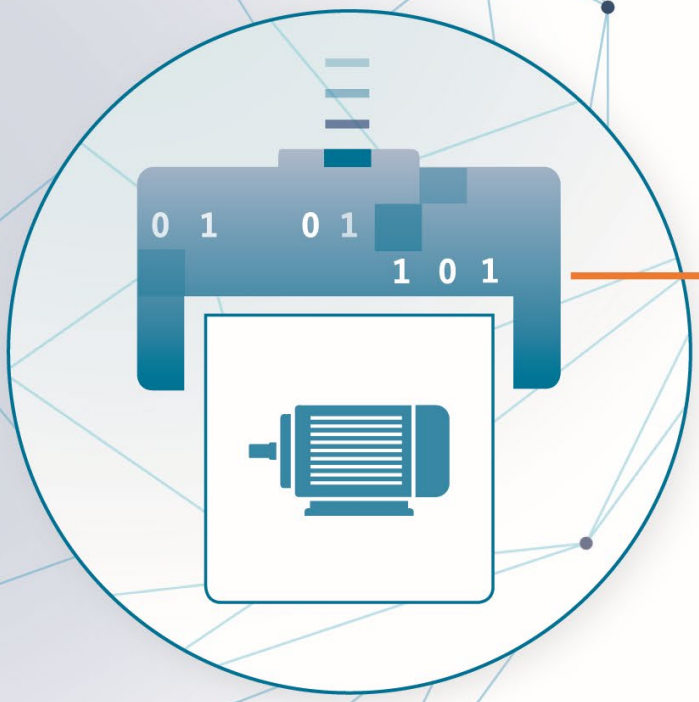
SPECIFICATION

Submodel Templates of the Asset Administration Shell



Submodel
TECHNICAL DATA

- Max. Rotation Speed = 5000 [1/min]
- Max. Torque = 200 [Nm]
- Cooling Type = BAB657

Submodel
OPERATIONAL DATA

- Rotation Speed = 4370 [1/min]
- Torque = 117.4 [Nm]

Submodel
DOCUMENTATION

- Title = Operating Manual
- Digital File PDF → /aasx/OperatingManual.PDF
- Document Class ID = 03-02

Product Change Notifications for **Industrial product types and items** in manufacturing (v0.8)

in cooperation with

PLATTFORM INDUSTRIE4.0

VDMA Fluid Power

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Contents

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]. Common terms and abbreviations can be found in [8].

The target audience 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 product change notifications between suppliers and users of industrial product types and items, particularly industrial components. These industrial product types and items are typically provided by manufacturers and suppliers, including dealers, and used by industrial users, e.g. original equipment manufacturers (OEMs), system integrators and producing enterprises (industrial end users). The product types are typically used to provide more than one product instance, however special cases such as mass-customization and engineer-to-order are applicable.

Product types have individual life cycles with individual steps and milestones, which are important to know for industrial users to safeguard and continue their business. The aim of this Submodel is to digitialize and interoperably convey sets of minimal required information and to ease the handover of these information sets, to make it possible to efficiently filter, monitor and store this information in software systems on industrial user's side.

The intended use-case is, that a manufacturer of industrial product types and items makes these product change notifications digitally available in a way, that these are interoperable and unambiguously understood by the other market participants, such as OEMs, system integrators or operators of industrial equipment.

This Submodel template specifies a basic set of SubmodelElements in order to bring about the necessary information according to this use-case.

1.3 Relevant standards and sources of concepts for the Submodel template

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

IEC 62890:2020-07 — Industrial-process measurement, control and automation - Life-cycle-management for systems and components	Describes basic concepts of product types and instances and the concepts of a life-cycle mode
VDMA 24903 — Obsolescence management – Exchange of information regarding change and discontinuance of products and items	Describes important event in the life-cycle of a product type and identifies important information elements to be conveyed

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 Approaches

2.1 Assets

Asset Administration Shells provide information with respect to well-identified assets. For this document, suitable assets are:

Asset	Description
Product types, such as model series of industrial components, systems	Typical application of this Submodel template. Change notifications from product types to be published.
Product instances, such as sold individual products, industrial components, systems	Viable application of this Submodel template. Changes of a one-of-a-kind component, system or machine to be published.

2.2 Life-cycle models

Figure 1 and Figure 2 shows the life-cycle model of IEC2690 and VDMA 24903, which is also compatible with IEC 62890. The life-cylce of a industrial product type or item is basically framed by SOP (start of production) and EOSR (End Of Service and Repair). Depending on the individual use-case, different time-intervals and life-cycle events are found to be relevant.

