SPECIFICATION

Submodel

Fibre Optic Cables and Microducts

1.0

08 November 2023

Submodel Template of the

Asset Adminstration Shell

Imprint

Publisher

Steinbeis Innovation gGmbH
Adornostr. 8
70599 Stuttgart
Germany

Source for Specification Document

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Version history

2023-11-08	1.0	Release of the Submodel template

Content

Foreword

The rapid advancements in fiber-based communication systems have led to a growing diversity of fever optical cables and microducts. These highly specialized products play a crucial role in various applications, be it in telecommunications, medical technology, sensing, or industrial processes. To ensure that these components can interact seamlessly and meet the ever-increasing demands for efficiency and performance, standardized product data exchange is of paramount importance.

The interoperability of fever optical cables and microducts is a key factor for the smooth integration of these components into a wide range of systems. It's not just about physical compatibility but also effective communication between different devices and platforms. Standardized product data exchange formats play a pivotal role here as they establish a unified language understood by manufacturers, developers, and users alike.

This foreword serves as an introduction to the relevance of standardized product data exchange for the interoperability of fever optical cables and microducts. By defining uniform data standards, not only is efficiency increased in production, but also compatibility between different products is ensured. This facilitates faster market introduction of new technologies, promotes competition, and opens up new avenues for innovation.

We encourage readers of this document to recognize and appreciate the importance of standardized product data exchange for the interoperability of fever optical cables and microducts. Only through the collaboration of manufacturers, researchers, and users can we ensure that the potentials of these advanced technologies can be fully realized. We hope that this publication contributes to raising awareness about the significance of standardized data formats and inspires the industry to work together towards an interoperable and efficient future.

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 [1-3] 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 [1-6].

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 aims at interoperable provision of information describing fibre optic cables and microducts in regard to the asset of the respective Asset Administration Shell. Central element is the provision of properties [7], ideally interoperable by the means of dictionaries such as ECLASS and IEC CDD (Common Data Dictionary). The purpose of this document is to make selected specifications of Submodels in such manner that information about assets can be exchanged in a meaningful way between partners in a value creation network.

The intended use-case is the provision of a standardized property structure for fibre optic cables and microducts, which enables a more efficient and interoperable data exchange and communication.

This concept can serve as a basis for standardizing the respective Submodel. The conception is based on existing norms, studies of common practices at enterprises, directives and standards so that a far-reaching acceptance can be achieved.

1.3 Relevant standards and sources of concepts for the Submodel template

According to [3], interoperable properties might be defined by standards, consortium specifications or manufacturer specifications. Useful standards providing sources of concepts are:

Table 1: List of examplary standards defining interoperable properties

DIN EN 60794-5-10 (VDE 0888-5-10)	Fibre optic cables - Part 5-10: Family specification for microduct fibre optic cables, microducts and protected microducts for installation by blowing for outdoor use
DIN EN 60794-5-20 (VDE 0888-5-20)	Fibre optic cables - Part 5-20: Family specification for microduct fibre optic units,

	microducts and protected microducts for installation by blowing for outdoor use
DIN EN 50411-2-4 (VDE 0888-500-24)	Fibre optic splice cassettes and closures for use in fibre optic communication systems - Product standards - Part 2-4: Fibre optic closures type 1 with sealed bonnet for categories S and A
DIN 47609	Outdoor enclosures for non-weather-protected use (outdoor climate) in the fields of telecommunications, signalling and traffic control technology and low-voltage power supply - Requirements and tests

So called property dictionaries are used identify information elements (see Terms and Definitions of [6]). Such property dictionaries include:

- ECLASS, see: https://www.eclasscontent.com/
- IEC CDD, see: https://cdd.iec.ch/cdd/iec61987/iec61987.nsf and https://cdd.iec.ch/cdd/iec62683/cdddev.nsf

In this document, properties are aimed to be described by ECLASS.

2 Information set for Submodel Contact Information

While defining Submodels the following three aspects must be considered as suggested in [5]:

Use and economic relevance

The AAS submodel will be used for the data exchange between producers and users for their use case in the sector of broadband dissemination or building information modelling applications to gain efficiencies in processing.

Property specification

See section 3 Submodel and Collections.

3 Submodel and Collections

3.1 Properties of the Submodel “Fibre Optic Cables and Microducts”

The figure below shows the UML-diagram defining the relevant properties which need to be set. Table describes the details of the Submodel structure combined with examples.

