CFIHOS RDL Development Guide

Version	Date	Comments/History
V01		Initial revision with Chevron content, titled "Chevron Approach to RDL Alignment" • Principles section • Guidelines section
V02		BP modifications: • Added Tagging criteria section • Updates to Principles and Guidelines section • Renamed to "BP Approach to RDL Alignment"
V03		Shell modifications • Added Background section • Added CFIHOS Submission section • Added Assessment Criteria section • Consolidated Guidelines section into Principles. • Updated Principles section to expand on the definition of the principles and provide examples • Updated Tagging Criteria section to compare criteria from BP, Chevron, and Shell • Renamed to "Consolidated Approach to CFIHOS RDL Alignment"
V04		Modifications to clarify functional/physical classification of equipment • Added Definitions section • Added Revision History section • Clarifications added for approach to functional and physical classes • Example classes updated to align with approach to functional and physical classes
V05		Add description of difference between Tag (Functional) and Equipment (Physical) Classes.
V06		Include rule changes agreed upon TOTAL joining group.
V07		• Merger of existing 'Consolidated Approach to CFIHOS RDL Alignment' and 'CFIHOS Properties Rules' • Incorporate comments from review by expanded CFIHOS RDL Working Group

Acknowledgements

In 2012, Shell approached Netherlands-based process industry organization USPI to explore turning their corporate information standard into an industry-wide standard. The result was the CFIHOS (Capital Facilities Information Handover Specification) project.

Its aim is to offer practical, standardized specifications for information handover that work across the supply chain – operators, contractors and suppliers. The most recent CFIHOS industry standard (Version 1.4) was published in October 2019 by USPI with support from the Engineering Advancement Association of Japan (ENAA). This document, describing the scope and procedures of CFIHOS, is part of this standard.

Following a member vote in 2019, the future governance, development, and maintenance of the CFIHOS project and standard moved from USPI to IOGP in January 2020, becoming Joint Industry Project (JIP)36.

The Capital Facilities Information Handover Specification (CFIHOS) is an industry standard developed to improve information exchange between the companies who own, operate, and construct plants for the process and energy sectors. Starting with a common equipment naming taxonomy and supporting specifications, its goal is to become a common language for the exchange of information in these sectors.

The initial focus is on information, both structured data and traditional document formats, which are required be handed over when a project moves from its development to operations phase. Ultimately, the aim is for CFIHOS to become the de-facto standard for information exchange throughout the physical asset lifecycle, from conception through to decommissioning.

The Reference Data Library or “RDL” lies at the heart of CFIHOS. This library gives a standard and unified naming convention for equipment, its attributes, properties, disciplines and documents and relationships.

The CFIHOS RDL includes:

- A list of Tag classes and their definitions, describing what the equipment does
- A list of Equipment and their descriptions, describing the physical equipment item
- A list of properties
- List of disciplines document types
- Lists of properties of tags and equipment
- Pick lists (allowable values for data properties to aid validation)
- Units of Measure
- Relationships between data objects.

The initial CFIHOS RDL development approach document was developed by the Owner Operator RDL Alignment Team (bp, Chevron, Shell and TotalEnergies) and later expanded to include ExxonMobil and Equinor with a view to carry out a one-off alignment of their existing RDLs.

Following the growth in membership of CFIHOS community across the supply chain, the RDL development and governance document has been improved to accommodate input from wider stakeholders to drive consistency and clarity in the set of criteria to be applied in maturing the content of the RDL through feature requests.

Contents

Figure List

Table List

1. Introduction

This document describes the rules that shall be applied by the CFIHOS RDL Work Group to identify equipment classes, their attributes, properties, units of measurement, pick list of values and relationships for additions/modifications/deletions in the CFIHOS RDL.

Engineering objects (e.g. Tags, Equipment or Model Parts) can be classified in CFIHOS to enable the grouping of similar objects and specification of common requirements. Tag (or Functional) and Equipment (or Physical) Class(es) are defined in the CFIHOS RDL, and a hierarchy to help to assign appropriate Class(es).

Each Tag is classified by a "Tag Class" and the basic function (e.g. pump) that the object is intended or required to perform is captured as design information (e.g. Flowrate). Once a physical object is selected to be installed at that function an "Equipment Class" (e.g. Centrifugal Pump) is used to describe the actual capability and nature of the installed equipment (e.g. Dimensions). These physical properties would change if the component was switched out for another, but the functional properties would not (See Annex 2 for further explanation).