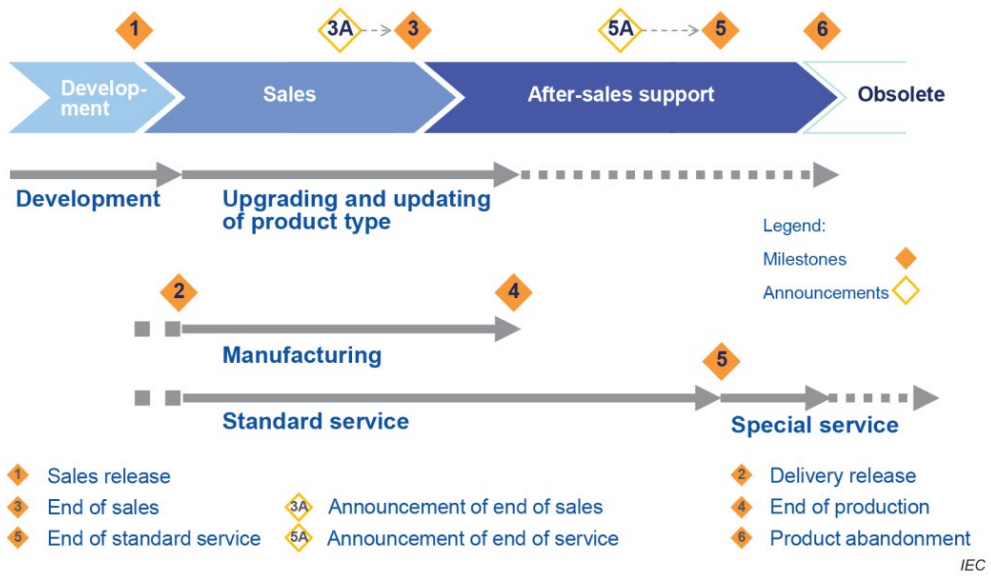


Figure 1 - Generic life-cycle model of a product type according IEC62890

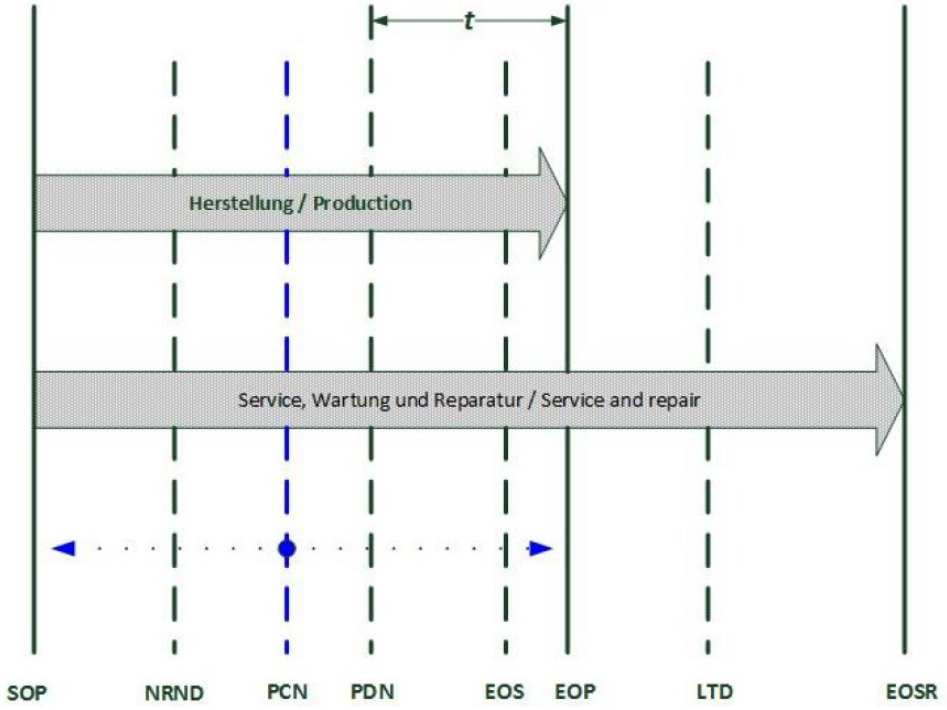


Figure 2 - Life-cylce model used by VDMA 24903

Relevant milestones are found to be:

Milestone	Description (EN)	Description (DE)	0173-10029#09-AAN976#001
SOP	Start Of Production	Beginn der Herstellung	0173-10029#07-ABO117#001
NRND	Not Recommended for New Design	Nicht empfohlen für Neukonstruktionen	0173-10029#07-ABO118#001
PCN	Product Change Notice	Produktänderungsmitteilung	0173-10029#07-ABO119#001
PDN	Product Discontinuance Notice for this document: special case of PCN	Produktabkündigungsmitteilung	0173-10029#07-ABO120#001
EOS	End Of Sale	Einstellung des Vertriebs	0173-10029#07-ABO121#001
EOP	End Of Production	Einstellung der Herstellung	0173-10029#07-ABO122#001
LTD	Last Time Delivery	Letztmalige Lieferung	0173-10029#07-ABO123#001
EOSR	End Of Service and Repair	Einstellung von Service, Wartung und Reparatur	0173-10029#07-ABO124#001

For some of these events, deadlines are applicable and might be described in a later version of this Submodel template.

The term "product change notification" refers to all of the above milestones.

2.3 Relevant information

Various information domains shall be expressed in the product change notification. This includes:

- record of product change notification itself
- details of the change (when, what, why, ..)
- master data of supplier (name, purpose, classification, ..)
- item, which is subject of the change notification (incl. identification properties, technical properties, logistic information)
- item(s), which might be proposed as substitute (incl. identification properties, technical properties, logistic information, properties describing operating ranges)

2.4 Comparability towards fit, form, function

Approach of the Submodel template is not only to provide change notifications, but to also provide one or multiple substitute recommendations from the manufacturer and a sufficient level of information to allow the industrial user to choose between them. Comparison should follow the categories of fit, form, function[1]. The Submodel template allows to provide values for properties, which fall into these 3 categories and let the user to assess about suitability. In order to optimize comparability, multiple recommandations are expected to provide comparable property selection. An overall percentage ("target estimate") gives a rough indication.