Figure 1: UML-Diagram for Submodel "Fibre Optic Cables and Microducts"

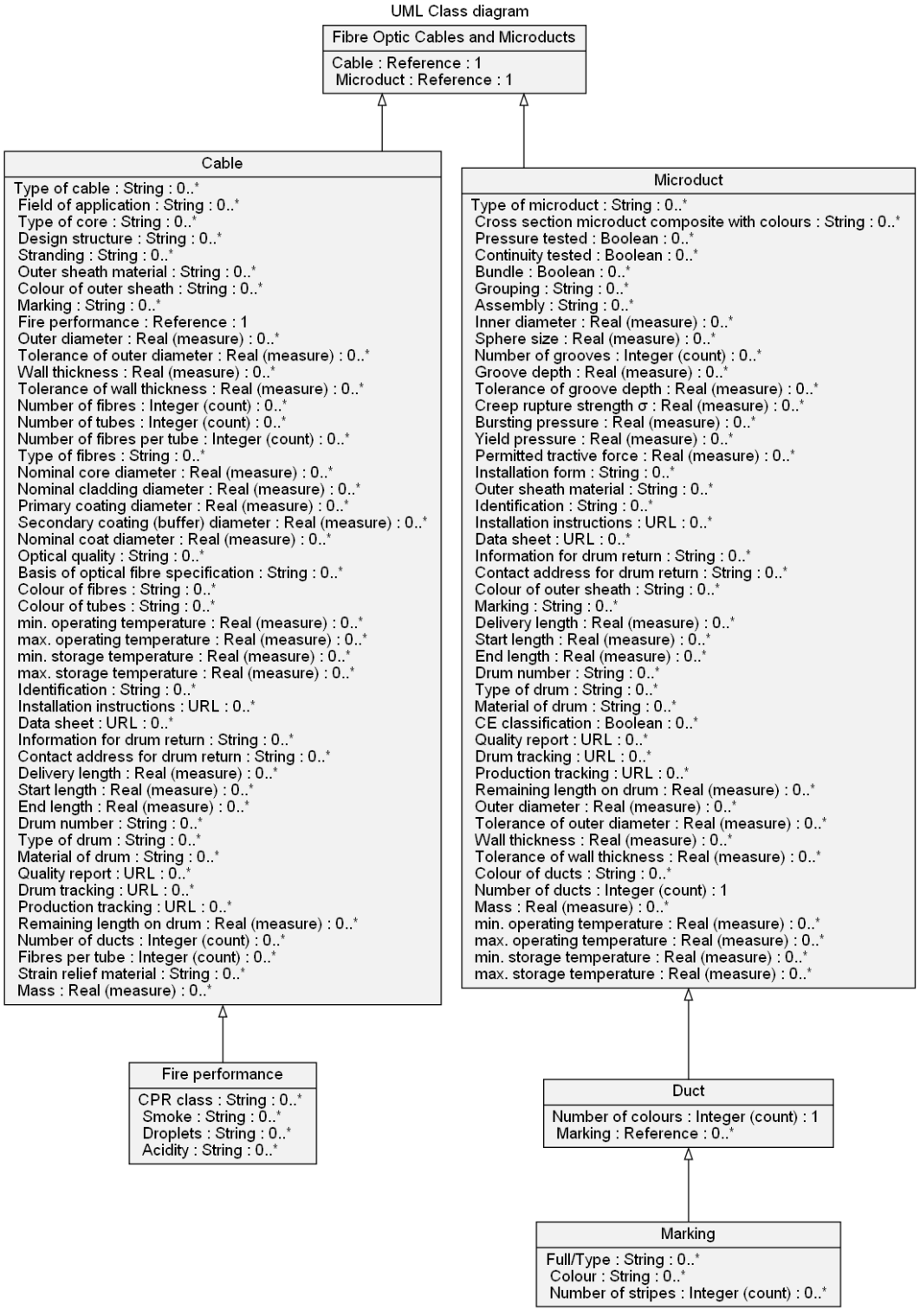

Table 2: Properties of Submodel “Fibre Optic Cables and Microducts"

idShort	*Fibre Optic Cables and Microducts*		
Class	Submodel		
semanticId	0173-EX-1#01-BMB334#001		
Explanation			
[SME type]	**semanticId = [idType]value**	**[valueType]**	**card.**
idShort	**Description@en**	**example**	
[Property] Cable	[IRDI] 0173-EX-1#02-TJS300#001	[REFERENCE]	1
[Property] Microduct	[IRDI] 0173-EX-1#02-SRT542#001	[REFERENCE]	1

3.2 Properties of the SMC “Microduct”

Figure 1 shows the UML-diagram defining the relevant properties which need to be set. The following table describes the details of the SMC structure combined with examples.

