						
5	B1 – usage phase	0173-1#07-ABU212#001																																																						
6	B2 – maintenance	0173-1#07-ABV498#001																																																						
15	B3 - repair	0173-1#07-ABV497#001																																																						
7	B5 – update/upgrade, refurbishing	0173-1#07-ABV499#001																																																						
8	B6 – usage energy consumption	0173-1#07-ABV500#001																																																						
9	B7 – usage water consumption	0173-1#07-ABV501#001																																																						
10	C1 – reassembly	0173-1#07-ABV502#001																																																						
11	C2 – transport to recycler	0173-1#07-ABU213#001																																																						
12	C3 – recycling, waste treatment	0173-1#07-ABV503#001																																																						
13	C4 – landfill	0173-1#07-ABV504#001																																																						
14	D - reuse	0173-1#07-ABU214#001																																																						
16	A1-A3	0173-1#07-ABZ789#001																																																						
[SMC] PCFGoodsAddr essHandover	[IRDI] 0173-1#02-ABI497#001 Indicates the place of hand-over of the goods (use structure defined in 2.5 SMC Address)			n/a	1																																																			

203

204

205

2.4 SMC Transport Carbon Footprint Calculation (TCF)

This SMC provides the means to access the Transport Carbon Footprint (PCF) of the asset. If several different calculation methods or processes are to be supplied with the submodel, multiple instances of this SMC should be instantiated.

Table 3: SMC Transport Carbon Footprint

idShort:	TransportCarbonFootprint{00}																													
	Note: a different idShort might be used, as long as it is unique in the Submodel.																													
Class:	SubmodelElementCollection (SMC)																													
semanticId:	[IRDI] 0173-1#01-AHE717#001																													
Parent:	SM CarbonFootprint (0173-1#01-AHE712#001)																													
Explanation:	Balance of greenhouse gas emissions generated by a transport service of a product.																													
[SME type]	semanticId = [idType]value	[valueType]	card.																											
idShort	Description@en	example																												
[property]	[IRDI] 0173-1#02-ABG859#001	String	1																											
TCFCalculation Method	Standard, method for determining the greenhouse gas emissions for the transport of a product Value List (0173-1#09-AAO116#001): <table><tr><th>Value Code</th><th>Value</th><th>valueId</th></tr><tr><td>1</td><td>EN 16258</td><td>0173-1#07-ABU224#001</td></tr></table>	Value Code	Value	valueId	1	EN 16258	0173-1#07-ABU224#001	“EN 16258”																						
Value Code	Value	valueId																												
1	EN 16258	0173-1#07-ABU224#001																												
[property]	[IRDI] 0173-1#02-ABG860#001	Double [kg]	1																											
TCFCO2eq	Sum of all greenhouse gas emissions from vehicle operation	5.3																												
[property]	[IRDI] 0173-1#02-ABG861#001	String	1																											
TCFReferenceValueForCalculation	Amount of product to which the TCF carbon footprint statement relates Value List (0173-1#09-AAO323#001): <table><tr><th>Value Code</th><th>Value</th><th>valueId</th></tr><tr><td>1</td><td>g</td><td>0173-1#07-ABZ596#001</td></tr><tr><td>2</td><td>kg</td><td>0173-1#07-ABZ597#001</td></tr><tr><td>3</td><td>t</td><td>0173-1#07-ABZ598#001</td></tr><tr><td>4</td><td>ml</td><td>0173-1#07-ABZ599#001</td></tr><tr><td>5</td><td>l</td><td>0173-1#07-ABZ600#001</td></tr><tr><td>6</td><td>cbm</td><td>0173-1#07-ABZ601#001</td></tr><tr><td>7</td><td>qm</td><td>0173-1#07-ABZ602#001</td></tr><tr><td>8</td><td>piece</td><td>0173-1#07-ABZ603#001</td></tr></table>	Value Code	Value	valueId	1	g	0173-1#07-ABZ596#001	2	kg	0173-1#07-ABZ597#001	3	t	0173-1#07-ABZ598#001	4	ml	0173-1#07-ABZ599#001	5	l	0173-1#07-ABZ600#001	6	cbm	0173-1#07-ABZ601#001	7	qm	0173-1#07-ABZ602#001	8	piece	0173-1#07-ABZ603#001	“piece”	
Value Code	Value	valueId																												
1	g	0173-1#07-ABZ596#001																												
2	kg	0173-1#07-ABZ597#001																												
3	t	0173-1#07-ABZ598#001																												
4	ml	0173-1#07-ABZ599#001																												
5	l	0173-1#07-ABZ600#001																												
6	cbm	0173-1#07-ABZ601#001																												
7	qm	0173-1#07-ABZ602#001																												
8	piece	0173-1#07-ABZ603#001																												
[property]	[IRDI] 0173-1#02-ABG862#001	Double	1																											