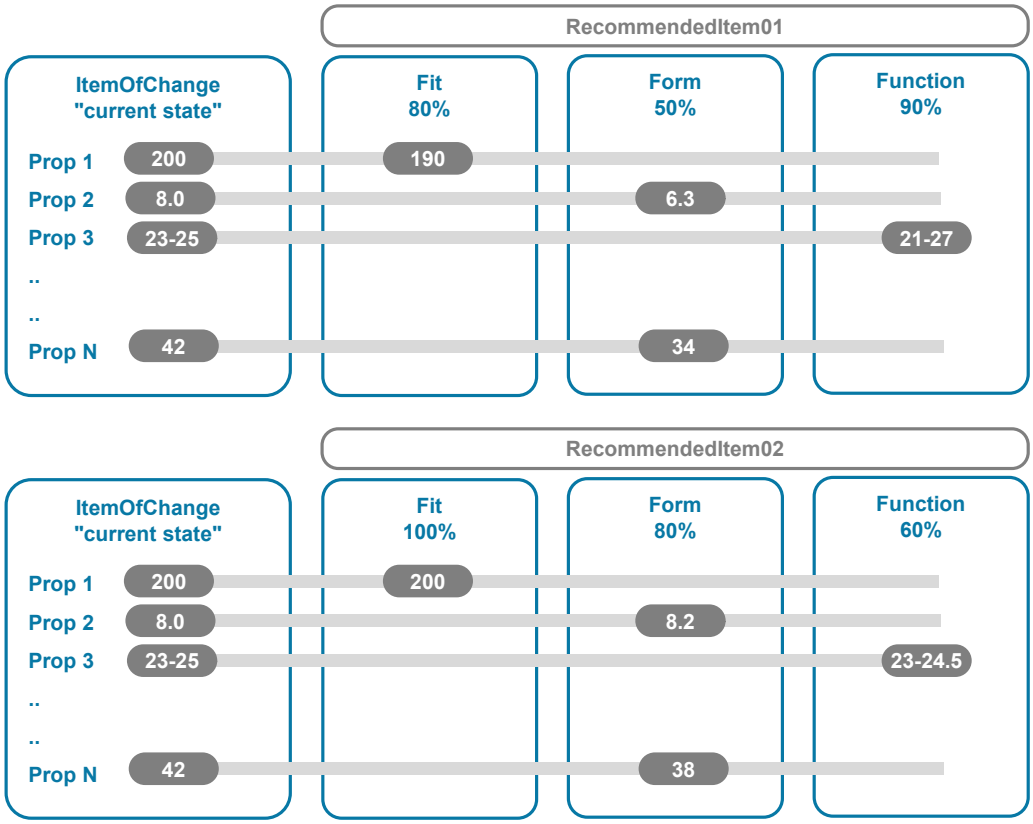
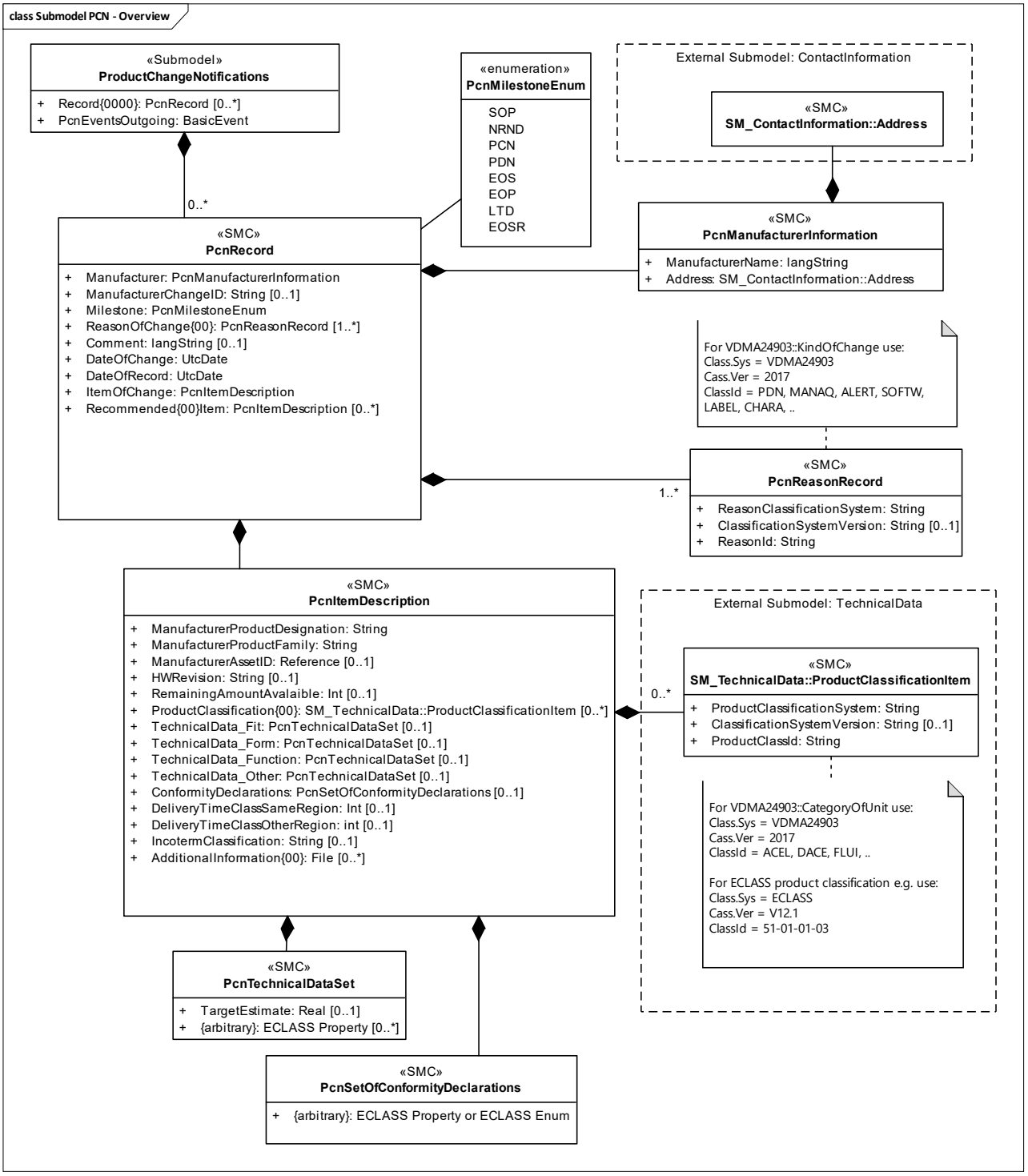