Table 3: Properties of SMC "Microduct"

idShort	*Microduct*		
Class	SubmodelElementCollection		
semanticId	0173-EX-1#02-SRT542#001		
isCaseOf			
AllowDuplicates	True		
Explanation			
[SME type]	**semanticity = [idType]value**	**[valueType]**	**card.**
idShort	**Description@en**	**example**	
[Property] Type_of_microduct	[IRDI] 0173-EX-1#02-SZZ788#001	[STRING]	0..*
[Property] Cross_section_microduct \ _composite_with_colours	[IRDI] 0173-EX-1#02-NDQ303#001	[STRING]	0..*
[Property] Pressure_tested	[IRDI] 0173-EX-1#02-MKG566#001	[BOOLEAN]	0..*
[Property] Continuity_tested	[IRDI] 0173-EX-1#02-BKN666#001	[BOOLEAN]	0..*

[Property] Bundle	[IRDI] 0173-EX-1#02-OKX091#001	[BOOLEAN]	0..*
[Property] Grouping	[IRDI] 0173-EX-1#02-POF888#001	[STRING]	0..*
[Property] Assembly	[IRDI] 0173-EX-1#02-DCH738#001	[STRING]	0..*
[Property] Inner_diameter	[IRDI] 0173-EX-1#02-SXD237#001	[REAL_MEASURE]	0..*
[Property] Sphere_size	[IRDI] 0173-EX-1#02-EUU295#001	[REAL_MEASURE]	0..*
[Property] Number_of_grooves	[IRDI] 0173-EX-1#02-ZIL037#001	[INTEGER_COUNT]	0..*
[Property] Groove_depth	[IRDI] 0173-EX-1#02-OQP170#001	[REAL_MEASURE]	0..*
[Property] Tolerance_of_groove_depth	[IRDI] 0173-EX-1#02-MBP298#001	[REAL_MEASURE]	0..*
[Property] Creep_rupture_strength_	[IRDI] 0173-EX-1#02-TJM755#001 170 h/80 °C	[REAL_MEASURE]	0..*
[Property] Bursting_pressure	[IRDI] 0173-EX-1#02-LAH572#001 tests are to be carried out in a standard climate according to DIN EN ISO 291, 23 °C and 50 % relative humidity	[REAL_MEASURE]	0..*
[Property] Yield_pressure	[IRDI] 0173-EX-1#02-WRL014#001 tests are to be carried out in a standard climate according to DIN EN ISO 291, 23 °C and 50 % relative humidity	[REAL_MEASURE]	0..*
[Property] Permitted_tractive_force	[IRDI] 0173-EX-1#02-EME582#001 tests are to be carried out in a standard climate according to DIN EN ISO 291, 23 °C and 50 % relative humidity	[REAL_MEASURE]	0..*
[Property] Installation_form	[IRDI] 0173-EX-1#02-OZB767#001	[STRING]	0..*
[Property] Outer_sheath_material	[IRDI] 0173-EX-1#02-XKV533#001	[STRING]	0..*
[Property] Identification	[IRDI] 0173-EX-1#02-UVT407#001	[STRING]	0..*