TCFQuantityOfMeasureForCalculation	Quantity of the product to which the TCF information on the CO2 footprint refers														
[property]	[IRDI] 0173-1#02-ABG863#001	String	1												
TCFProcessesForGreenhouseGasEmissionInATransportService	Processes in a transport service to determine the sum of all direct or indirect greenhouse gas emissions from fuel supply and vehicle operation Value List (0173-1#09-AAO114#001): <table><tr><th>Value Code</th><th>Value</th><th>valueId</th></tr><tr><td>1</td><td>WTT - Well-to-Tank</td><td>0173-1#07-ABU216#001</td></tr><tr><td>2</td><td>TTW - Tank-to-Wheel</td><td>0173-1#07-ABU215#001</td></tr><tr><td>3</td><td>WTW - Well-to-Wheel</td><td>0173-1#07-ABU217#001</td></tr></table>	Value Code	Value	valueId	1	WTT - Well-to-Tank	0173-1#07-ABU216#001	2	TTW - Tank-to-Wheel	0173-1#07-ABU215#001	3	WTW - Well-to-Wheel	0173-1#07-ABU217#001	“WTT - Well-to-Tank”	
Value Code	Value	valueId													
1	WTT - Well-to-Tank	0173-1#07-ABU216#001													
2	TTW - Tank-to-Wheel	0173-1#07-ABU215#001													
3	WTW - Well-to-Wheel	0173-1#07-ABU217#001													
[SMC]	[IRDI] 0173-1#02-ABI499#001	n/a	1												
TCFGoodsTransportAddressTakeover	Indication of the place of receipt of goods (use structure defined in 2.5 SMC Address)														
[SMC]	[IRDI] 0173-1#02-ABI498#001	n/a	1												
TCFGoodsTransportAddressHandover	Indicates the hand-over address of the goods transport (use structure defined in 2.5 SMC Address)														

212
213214

2.5 SMC Address

215 This SMC supplies a structure for denoting addresses as part of the CF declaration.

idShort:	-----		
Class:	SubmodelElementCollection (SMC)		
semanticId:	-----		
Parent:	ProductCarbonFootprint and TransportCarbonFootprint		
Explanation:	Structure to be reused for denoting addresses		
[SME type]	semanticId = [idType]value	[valueType]	card.
idShort	Description@en	example	
[property]	[IRDI] 0173-1#02-ABH956#001	String	0..1
Street	Street indication of the place of transfer of goods	"Myroad"	
[property]	[IRDI] 0173-1#02-ABH957#001	String	0..1
HouseNumber	Number for identification or differentiation of individual houses of a street	"1a"	
[property]	[IRDI] 0173-1#02-ABH958#001	String	0..1
ZipCode	Zip code of the goods transfer address	"12345"	

[property]	[IRDI] 0173-1#02-ABH959#001	String	0..1
CityTown	Indication of the city or town of the transfer of goods	"Mytown"	
[property]	[IRDI] 0173-1#02-AAO259#005	String	0..1
Country	Country where the product is transmitted	"Mycountry"	
[property]	[IRDI] 0173-1#02-ABH960#001	Double	0..1
Latitude	Latitude (B), also called geodetic latitude or latitude (Latin latitudo, English latitude, international abbreviation Lat. or LAT), is the northerly or southerly distance of a point on the earth's surface from the equator, given in angular measure in the unit of measurement degrees	40.757	
[property]	[IRDI] 0173-1#02-ABH961#001	Double	0..1
Longitude	Geographic longitude, also called longitude (Latin longitudo, English longitude, international abbreviation long or LON), describes one of the two coordinates of a location on the earth's surface, namely its position east or west of a defined (arbitrarily determined) north-south line, the prime meridian	-73.986	

216

217

2.6 SMC Reference To Data Source

218 tbd

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 [] 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:

SME type	SubmodelElement type
Property	Property
MLP	MultiLanguageProperty
Range	Range
File	File
Blob	Blob
Ref	ReferenceElement
Rel	RelationshipElement
SMC	SubmodelElementCollection

- 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: [IRI]https://admin-shell.io/vdi/2770/1/0/DocumentId/Id. The attributes "type" and "local" (typically "ConceptDescription" and "(local)" or "GlobalReference" and (no-local)) 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.
- For some properties a valueList is given, meaning that only values from this list should be used. It is recommended to use the given valueID as reference. If both, the value and the valueID are present then the value needs to be identical to the value of the referenced coded value in valueID.

Bibliography

- [1] "Recommendations for implementing the strategic initiative INDUSTRIE 4.0", acatech, April 2013. [Online]. Available: [https://www.acatech.de/Dateien/2013/04/20130401_Industrie40_Empfehlungen.pdf](#)
- [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/noindex/Publikationen/2016/Sonstiges/Implementation-Strategy-Industrie-40/2016-01-Implementation-Strategy-Industrie40.pdf>
- [3] "The Structure of the Administration Shell: TRILATERAL PERSPECTIVES from France, Italy and Germany", March 2018. [Online]. Available: <https://www.platform-40.de/40/Redaktion/EN/Downloads/Publikation/hm-2018-trilaterale-coop.html>
- [4] "Beispiele zur Verwaltungsschale der Industrie 4.0-Komponente – Basisteil (German)"; ZVEI e.V., Whitepaper, November 2016. [Online]. Available: <https://www.zvei.org/presse-medien/publikationen/beispiele-zur-verwaltungsschale-der-industrie-40-komponente-basisteil/>
- [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.platform-40.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://www.platform-40.de/PI40/Redaktion/EN/Downloads/Publikation/Details-of-the-Asset-Administration-Shell-Part1.html>
- [7] **White Paper: ZVEI-Show-Case PCF@ControlCabinet**, ZVEI e. V., December 2022. [Online]. Available: https://www.zvei.org/Dateien/2022/12/20221225_Whitepaper_ZVEI-Show-Case-PCF-Control-Cabinet-HMI2022.pdf

294
295
296
297
298
299
300
301
302
303
304

305