Figure 3 - Example of comparability towards fit, form, function for two recommended sustitutions of a product

[1] see https://en.wikipedia.org/wiki/Form,_fit_and_function

2.5 Information structuring

The SubmodelElements described in clause 3 are structured in the following way:



3 Element specifications

3.1 Attributes of the Submodel ProductChangeNotifications

For the Submodel instance, these elements are described as follows. The table convention is explained in Annex A.2.

idShort:	ProductChangeNotifications		
Class:	Submodel		
semanticId:	[IRDI] 0173-10029#01-XFB001#001		
Parent:	Asset Administration Shell with asset, which is an industrial product type or item		
Explanation:	Submodel containing a set of product change notifications over life-time.		
[SME type]	**semanticId = [idType]value**	**[valueType]**	**card.**
idShort	**Description@en**	**example**	
[SMC] Record{0000}	[IRDI] 0173-10029#01-XFB002#001 Individual records of product change notification; provided by the manufacturer; extended over life-time.	n/a	0..*
[Event] PcnEventsOutgoing	[IRI] http://admin-shell.io/VDMA/Fluidics/ProductChangeNotification/EventsOutgoing/1/0 Declaration of AAS events which is able to publish the extending of this Submodel by incementally adding product change notifications. Note: Industrial users will subscribe to this event by different implementation technologies.	n/a	0..1

3.2 SubmodelElements of ProductChangeNotificationRecord

The SubmodelElementCollection (SMC) described as follows. The table convention is explained in Annex A.2.

idShort:	ProductChangeNotificationRecord{0000}		
Class:	SubmodelElementCollection		
semanticId:	[IRDI] 0173-10029#01-XFB002#001		
Parent:	ProductChangeNotifications		
Explanation:	Information set of an individual record of product change notification		
[SME type]	**semanticId = [idType]value**	**[valueType]**	**card.**
idShort	**Description@en**	**example**	
[SMC] Manufacturer	[IRDI] 0173-10029#01-XFB003#001 Set of information identifying the manufacturer or supplier, which puts the described items on the market.	n/a	1
[Property] ManufacturerChangeID	[IRDI] 0173-10029#02-ABC507#001 Id of change given by and specific to individual namespace of the manufacturer.	[string] CN123456	0..1
[Property] Milestone	[IRDI] 0173-10029#02-ABC548#001 Classification of milestone according to VDMA24903 Note: defined point in time with a specific meaning for life-cycle management (IEC 62890:2020) Anmerkung: definierter Zeitpunkt mit spezifischer Bedeutung im Lebenszyklus-Management SOP (0173-10029#07-ABO117#001), NRND (0173-10029#07-ABO118#001), PCN (0173-10029#07-ABO119#001), PDN (0173-10029#07-ABO120#001), EOS (0173-10029#07-ABO121#001), EOP (0173-10029#07-ABO122#001), LTD (0173-10029#07-ABO123#001), EOSR (0173-10029#07-ABO124#001),	[string] EOS 0173-10029#07-ABO121#001	1
[SMC] ReasonOfChange{00}	[IRDI] 0173-10029#01-XFB005#001 One or more classifications of reason of change. Constraint: at least a classification according to VDMA24903 shall be expressed.	n/a	1..*
[MLP] Comment	[IRDI] 0173-1#02-ABF814#001 Comment explaining the reason of change and further circumstances in natural language.	[string] Change of material of housing to casted iron for approx. 6 months.	0..*