[Property] Installation_instructions	[IRDI] 0173-EX-1#02-LKV717#001	[URL]	0..*
[Property] Data_sheet	[IRDI] 0173-EX-1#02-KRU874#001	[URL]	0..*
[Property] Information_for_drum_return	[IRDI] 0173-EX-1#02-SUA707#001	[STRING]	0..*
[Property] Contact_address_for \ _drum_return	[IRDI] 0173-EX-1#02-KME013#001	[STRING]	0..*
[Property] Colour_of_outer_sheath	[IRDI] 0173-EX-1#02-YRB346#001	[STRING]	0..*
[Property] Marking	[IRDI] 0173-EX-1#02-PVR550#001	[STRING]	0..*
[Property] Delivery_length	[IRDI] 0173-EX-1#02-GZD363#001	[REAL_MEASURE]	0..*
[Property] Start_length	[IRDI] 0173-EX-1#02-XZX286#001	[REAL_MEASURE]	0..*
[Property] End_length	[IRDI] 0173-EX-1#02-XDW116#001	[REAL_MEASURE]	0..*
[Property] Drum_number	[IRDI] 0173-EX-1#02-VIL932#001	[STRING]	0..*
[Property] Type_of_drum	[IRDI] 0173-EX-1#02-TWX714#001	[STRING]	0..*
[Property] Material_of_drum	[IRDI] 0173-EX-1#02-LRX609#001	[STRING]	0..*
[Property] CE_classification	[IRDI] 0173-EX-1#02-PQE744#001	[BOOLEAN]	0..*
[Property] Quality_report	[IRDI] 0173-EX-1#02-RAH689#001	[URL]	0..*
[Property] Drum_tracking	[IRDI] 0173-EX-1#02-TSE113#001	[URL]	0..*
[Property] Production_tracking	[IRDI] 0173-EX-1#02-EUB538#001	[URL]	0..*
[Property] Remaining_length_on_drum	[IRDI] 0173-EX-1#02-HOX303#001	[REAL_MEASURE]	0..*
[Property] Outer_diameter	[IRDI] 0173-1#02-ABG720#001 describes the outer diameter	[REAL_MEASURE]	0..*
[Property] Tolerance_of_outer_diameter	[IRDI] 0173-EX-1#02-QSH219#001	[REAL_MEASURE]	0..*
[Property] Wall_thickness	[IRDI] 0173-1#02-AAQ898#005 half of the difference between the outside and the	[REAL_MEASURE]	0..*

	inside diameter of a pipe, conduit or vessel		
[Property] Tolerance_of_wall_thickness	[IRDI] 0173-EX-1#02-XGO526#001	[REAL_MEASURE]	0..*
[Property] Colour_of_ducts	[IRDI] 0173-EX-1#02-GRV637#001	[STRING]	0..*
[Property] Number_of_ducts	[IRDI] 0173-EX-1#02-GDZ551#001	[INTEGER_COUNT]	1
[Property] Mass	[IRDI] 0173-EX-1#02-AQI523#001	[REAL_MEASURE]	0..*
[Property] min_operating_temperature	[IRDI] 0173-1#02-BAA015#010 lowest allowable temperature at which a device is allowed to operate	[REAL_MEASURE]	0..*
[Property] max_operating_temperature	[IRDI] 0173-1#02-BAA036#010 highest allowable temperature at which a device may operate	[REAL_MEASURE]	0..*
[Property] min_storage_temperature	[IRDI] 0173-1#02-AAQ342#005 temperature above which the device may be stored or transported without any permanent impairment to its operability	[REAL_MEASURE]	0..*
[Property] max_storage_temperature	[IRDI] 0173-1#02-AAQ341#005 temperature up to which the device may be stored or transported without any permanent impairment to its operability	[REAL_MEASURE]	0..*

3.3 Properties of the SMC “Identification”

Table 4: Properties of SMC "Identification"

idShort	*Identification*
Class	SubmodelElementCollection
semanticId	0173-EX-1#02-UVT407#001
isCaseOf	
AllowDuplicates	True

Explanation			
[SME type]	**semanticity = [idType]value**	**[valueType]**	**card.**
idShort	**Description@en**	**example**	
[Property] Manufacturer	[IRDI] 0173-1#02-AAQ373#011 Manufacturer of a device/product who produces it in his own manufacturing plants or in other facilities under contract manufacture and who distributes it under his own name	[REFERENCE]	1
[Property] Supplier	[IRDI] 0173-1#02-AAQ376#010 Company/dealer who purchases the device/product from the manufacturer and sells it under his own name	[REFERENCE]	1

3.4 Properties of the SMC “Supplier”

Table 5: Properties of SMC "Supplier"

idShort	*Supplier*		
Class	SubmodelElementCollection		
semanticId	0173-1#02-AAQ376#010		
isCaseOf			
AllowDuplicates	True		
Explanation	Company/dealer who purchases the device/product from the manufacturer and sells it under his own name		
[SME type]	**semanticity = [idType]value**	**[valueType]**	**card.**
idShort	**Description@en**	**example**	
[Property] delivery_time_of_supplier	[IRDI] 0173-1#02-AAM548#004 duration per working days needed by the supplier to deliver the product beginning with the receipt of the order	[REAL_MEASURE]	0..*
[Property] product_article_number \ _of_supplier	[IRDI] 0173-1#02-AAO736#004 unique product order identifier of the supplier	[STRING]	0..*
[Property] name_of_supplier	[IRDI] 0173-1#02-AAO735#003 name of supplier which provides the customer with a product or a service	[STRING]	0..*