The split between Tag (Functional) and Equipment (Physical) class is difficult to define. In the current version of the CFIHOS RDL the same class name is used for Tag and Equipment classes. Where the tag class and equipment class are not the same, mappings between the Tag and Equipment have been made, as shown in figure 1 below:

tag class name	equipment class name
compressor	axial compressor
compressor	centrifugal compressor
compressor	reciprocating compressor
compressor	rotary compressor
pump	centrifugal pump
pump	reciprocating pump
pump	rotary pump

Figure 1: example of tag class to equipment class mapping

The approach taken for the RDL is based on the assumption that a class can be either just a tag class, just an equipment class, or both. The split between functional and physical classes in a practical implementation will be one of how far down the class hierarchy you go before you move from functional to physical. E.g. pump could be functional where subclass centrifugal pump might be physical.

Simplistically this will be interpreted as if the respective Owner Operator's Tagging Specifications have a requirement for a functional class, it shall be considered as a valid Tag (Functional) class. This shall apply for items that traditionally have not been uniquely identified, for example Special Piping (SP) Items as well as uniquely identified tags. A high level comparison of the Owner Operator's Tagging Specs is shown in Section 6.

This approach will be reviewed for continuous improvement to ensure that it is fit for purpose.

Each class can have properties associated with it that describe some aspect of the Tag, Equipment or Model Part. Classes and Properties are created, populated and maintained in order to satisfy business needs (e.g. the 'Voltage' is a commonly used physical property for electrical equipment, as the value has a large impact on the maintenance routine for that piece of equipment). An object of a

specific Class is placed in an operating environment in order to perform its function and it usually contains a product, for which the property 'fluid phase' (e.g. gas, liquid.) would be required.

2. Definitions

A.1 A class represents a group of objects that have similar properties, behaviours and relationships as defined by the rules for membership of the class

A.2 The Tag Class represents the design intent or engineering specification

A.3 The Equipment Class represents the physical item, i.e. actual installed item

A.4 The Model represents what can be purchased to satisfy the function

A.5 Property or attribute or characteristic are synonyms for a discrete item of data; it should have a unique name or label, a concise, unique and unambiguous definition or description, including data type and rules for acceptable population with a value. Property, Attribute and Characteristic are synonyms in the context of this document

A.6 Functional properties describe engineering requirements for design or purchase purposes

A.7 Physical properties describe standard equipment from a manufacturers catalogue or actual installed equipment.

3. Principles

Each of the participating Companies have their own RDL/Class Library. To enable consensus and alignment of the Companies' RDLs, each Company shall map their own RDL with the CFIHOS RDL. Each Company can then propose any changes considered necessary to the RDL Work Group for agreement through Feature Requests. Sections 4 and 5 provides further detail of the criteria for agreeing proposed changes.

4. Criteria for Class acceptance or rejection

The initial CFIHOS RDL classes were built upon, and shall be maintained based on the following:

4.1 A Class is accepted when it reflects:

A.8 Different Classes (Functional or Physical) must have different sets of properties. If this is not the case, then there is no reason to have a different Class. Example:

a) Tag (functional) class "electric motor" does not have the same set of properties, as an "electric generator", so two distinct classes are required except as mandated by legislation or relevant international standards.

b) Equipment (physical) class "Centrifugal Pump" shares the same properties, as a "Multistage Centrifugal Pump", only the value for the property 'Number of Stage' would be different, so only one class is required, the most generic one.

A.9 In case of measurement devices (e.g. instruments), the class name may contain the measured variable (e.g. "pressure transmitter").

A.10 The method (physical process) used to perform the function. In order to perform the function different methods (e.g. geometry, physical effect) can be used. Different methods imply different detailed properties, this means that in that case more than one class is required to group these properties. Examples:

- An object of equipment class "Centrifugal pump" uses the centrifugal force in order to perform the "pump" function.

- Objects of equipment class “Plate heat exchanger” and “shell and tube heat exchanger” are fundamentally different in shape

A.11 The primary function performed by the object. For example, “ventilation fan” and “cooling fan” are in fact “fans” that performs different secondary functions,” ventilating” and “cooling”, but the primary function of a “fan” is to create a flow of gas. This flow of gas may be used to “ventilate” or to “cool”.

A.12 In this particular case, the object performing the function should be contained in the name, description or properties in the corresponding secondary function. In the previous example, the Tag description (service) could be “Main Control room ventilation fan” and the Functional Class of the Tag would be “fan”. The physical class could be “centrifugal fan” or “axial fan”, describing the actual type of fan installed to perform the function

A.13 If the installed object has different maintenance requirements, different physical classes may be required, e.g. “gas turbine” vs “steam turbine”.

4.2 A Class name is rejected when it:

R.1 Contains the location where the classified object will be installed (e.g. “deep well pump”) or is ambiguous – e.g. subsea control panel is unlikely to be installed under water.