[Property] DateOfChange	[IRDI] 0173-1#02-ABF815#001 Calendar date when the change will take place.	[UtcDate] 2022-08-01T00:00Z	1
[Property] DateOfRecord	[IRDI] 0173-1#02-ABF816#001 Calendar date when the record of change was initially published by the manufacturer.	[UtcDate] 2022-07-26T18:27Z	1
[SMC] ItemOfChange	[IRDI] 0173-10029#01-XFB006#001 Information set which describes an item of change or a recommended substitution by the manufacturer	n/a	1
[SMC] RecommendedItem{00}	[IRDI] 0173-10029#01-XFB006#001 Information set which describes an item of change or a recommended substitution by the manufacturer	n/a	1

3.3 SubmodelElements of ProductChangeNotificationItemDescription

The SubmodelElementCollection (SMC) is described as follows. The table convention is explained in Annex A.2.

idShort:	ItemOfChange		
Class:	SubmodelElementCollection		
semanticId:	[IRDI] 0173-10029#01-XFB006#001		
Parent:	ProductChangeNotificationRecord{0000}		
Explanation:	Information set which describes an item of change or a recommended substitution by the manufacturer		
[SME type]	**semanticId = [idType]value**	**[valueType]**	**card.**
idShort	**Description@en**	**example**	
[MLP] ManufacturerProductDesignation	[IRDI] 0173-1#02-AAW338#001 Short description of the product (short text) Note: mandatory property according to EU Machine Directive 2006/42/EC.	[langString] OVEL-5-H-10-P-VQ4-UA-Z-C-A-V1PNLK-H3@EN	1
[MLP] ManufacturerProductFamily	[IRDI] 0173-1#02-AAU731#001 2nd level of a 3 level manufacturer specific product hierarchy Note: mandatory property according to EU Machine Directive 2006/42/EC.	[langString] OVEL Vacuum generator@EN	1
[Ref] ManufacturerAssetID	[IRDI] 0173-10029#02-ABF978#001 Reference to asset identification of the item in the domain of the manufacturer.	[Reference] [IRI]http://example.com/assets/series/AB123	0..1

	Note: this can be used to easily retrieve further information on the described item, such as full technical data, documentation, MCAD or ECAD models and more..		
[Property] HWRevision	[IRDI] 02-AAN270	[String] 1.1	0..1
[Property] RemainingAmountAvailable	[IRDI] 0173-1#02-BAF551#003 Remaining amount of product instances available to the individual customer, as of change date. Note: this is an indicative figure; the manufacturer may use a heuristical model to distribute available stock to a forecasted number of customers. Useful for industrial users to assess individual need of products against assumed availability.	[Int] 4500	0..1
[SMC] ProductClassification{00}	[IRDI] 0173-10029#01-XFB007#001 Single product classification item by association with product class in a particular classification system or property dictionary. Note: it is recommended to provide at least a classification of the item according to VDMA24903 and according ECLASS. Note: ECLASS refers to this as 0173-10029#02-XFR007#001, but for the time being, the above IRI for SMT Technical Data is used.	n/a	0..*
[SMC] TechnicalData_Fit	[IRDI] 0173-10029#01-XFB008#001 Set of SubmodelElements describing technical properties of the item, in particular regarding the fit, form or function of the product. Note: it is recommended that the selected property types for the recommended items are matching to the provided properties if the item of change to allow a one-by-one comparison of items. Note: the manufacturers are recommended to select only those property types, which support a meaningful comparison of the recommendation with the item of change. To many property types are considered to increase the signal/ noise ratio of information.	n/a	0..1
[SMC] TechnicalData_Form	[IRDI] 0173-10029#01-XFB009#001 Set of SubmodelElements describing technical properties of the item, in particular regarding the fit, form or function of the product. Note: it is recommended that the selected property types for the recommended items are matching to the provided properties if the item of change to allow a one-by-one comparison of items. Note: the manufacturers are recommended to select only those property types, which support a meaningful comparison of the recommendation with the item of change. To many property types are considered to increase the signal/ noise ratio of information.	n/a	0..1
[SMC] TechnicalData_Function	[IRDI] 0173-10029#01-XFB010#001 Set of SubmodelElements describing technical properties of the item, in particular regarding the fit, form or function of the product.	n/a	0..1