[Property] Supplier_product_designation	[IRDI] 0173-1#02-AAM551#002 Short description of the product (short text)	[STRING_TRANSLATABLE_]	0..*
[Property] batch_number_from_supplier	[IRDI] 0173-1#02-AAT106#002 unique combination of numbers and letters that distinguishes a product from other products of a different fabrication process	[STRING]	0..*
[Property] Supplier_product_description	[IRDI] 0173-1#02-AAU730#001 Description of the product, it's technical features and implementation if needed (long text)	[STRING_TRANSLATABLE_]	[0..1
[Property] Supplier_product_family	[IRDI] 0173-1#02-AAU728#001 2nd level of a 3 level supplier specific product hierarchy	[STRING_TRANSLATABLE_]	[0..1
[Property] Supplier_product_root	[IRDI] 0173-1#02-AAU729#001 Top level of a 3 level supplier specific product hierarchy	[STRING_TRANSLATABLE_]	[0..1
[Property] Supplier_product \ _order_suffix	[IRDI] 0173-1#02-AAW337#001 By the supplier awarded string for the identification of additional attributes, not by a structured supplier item number may be expressed	[STRING_TRANSLATABLE_]	[0..1
[Property] Supplier_product_type	[IRDI] 0173-1#02-AAW336#001 Characteristic to differentiate between different products of a product family or special variants	[STRING_TRANSLATABLE_]	[0..1
[Property] GLN_of_supplier	[IRDI] 0173-1#02-AAY813#001 internationally unique identification number for the supplier of the device or the product and for the physical location	[INTEGER_COUNT]	0..*
[Property] Charge_number_of_supplier	[IRDI] 0173-1#02-AAM553#001 Charge number used by the supplier for its product	[STRING_TRANSLATABLE_]	0..*

[Property] item_type_of_supplier	[IRDI] 0173-1#02-AAM549#002 additional information for describing products of a supplier for the purpose of distinguishing between products from a product family or of a special design (variants)	[STRING_TRANSLATABLE_]	0..*
[Property] supplement_item_order \ _suffix_of_supplier	[IRDI] 0173-1#02-AAM550#002 by the supplier issued text for the identification of additional attributes, which can not be expressed by a structured supplier item number	[STRING_TRANSLATABLE_]	0..*
[Property] item_name_of_supplier	[IRDI] 0173-1#02-AAM554#002 by the supplier (or distribution) established brand name for a product where product is a synonym for property, object, or service	[STRING_TRANSLATABLE_]	0..*

3.5 Properties of the SMC “Manufacturer”

Table 6: Properties of SMC "Manufacturer"

idShort	*Manufacturer*		
Class	SubmodelElementCollection		
semanticId	0173-1#02-AAQ373#011		
isCaseOf	Manufacturer of a device/product who produces it in his own manufacturing plants or in other facilities under contract manufacture and who distributes it under his own name		
AllowDuplicates	True		
Explanation			
[SME type]	**semanticity = [idType]value**	**[valueType]**	**card.**
idShort	**Description@en**	**example**	
[Property] delivery_time_of_manufacturer	[IRDI] 0173-1#02-AAM555#002 duration per working days needed by the manufacturer to	[STRING_TRANSLATABLE_]	0..*

	deliver the product beginning with the receipt of the order		
[Property] GTIN	[IRDI] 0173-1#02-AAO663#003 internationally unique and unambiguous article number for products and services (Global Trade Item Number)	[STRING]	0..*
[Property] Manufacturer_name	[IRDI] 0173-1#02-AAO677#002 legally valid designation of the natural or judicial person which is directly responsible for the design, production, packaging and labeling of a product in respect to its being brought into circulation	[STRING]	0..*
[Property] fabrication_number	[IRDI] 0173-1#02-AAO674#004 alphanumeric character sequence assigned to a fabricated product, which allows the date, time and circumstances of fabrication to be traced	[STRING]	0..*
[Property] serial_number	[IRDI] 0173-1#02-AAM556#002 unique combination of numbers and letters used to identify the device once it has been manufactured	[STRING_TRANSLATABLE_]	0..*
[Property] product_article_number \ _of_manufacturer	[IRDI] 0173-1#02-AAO676#003 unique product identifier of the manufacturer	[STRING]	0..*
[Property] Date_of_manufacture	[IRDI] 0173-1#02-AAR972#002	[DATE]	0..*