R.2 Contains the dimensions of the classified object (e.g.”5-inch valve”).

R.3 Contains the material that is used to build the object (e.g. “stainless valve”).

R.4 Makes reference to the product properties that could be contained within the Object (in term of physical variables like pressure, flow, temperature or fluid type) unless its primary function is to measure these physical variables (e.g. “chemical tank” would be rejected because it could be used for storing other contents, for example diesel).

R.5 For measurement devices, contains the Unit of measure used to measure the variable (e.g. PSI pressure transmitter).

R.6 Contains a term that is part of an infinite series of terms which would result in the creation of an infinite number of classes. (e.g. “CO2 gas detector” is rejected because CO2 is one combination of molecules and there are an infinite number of molecules combinations).

R.7 Is intended to classify objects of different natures, i.e. “catch-all” type of classes (e.g. “Other mechanical equipment”)

R.8 Is a Tag Class, with the ‘Equipment Installed’ attribute set to yes, that does not have any mapped physical classes.

R.9 Is a Functional Class at the lowest level of the hierarchy that is not used by any of the Owner Operator RDL Alignment Team members (See Section 4.5.1).

R.10 Contains an abbreviation in the Name

R.11 Shares the same definition as another class (provision is available in CFIHOS to capture a synonym).

R.12 Is a Tag or Equipment class with only one child at the lowest level of the hierarchy.

4.3 Procedure for Class acceptance or rejection

CFIHOS members’ proposal submitted through CFIHOS Feature Request (FR) process shall be assessed based on the criteria defined in Section 4 to enable consensus.

1. The proposing member is responsible for

a. submitting a Feature Request regarding their proposal

b. ensuring the proposed class meets the criteria described in section 4.

c. providing all relevant information to support CFIHOS members voting regarding the overall principle of the FR.

2. Provided the proposed change meet the criteria and supported by majority of RDL Work Group members, the change will be submitted to the CFIHOS RDL FR Maintenance Team for inclusion in the CFIHOS RDL.

3. If a majority is not achievable, proposed change will be deferred or outrightly rejected. The outcome will be reported to the CFIHOS RDL FR Maintenance team as "not approved" along with the reason for rejection documented (in case it is proposed again in the future).

4.3.1 Completion of Mandatory fields

Defined in the CFIHOS Tag/Functional Class and Equipment/Physical Class definitions the following fields are considered mandatory and additions will not be proposed if these fields cannot be completed (Source: CFIHOS V1.5).

Tag_Class				**Equipment_Class**			
Attribute_ Name	**Definition**	**Constraint**	**Mandatory Primary Key**	**Attribute_ Name**	**Definition**	**Constraint**	**Mandatory Primary Key**
parent tag class name	Identify the parent class of a Tag_Class, in order to build a hierarchy of Classes.	Refer to definition group: Tag_Class	M[1]	parent equipment class name	Identify the parent class of an Equipment_Class, in order to build a hierarchy of Classes.	Refer to definition group: Equipment_Class	M[1]
tag class name	The full name of the tag class.		PK	equipment class name	The full name of the Equipment_Class.		PK
tag class definition	Definition of the Tag_Class.		M	equipment class definition	Definition of the Equipment_Class.		M
abstract class flag	When set to No, indicates that the Class can be used for classifying Tag, Equipment or Model_Part. If set to Yes, indicates that the Class can only be	See Picklist: yes no	M	abstract class flag	When set to No, indicates that the Class can be used for classifying Tag, Equipment or Model_Part. If set to Yes, indicates that the Class can only be used for	See Picklist: yes no	M

[1] All new classes proposed will be provided with a Parent Class to ensure that it can be added to the existing hierarchy.

Tag_Class				Equipment_Class			
Attribute_ Name	**Definition**	**Constraint**	**Mandatory Primary Key**	**Attribute_ Name**	**Definition**	**Constraint**	**Mandatory Primary Key**
	used for building a class hierarchy.				building a class hierarchy.		
ISO15926 part4 unique number	The identifier used in ISO 15926-4 to identify this class uniquely.			iso15926 part4 unique number	The identifier used in ISO 15926-4 to identify this class uniquely.		
CFIHOS unique id	A unique id number assigned by the CFIHOS project.			CFIHOS unique id	A unique id number assigned by the CFIHOS project.		
unique id STEPLIB	The identifier used in Steplib to identify this class uniquely.			unique id steplib	The identifier used in Steplib to identify this class uniquely.		
unique id POSC CAESAR	The identifier used in POSC-CAESAR to identify this class uniquely.			unique id posc caesar	The identifier used in POSC-CAESAR to identify this class uniquely.		
referenced standard	International or Industry Standard that requirement is sourced from.			referenced standard	International or Industry Standard that requirement is sourced from.		
tag number format	A regular expression that represents the tag class format according to Principals Tagging Specification			spare part info req	Indicate if some spare part information is required for this type of Equipment.	See Picklist: yes no	M
equipment installed	Indicate if equipment is expected to be installed for this type of Tag.	See Picklist: yes no	M	reason for having class	To provide the Reason for having the Class.		
reason for having class	To provide the Reason for having the Class.						