	Note: it is recommended that the selected property types for the recommended items are matching to the provided properties if the item of change to allow a one-by-one comparison of items. Note: the manufacturers are recommended to select only those property types, which support a meaningful comparison of the recommendation with the item of change. To many property types are considered to increase the signal/ noise ratio of information.		
[SMC] TechnicalData_Other	[IRDI] 0173-10029#01-XFB011#001 Set of SubmodelElements describing technical properties of the item, in particular regarding the fit, form or function of the product. Note: it is recommended that the selected property types for the recommended items are matching to the provided properties if the item of change to allow a one-by-one comparison of items. Note: the manufacturers are recommended to select only those property types, which support a meaningful comparison of the recommendation with the item of change. To many property types are considered to increase the signal/ noise ratio of information. Note: the SMC TechnicalData_Other is supposed to comprise meaningful property instances, which do not fit into the categorries fit, form, function.	n/a	0..1
[SMC] ConformityDeclarations	[IRDI] 0173-10029#01-XFB012#001 Set of information describing conformity declaration, certificate and suitability for different industrial sectors (branches).	n/a	0..1
[Property] DeliveryTimeClassSameRegion	[IRDI] 0173-10029#02-ABF981#001 Describes the expected duration in working days of delivery towards representative customers in the same region	[Double] 2	0..1
[Property] DeliveryTimeClassOtherRegion	[IRDI] 0173-10029#02-ABF982#001 Describes the expected duration in working days of delivery towards representative customers in other regions	[Double] 5	0..1
[Property] IncotermCode	[IRDI] 0173-1#02-AAO280#002 Classification to "clearly communicate the tasks, costs, and risks associated with the global or international transportation and delivery of goods" (Wikipedia). Note: see https://en.wikipedia.org/wiki/Incoterms	[String] DAT	0..1
AdditionalInformation{00}	[IRDI] 0173-1#01-ADN356#009 File in common data format providing further descriptive information or information in natuaral language or graphical representation. Note: The file can be the product change notification document typically provided to customers. Note: Recommendation is to provide such files as PDF or HTML.	[File] PCN3456.PDF	0..*

3.4 SubmodelElements of ProductChangeNotificationManufacturerInformation

The SubmodelElementCollection (SMC) is described as follows. The table convention is explained in Annex A.2.

idShort:	Manufacturer		
Class:	SubmodelElementCollection		
semanticId:	[IRDI] 0173-10029#01-XFB003#001		
Parent:	ProductChangeNotificationRecord{0000}		
Explanation:	Set of information identifying the manufacturer or supplier, which puts the described items on the market		
[SME type]	**semanticId = [idType]value**	**[valueType]**	**card.**
idShort	**Description@en**	**example**	
[MLP] ManufacturerName	[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	[langString] Beispiel & Söhne@DE	1
[SMC] AdressInformation	[IRDI] 0173-1#02-AAQ832#005 Address information of a business partner Note: this set of information is described by SMT "Contact Information", SMC with semanticId: [IRI] https://admin-shell.io/zvei/nameplate/1/0/ContactInformations/ContactInformation. Note: ECLASS refers to this SMC also as 0173-10029#01-XFB004#001. However, as the SMT "Contact Information" explains a set of contact information as isCaseOf AAQ832, this IRDI is used.	n/a	1

3.5 SubmodelElements of ProductClassification

The classification items themselves are defined externally by the Submodel template "Generic Frame for Technical Data for Industrial Equipment in Manufacturing (Version 1.1)". The SubmodelElementCollection (SMC) described as follows takes over the structure, however updates to ECLASS semantics. The table convention is explained in Annex A.2.

idShort:	ProductClassification{00}
Class:	SubmodelElementCollection
semanticId:	[IRDI] 0173-10029#01-XFB007#001
Parent:	ItemOfChange

Explanation:	Single product classification by association with product class in a particular classification system or property dictionary.		
[SME type]	**semanticId = [idType]value**	**[valueType]**	**card.**
idShort	**Description@en**	**example**	
[Property] ProductClassificationSystem	[IRDI] 0173-1#02-AAR709#001 Common name of the classification system. Note: Examples for common names for classification systems are "ECLASS" or "IEC CDD". Note: the SMT "Technical Data" refers to this as: [IRI] https://admin-shell.io/ZVEI/TechnicalData/ProductClassificationSystem/1/1	[string] ECLASS or: IEC CDD	1
[Property] ClassificationSystemVersion	[IRDI] 0173-1#02-AAR710#001 Common version identifier of the used classification system, in order to distinguish different version of the property dictionary. Note: Casing is to be ignored. Note: the SMT "Technical Data" refers to this as: [IRI] https://admin-shell.io/ZVEI/TechnicalData/ClassificationSystemVersion/1/1	[string] 9.0 (BASIC)	0..1
[Property] ProductClassId	[IRDI] 0173-10029#02-ABF979#001 Class of the associated product or industrial equipment in the classification system. According to the notation of the system. Note: Ideally, the Property/valueId is used to reference the IRI/ IRDI of the product class. Note: the SMT "Technical Data" refers to this as: [IRI] https://admin-shell.io/ZVEI/TechnicalData/ProductClassId/1/1	[string] 27-01-88-77 or: 0112/2///61987#ABA827#003	1

3.6 SubmodelElements of ProductChangeNotificationReasonRecord

This classification follows the approach of classification of the ProductClassification (see 0). The reason of change is defined by referencing one or multiple classification systems. The table convention is explained in Annex A.2.