	Date from which the production and / or development process is completed or from which a service is provided completely		
[Property] National_stock_number	[IRDI] 0173-1#02-AAN075#003 13-digit numeric code, identifying all the standardized material items of supply as they have been recognized by the United States Department of Defense	[STRING_TRANSLATABLE_]	0..*
[Property] Manufacturer_product_description	[IRDI] 0173-1#02-AAU734#001 Description of the product, it's technical features and implementation if needed (long text)	[STRING_TRANSLATABLE_]	[0..1
[Property] Brand	[IRDI] 0173-1#02-AAO742#002 Part of the naming for the support and the recognition of the brand position of products and services consisting of words, numbers, letters or other characters. Registered brands and trademarks are indicated with the appropriate protective signs (® or TM)	[STRING]	0..*
[Property] Manufacturer_product_order_suffix	[IRDI] 0173-1#02-AAU733#001 By the manufacturer awarded string for the identification of additional attributes, not by a structured manufacturer item number may be expressed	[STRING_TRANSLATABLE_]	[0..1

[Property] Manufacturer_product_root	[IRDI] 0173-1#02-AAU732#001 Top level of a 3 level manufacturer specific product hierarchy	[STRING_TRANSLATABLE_]	[0..1
[Property] Manufacturer_product_family	[IRDI] 0173-1#02-AAU731#001 2nd level of a 3 level manufacturer specific product hierarchy	[STRING_TRANSLATABLE_]	[0..1
[Property] Manufacturer_product_designation	[IRDI] 0173-1#02-AAW338#001 Short description of the product (short text)	[STRING_TRANSLATABLE_]	[0..1
[Property] Product_type	[IRDI] 0173-1#02-AAO057#002 Characteristic to differentiate between different products of a product family or special variants	[STRING_TRANSLATABLE_]	0..*
[Property] URI_of_manufacturer	[IRDI] 0173-1#02-ABA669#001 fully qualified domain name of the manufacturer of a product using a universal resource identifier (URI)	[URL]	0..*
[Property] GLN_of_manufacturer	[IRDI] 0173-1#02-AAY812#001 internationally unique identification number for the manufacturer of the device or the product and for the physical location	[INTEGER_COUNT]	0..*
[Property] URI_of_the_product	[IRDI] 0173-1#02-ABH173#001 unique global identification of the product using an universal resource identifier (URI)	[URL]	[0..1
[Property] URI_of_the_product	[IRDI] 0173-1#02-AAY811#001 unique global identification of the product using an	[STRING_TRANSLATABLE_]	[0..1

	universal resource identifier (URI)		
[Property] Date_of_manufacture	[IRDI] 0173-1#02-AAO686#001 Datum as of which a product, procedure, standard or similar entity is valid	[STRING]	0..*
[Property] supplement_item_order \ _suffix_of_manufacturer	[IRDI] 0173-1#02-AAM547#002 by the manufacturer issued string for the identification of additional attributes, which can not be expressed by a structured manufacturer item number	[STRING_TRANSLATABLE_]	0..*
[Property] item_name_of_manufacturer	[IRDI] 0173-1#02-AAM552#002 by the manufacturer (or distribution) set brand name for a product where product is a synonym for property, object, or service	[STRING_TRANSLATABLE_]	0..*
[Property] item_type_of_manufacturer	[IRDI] 0173-1#02-AAN389#002 short name issued by the manufacturer or type detail as an additional detail to the product brand name, coded to be able to distinguish product items of a product family or special variants from each other	[STRING_TRANSLATABLE_]	0..*
[Property] product_type_of_manufacturer	[IRDI] 0173-1#02-AAO681#003 additional information for describing products of a manufacturer for the purpose of distinguishing between products from a product family	[STRING]	0..*

	or of a special design (variants)		
[Property] product_designation \ _of_manufacturer	[IRDI] 0173-1#02-AAO682#003 designation used by the manufacturer for his product	[STRING]	0..*