Figure 2: Required attribute for tag class or equipment class request

4.4 Assumption of validity

Each company has invested time and expertise into their respective class libraries – suggestions should be accepted provided that they meet the defined criteria.

4.5 Further Assessment Criteria

4.5.1 Valid Business Need

A valid business need must be demonstrated before proposing a new class. The standard rule is that the class must be in use at more than one asset to consider adding (this may be across OOs). If only in use in one asset, then the class would be considered as project/asset specific and the OO can still use in their local library until usage increases.

4.5.2 Reference to International or Industry standard

Proposed new classes should (wherever possible) be described in an international or industry standard/reference, preferably ISO 15926 Part 4 and/or other standards (for example API, ISO, IEE, ISA).

4.5.3 Hierarchy maintenance during class removal

Where the list of child classes of a parent class reduces into one class, such parent class ceases to be a parent class. However, such parent class could be restored where additional class(es) are proposed and accepted to the list of child classes in the future.

4.5.4 Duplication of classes

New classes must not be proposed that are synonyms of existing classes. Synonyms may be added to existing classes to allow for variations between companies/regions. Such synonym cannot be used for more than one class.

4.5.5 Specialization

All classes shall be added whenever possible to the existing CFIHOS class hierarchy. Where possible this should maintain consistency with the existing granularity within CFIHOS.

Class	Sub Class	Sub Sub Class
Valve	Ball Valve	
Transmitter	Pressure Transmitter	
Analysing instrument	Chromatograph	Gas chromatograph

Figure 3: tag/equipment class hierarchy

The decision on where to stop the sub classification can be made by applying the rules described in this document (rule R12).

5. Criteria for creating and maintaining Properties

The initial CFIHOS RDL classes and properties were built upon, and shall be maintained based on the following:

5.1 Criteria to decide the creation of a new property.

P.1 The property must appear on an international or industry standard or datasheet (See rule P10 for how to deal with inconsistent property naming in existing standards).

P.2 The property will be used for the purposes of reporting (e.g. Ex register), searching, calculations or sharing (e.g. common data between CMMS and Inspection Management System). The property may have multiple purposes, i.e. for multiple consuming organizations and/or data systems. Purpose(s) must be explicit.

NB. CFIHOS does not try to include all data sheet fields on a datasheet, only those where a specific business requirement exists to hold the value as data will be included.

P.3 The property shall be related to at least one tag Class or one equipment Class or one CFIHOS Data object (i.e. no property will be unused).

P.4 The same property name can be used for both Tag (Functional) and Equipment (Physical) classes. For example, explosion protection gas group are required to define the EX requirement (functional) and the suitability of the equipment for use (physical). The Functional and Physical properties can be compared to partially automate the verification of the requirement.

5.2 Rules for naming a new property.

P.5 Each property shall have a unique name and unique definition.

P.6 Abbreviations and special characters (e.g. /) shall be avoided in property names.

P.7 The picture below illustrates the usage of the terms 'upper limit', 'lower limit', 'normal' and 'rated'.

CFIHOS Name	Common Name
Upper limit allowable pressure	Maximum allowable working pressure
Upper limit design pressure	Upper design pressure
Upper limit operating pressure	Maximum operating pressure
Rated pressure	
Normal operating pressure	Operating pressure
Lower limit operating pressure	
Lower limit design pressure	Lower design pressure
Lower limit allowable pressure	Minimum allowable working pressure

Figure 4: Taxonomy mapping between CFIHOS and Common names

Some Definitions:

- The values for 'allowed' are set by regulatory requirements.
- The value for 'rated' is the value at which the equipment has been designed to operate most efficiently.
- The value for 'normal operating' is the value at which the equipment will operate most of the time.

Note:

- The above example is for pressure but is applicable to any measured variable.
- The terms 'normal design' and 'rated design' are not allowed. The term 'rated' is used instead.

P.8 The name used for a property of a 'part' should contain the:

a) Role of the part within the whole (e.g. inlet)

b) Class of the part (e.g. flange) – see note below

c) Property name (e.g. diameter)

Concatenating these words gives the name of the property ‘inlet flange diameter’.