idShort:	ReasonOfChange{00}		
Class:	SubmodelElementCollection		
semanticId:	[IRDI] 0173-10029#01-XFB005#001		
Parent:	ProductChangeNotificationRecord{0000}		
Explanation:	One or more classifications of reason of change.		
[SME type]	**semanticId = [idType]value**	**[valueType]**	**card.**

idShort	Description@en	example	
[Property] ReasonClassificationSystem	[IRDI] 0173-1#02-ABF813#001 Common name of the classification system for reasons of change. Note: Examples for common names for classification systems are "VDMA24903" or "ECLASS".	[string] VDMA24903 or ECLASS	1
[Property] ClassificationSystemVersion	[IRDI] 0173-1#02-AAR710#001 Common version identifier of the used classification system, in order to distinguish different version of the property dictionary. Note: Casing is to be ignored. Note: 4 digit year of publication data of classifcation standard can serve as version.	[string] 2017 or 12.0	0..1
[Property] ReasonId	[IRDI] 0173-10029#02-ABC727#001 Class of the reason itself. Code as alphanumerical string. Note: Ideally, the Property/valueId is used to reference the IRI/ IRDI of the reason id given by ECLASS.	[string] LABEL	1

3.7 SubmodelElements of PcnTechnicalDataSet

The SubmodelElementCollection (SMC) is described as follows. The table convention is explained in Annex A.2.

idShort:	TechnicalData_Fit, TechnicalData_Form, TechnicalData_Function, TechnicalData_Other		
Class:	SubmodelElementCollection		
semanticId:	[IRDI] 0173-10029#01-XFB008#001, [IRDI] 0173-10029#01-XFB009#001, [IRDI] 0173-10029#01-XFB010#001, [IRDI] 0173-10029#01-XFB011#001		
Parent:	ItemOfChange		
Explanation:	Set of SubmodelElements describing technical properties of the item, in particular regarding the fit, form or function of the product.		
[SME type]	**semanticId = [idType]value**	**[valueType]**	**card.**
idShort	**Description@en**	**example**	
[Property] TargetEstimate	[IRDI] 0173-10029#02-ABF980#001 Indicator, to which degree in terms of fit, form, function the match to the item of change is achieved by the particualr given item. Ranges from 0.0 to 1.0, or 0% to 100%. Note: Not applicable for ItemOfChange and TechnicalData_Other	[Real] 0.7	0..1
[SME]	semanticId = {arbitray} but defined in a classification system	Width@en= 32 [mm]	0..*

{arbitrary}	Arbitrary SubmodelElement with semanticId possibly referring to a ConceptDescription which can be used within the Technical Properties.		

3.8 SubmodelElements of PcnSetOfConformityDeclarations

The SubmodelElementCollection (SMC) is described as follows. The table convention is explained in Annex A.2.

idShort:	ConformityDeclarations		
Class:	SubmodelElementCollection		
semanticId:	0173-10029#01-XFB012#001		
Parent:	ItemOfChange		
Explanation:	Set of information describing conformity declaration, certificate and suitability for different industrial sectors (branches).		
[SME type]	**semanticId = [idType]value**	**[valueType]**	**card.**
idShort	**Description@en**	**example**	
[SME] {arbitrary}	semanticId = {arbitray} but defined in a classification system Arbitrary SubmodelElement with semanticId possibly referring to a ConceptDescription which can be used to describe the conformity of the item.	CECC mark of conformity 0173-1#07-AAA555#001	0..*

4 Classifications and Identifiers

4.1 Classification of PCN Reason according VDMA24903

Unit category

Description: Rough categorization of the unit for rule-based processing.

Occurrence: once per affected unit

Mandatory field: yes

Format: Value from the following enumeration

Title	Description	XML-value
Active electronics	Units with active electronics: semiconductors, electronic assemblies	ACEL
Data / Certificate	Data media and digital certificates (such as parameter sets, setting values, databases, security certificates, cryptography keys)	DACE
Service	Services of all kinds (such as logistics, monitoring, cleaning, maintenance)	SERV
Documentation	Documentation (such as data sheets, descriptions, instructions) DOCU	DOCU
Electromechanics	Units with electromechanical function (like relays, contactors, switches)	ELME
Fluid	Fluids of all kinds (such as oils, fuels, hydraulic oil, gases)	FLUI
Auxiliary material	Auxiliary materials of all kinds (such as chemical substances, operating materials, cleaning agents)	AUXM
Hydraulics	Units with hydraulic function (such as hoses, pumps, cylinders)	HYDR
Mechanics	Units with a purely mechanical function (such as shafts, gears, screws)	MECH
Several categories	Not to be assigned to a specific category, affects more than one category, type to be used for the PCN/PDN as a whole when type assignment is specific within the block Item numbers.	MULT
Passive electrics / electronics	Units with passive electrics/electronics, assemblies that do not receive active components.	PAEL
Pneumatics	Units with pneumatic function (such as hoses, pumps, valves, cylinders)	PNEU
Raw material	Raw materials of all types (such as chemical materials, plastic granules, metals, textiles)	RAWM
Software / Firmware	Software including firmware	SWFW
Other	Other	OTHR
Connectors / Cables	Connectors and cables of all kinds, passive connectivity	CCBL
Assembly	Assemblies	ASSY

4.2 Classification of PCN Item according VDMA24903

Description: Classification into different categories, which indicate the type of changes as a short form of the changes.