3.6 Properties of the SMC “Cable”

Table 7: Properties of SMC "Cable"

idShort	*Cable*		
Class	SubmodelElementCollection		
semanticId	0173-EX-1#02-TJS300#001		
isCaseOf			
AllowDuplicates	True		
Explanation			
[SME type]	**semanticity = [idType]value**	**[valueType]**	**card.**
idShort	**Description@en**	**example**	
[Property] Type_of_cable	[IRDI] 0173-EX-1#02-ZUL833#001	[STRING]	0..*
[Property] Field_of_application	[IRDI] 0173-EX-1#02-XOY451#001	[STRING]	0..*
[Property] Type_of_core	[IRDI] 0173-EX-1#02-LOD734#001	[STRING]	0..*
[Property] Design_structure	[IRDI] 0173-EX-1#02-XXP848#001	[STRING]	0..*
[Property] Stranding	[IRDI] 0173-EX-1#02-FVS810#001	[STRING]	0..*
[Property] Outer_sheath_material	[IRDI] 0173-EX-1#02-XKV533#001	[STRING]	0..*
[Property] Colour_of_outer_sheath	[IRDI] 0173-EX-1#02-YRB346#001	[STRING]	0..*
[Property] Marking	[IRDI] 0173-EX-1#02-PVR550#001	[STRING]	0..*
[Property] Fire_performance	[IRDI] 0173-EX-1#02-OXS180#001	[REFERENCE]	1

[Property] Outer_diameter	[IRDI] 0173-1#02-ABG720#001 describes the outer diameter	[REAL_MEASURE]	0..*
[Property] Tolerance_of_outer_diameter	[IRDI] 0173-EX-1#02-QSH219#001	[REAL_MEASURE]	0..*
[Property] Wall_thickness	[IRDI] 0173-1#02-AAQ898#005 half of the difference between the outside and the inside diameter of a pipe, conduit or vessel	[REAL_MEASURE]	0..*
[Property] Tolerance_of_wall_thickness	[IRDI] 0173-EX-1#02-XGO526#001	[REAL_MEASURE]	0..*
[Property] Number_of_fibres	[IRDI] 0173-EX-1#02-CXR490#001	[INTEGER_COUNT]	0..*
[Property] Number_of_tubes	[IRDI] 0173-EX-1#02-SFA974#001	[INTEGER_COUNT]	0..*
[Property] Number_of_fibres_per_tube	[IRDI] 0173-EX-1#02-BPC141#001	[INTEGER_COUNT]	0..*
[Property] Type_of_fibres	[IRDI] 0173-EX-1#02-BJY668#001	[STRING]	0..*
[Property] Nominal_core_diameter	[IRDI] 0173-EX-1#02-AZX755#001	[REAL_MEASURE]	0..*
[Property] Nominal_cladding_diameter	[IRDI] 0173-EX-1#02-RKT676#001	[REAL_MEASURE]	0..*
[Property] Primary_coating_diameter	[IRDI] 0173-EX-1#02-QLL013#001	[REAL_MEASURE]	0..*
[Property] Secondary_coating_buffer \ _diameter	[IRDI] 0173-EX-1#02-FPE530#001	[REAL_MEASURE]	0..*
[Property] Nominal_coat_diameter	[IRDI] 0173-EX-1#02-SYI713#001	[REAL_MEASURE]	0..*
[Property] Optical_quality	[IRDI] 0173-EX-1#02-APG131#001 attenuation and chromatic dispersion or bandwidth length product	[STRING]	0..*
[Property] Basis_of_optical_fibre \ _specification	[IRDI] 0173-EX-1#02-LTV955#001	[STRING]	0..*
[Property] Colour_of_fibres	[IRDI] 0173-EX-1#02-JKD343#001	[STRING]	0..*
[Property] Colour_of_tubes	[IRDI] 0173-EX-1#02-CBY564#001	[STRING]	0..*