Note: Multiple categories may also be specified. In addition to the categories listed below, additional categories may also be specified
Occurrence: several times per affected unit
Mandatory field: yes (at least one value)
Format: value from the following enumeration,

Definition	Description	XML-value
Discontinuation	Unit is no longer produced by the original manufacturer according to original specification.	PDN
Acquisition	Transfer of a unit, portfolio or production from one production from one manufacturer to another	MANAQ
Alarm	The manufacturer warns of changes and restrictions that he has detected in a product. For example, functional limitations on the units themselves, but also descriptions of unexpected behavior under certain conditions and also temporary interruptions in the production of the units.	ALERT
Change of the software	Change of the software	SOFTW
Labeling	Change the labeling of the unit and or Packing	LABEL
Characteristics	Characteristics such as attribute values of the unit are omitted, are added or changed. They can be electrical, mechanical, thermal or other characteristics kind	CHARA
Documentation	General summary of changes made to the changes made. It does not change characteristics of the units are changed.	DOCUM
Restriction of the Recommendation for use	Official recommendation to no longer use the unit for new developments	NRND
Fit	Describes a change in the units of fit and fit with respect to other units connected in the units connected in the product.	FIT
Shape and Appearance	Describes a change in the outward appearance of the units. This concerns the spatial dimensions and from, but also colors and surface textures.	FORM
Function	Changes or effects from operation and Performance	FUNCT
Insolvency	insolvency of the manufacturer	INSOL
Correction	Correction of documentation without change to the unit	CORR
Delivery	Change of delivery. e.g. container sizes etc. or delivery routes and times	SHIP
Material	Change of the material or substances in the Material declaration	MATER
Production start-up	The production of this unit is officially started	PRODS
Production process	Production process is changed.	PPROC
Production site	The production site is changed.	PSITE
Undo PCN	A certain previous PCN will be undone reversed	CANCN

Withdrawal PDN	Production of the unit is resumed. PDN loses validity.	CANDN
Recall	The manufacturer recalls the units from the market and explains the reasons and effects on the units themselves. The reasons can be manifold, from technical malfunctions to patent infringements	RECA
Test process	Modification of test processes before, during and after production, before delivery	TESTP
Test location	Change of the location where the tests are performed are performed	TESTS
Type codes	Accompanying numbers next to the identifying number of the unit are changed - not the identifying number itself.	ORCOD
Packaging	The packaging of the unit is changed.	PACKA

4.3 Incoterm classes

Code	englisch	Bedeutung	anzugebender Ort
EXW	englisch ***EX** **W**orks*	ab Werk	Standort des Werks oder jeder andere Ort
FCA	englisch ***F**ree **CA**rrier*	frei Frachtführer	Ort des Verkäufers oder Ort des Frachtführers[16]
FAS	englisch ***F**ree **A**longside **S**hip*	frei längsseits Schiff	vereinbarter Verladehafen (ausschließlich zur Schiffsverladung geeignet)
FOB	englisch ***F**ree **O**n **B**oard*	frei an Bord	vereinbarter Verladehafen (ausschließlich zur Schiffsverladung geeignet)
CFR	englisch ***C**ost And **FR**eight*	Kosten und Fracht	vereinbarter Bestimmungshafen (ausschließlich zur Schiffsverladung geeignet)
CIF	englisch ***C**ost **I**nsurance **F**reight*	Kosten, Versicherung und Fracht bis zum Bestimmungshafen	vereinbarter Bestimmungshafen (ausschließlich zur Schiffsverladung geeignet)
DAP	englisch ***D**elivered **A**t **P**lace*	geliefert benannter Ort	vereinbarter Liefer- und Bestimmungsort (meist Bestimmungsterminal oder Ort des Käufers)
DPU	englisch ***D**elivered at **P**lace **U**nloaded*	geliefert benannter Ort entladen	vereinbarter Liefer- und Bestimmungsort (meist Bestimmungsterminal oder Ort des Käufers)
CPT	englisch ***C**arriage **P**aid **T**o*	Fracht bezahlt bis	vereinbarter Bestimmungsort (meist Bestimmungsterminal oder Ort des Käufers)
CIP	englisch ***C**arriage **I**nsurance **P**aid*	Fracht und Versicherung bezahlt	vereinbarter Bestimmungsort (meist Bestimmungsterminal oder Ort des Käufers)
DDP	englisch ***D**elivered **D**uty **P**aid*	geliefert, Zoll & Steuer bezahlt	vereinbarter Liefer- und Bestimmungsort (meist Bestimmungsterminal oder Ort des Käufers)

see: https://en.wikipedia.org/wiki/Incoterms

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 the following annex in form of an XML mapping 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
SME, SubmodelElement	SubmodelElement

- 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 parents 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 ISO639 language code: example@EN.
- The [valueType] is only given for Properties.

Annex B. Bibliography

[1] "Recommendations for implementing the strategic initiative INDUSTRIE 4.0", acatech, April 2013. [Online]. Available https://www.acatech.de/Publikation/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/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.plattform-i40.de/I40/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.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 2.0.1)", May 2020, [Online]. Available: https://www.plattform-i40.de/PI40/Redaktion/EN/Downloads/Publikation/Details-of-the-Asset-Administration-Shell-Part1.html

[7] Semantic interoperability: challenges in the digital transformation age, IEC, International Electronical Commision; 2019; Available: https://basecamp.iec.ch/download/iec-white-paper-semantic-interoperability-challenges-in-the-digital-transformation-age-en/?

[8] Common terms and abbreviations according to VDI FA 7.21 Wiki; Available: http://i40.iosb.fraunhofer.de/

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