[Property] min_operating_temperature	[IRDI] 0173-1#02-BAA015#010 lowest allowable temperature at which a device is allowed to operate	[REAL_MEASURE]	0..*
[Property] max_operating_temperature	[IRDI] 0173-1#02-BAA036#010 highest allowable temperature at which a device may operate	[REAL_MEASURE]	0..*
[Property] min_storage_temperature	[IRDI] 0173-1#02-AAQ342#005 temperature above which the device may be stored or transported without any permanent impairment to its operability	[REAL_MEASURE]	0..*
[Property] max_storage_temperature	[IRDI] 0173-1#02-AAQ341#005 temperature up to which the device may be stored or transported without any permanent impairment to its operability	[REAL_MEASURE]	0..*
[Property] Identification	[IRDI] 0173-EX-1#02-UVT407#001	[STRING]	0..*
[Property] Installation_instructions	[IRDI] 0173-EX-1#02-LKV717#001	[URL]	0..*
[Property] Data_sheet	[IRDI] 0173-EX-1#02-KRU874#001	[URL]	0..*
[Property] Information_for_drum_return	[IRDI] 0173-EX-1#02-SUA707#001	[STRING]	0..*
[Property] Contact_address_for \ _drum_return	[IRDI] 0173-EX-1#02-KME013#001	[STRING]	0..*
[Property] Delivery_length	[IRDI] 0173-EX-1#02-GZD363#001	[REAL_MEASURE]	0..*
[Property] Start_length	[IRDI] 0173-EX-1#02-XZX286#001	[REAL_MEASURE]	0..*
[Property] End_length	[IRDI] 0173-EX-1#02-XDW116#001	[REAL_MEASURE]	0..*
[Property] Drum_number	[IRDI] 0173-EX-1#02-VIL932#001	[STRING]	0..*
[Property] Type_of_drum	[IRDI] 0173-EX-1#02-TWX714#001	[STRING]	0..*

[Property] Material_of_drum	[IRDI] 0173-EX-1#02-LRX609#001	[STRING]	0..*
[Property] Quality_report	[IRDI] 0173-EX-1#02-RAH689#001	[URL]	0..*
[Property] Drum_tracking	[IRDI] 0173-EX-1#02-TSE113#001	[URL]	0..*
[Property] Production_tracking	[IRDI] 0173-EX-1#02-EUB538#001	[URL]	0..*
[Property] Remaining_length_on_drum	[IRDI] 0173-EX-1#02-HOX303#001	[REAL_MEASURE]	0..*
[Property] Number_of_ducts	[IRDI] 0173-EX-1#02-ZDQ165#001	[INTEGER_COUNT]	0..*
[Property] Fibres_per_tube	[IRDI] 0173-EX-1#02-MNB609#001	[INTEGER_COUNT]	0..*
[Property] Strain_relief_material	[IRDI] 0173-EX-1#02-CGR378#001	[STRING]	0..*
[Property] Mass	[IRDI] 0173-EX-1#02-AQI523#001	[REAL_MEASURE]	0..*

3.7 Properties of the SMC “Fire performance”

Table 8: Properties of SMC " Fire performance"

idShort	*Fire_performance*		
Class	SubmodelElementCollection		
semanticId	0173-EX-1#02-OXS180#001		
isCaseOf			
AllowDuplicates	True		
Explanation			
[SME type]	**semanticity = [idType]value**	**[valueType]**	**card.**
idShort	**Description@en**	**example**	
[Property] CPR_class	[IRDI] 0173-EX-1#02-GOB233#001	[STRING]	0..*
[Property] Smoke	[IRDI] 0173-EX-1#02-CGJ235#001	[STRING]	0..*
[Property] Droplets	[IRDI] 0173-EX-1#02-LCK911#001	[STRING]	0..*
[Property] Acidity	[IRDI] 0173-EX-1#02-UHO478#001	[STRING]	0..*

3.8 Additional notes and outlook

This worked out AAS submodel is the first version of the common work. After practical use, necessary improvements are expected.

Annex A: Explanations on used table formats

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.

Tables on Submodels and SubmodelElements
For clarity and brevity, a set of rules is used for the tables for describing Submodels and SubmodelElements.

- The tables follow in principle the same conventions as in [5].
- The table heads abbreviate 'cardinality' with 'card'.
- The tables often place two informations in different rows of the same table cell. In this case, the first information is marked out by sharp brackets [] form the second information. A special case are the semanticIds, which are marked out by the format: (type)(local)[idType]value.
- The types of SubmodelElements are abbreviated: SME

SME type Submodel	**Element 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 choosen, as long as it is unique in the parent's context.
- The Keys of semanticId in the main section feature only idType and value, such as: [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@de.
- The [valueType] is only given for Properties.

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