Note:

- ‘Part’ should not be used to capture properties for tagged items (i.e. items that have a class defined in the Tag Class reference data). For example, in a package, pumps shall be uniquely tagged. Properties should therefore be associated against the pump tag and not the package tag, hence eliminating the need for a pump capacity property against the package. Components of the pump, for example the impellor, the casing can have properties created, i.e. casing material, impellor diameter, etc.).

P.9 The property name should be very specific (e.g. on a shell and tube heat exchanger ‘shell side fluid name’ is preferred to ‘fluid name’), unless this is the fluid in the whole assembly. This allows one:

- To re-use the property for another class and to have a precise non-ambiguous definition.
- To add more properties in the future without having to rename the existing ones (e.g. if ‘fluid name’ was created instead of ‘shell fluid name’, then it would be hard to introduce at a later stage a property for the ‘tube fluid name’).

P.10 Where possible, property names should align with international or industry standards (e.g. ISO-13709 for centrifugal pumps). Ideally the names would be the same but there are many inconsistencies in the engineering standards today that prevent this, so a reference to the source property name shall be retained where the property has different names in separate standards.

P.11 The word ‘Type’ shall be used in an unambiguous way, e.g. ‘actuator type’ is not a good property name as it could be referring to many aspects of the actuator; the signal type, the type of motion (linear or rotary) or the type of actuation, etc.

5.3 Rules for describing metadata for a new property.

P.12 The property definition should be detailed enough to avoid ambiguities. The definition must not be a simple repetition of the property name or synonyms thereof. The definition should use terminology that can be understood by people from any discipline/background.

P.13 When a new property requires a unit of measure, it must be associated with a valid unit of measure dimension (for example temperature) which would allow for the specific uom (for example degrees Celsius or Kelvin).

P.14 Pick lists should be used when there is a finite list of well-defined values or options. Free text should be used when there is potentially an infinite number of options e.g. a property like ‘gas composition’ is not suitable for a pick list as there are too many possible values options to list.

P.15 The use of lookup values for property shall be maximized whenever possible and reference to the corresponding standard, if exist mentioned (e.g. explosion protection concept property lookup values are referenced back to EN 50014).

P.16 The property shall be mapped to one and only one ISO15926/PCA Property (check date – based on)

P.17 CFIHOS shall not capture the mapping between the property name and the equivalent

name in other applications (e.g. CMMS, Corrosion/Inspection System, and Commissioning Completions Management System). If this mapping is required, it will be retained by each Owner Operator as the number of variations is too large to handle within the standards.

See the CFIHOS Data Dictionary for latest Meta data. Below is screenshot

Name	Definition	Note / comment	Example	Identifier / Mandatory / Optional	Format	"Constraint : Must be present in"	CFIHOS unique id
PROPERTY	A type of feature that is used to distinguish and describe tags, equipment, models or their class.	Alias attribute, characteristic					CFIHOS-00000029
Property name	A name that uniquely identifies the property		Example : normal operating pressure	Identifier	Text, max 30 characters		CFIHOS-10000056
Property definition	A definition of what the property represents		Example : The pressure at which a functional or physical object is expected to operate normally.	Mandatory	Text, max 60 characters		CFIHOS-10000135
Property data type	An indication whether the values of the property are numeric or not		Example : Yes	Mandatory	Boolean (Yes/No)		CFIHOS-10000171
Property data type length	The maximum length that a property value may have in a pick list		Example : 40	Optional	Integer		CFIHOS-10000236
CFIHOS unique code	A code that uniquely identifies the property in CFIHOS		Example : CFIHOS-10000146	Optional	Text, max 40 characters		CFIHOS-10000146
Property existence reason description	The reason why the property has been added in CFIHOS			Optional	Text, max 255 characters		CFIHOS-10000057
Unit of measure dimension code	A code that uniquely identifies the unit of measure dimension		Example : Volume	Optional	Text, max 6 characters	UNIT OF MEASURE DIMENSION	CFIHOS-10000233
Property picklist name	The name by which the pick list is designated.		Example : air cooler type	Optional	Text, max 100 characters	PROPERTY PICKLIST	CFIHOS-10000059

Figure 5: Property entity attributes

Note:
Additional meta-data requirements would be considered as part of future maturation of CFIHOS standard for properties. Examples include:

- Required at Maturity Level – to indicate when in the lifecycle the property needs to be provided. For example, At end of FEED, prior to procurement, after procurement, etc.
- Attribute Group – to group properties as they are on a typical data sheet. The example below shows an example for Air Cooled Heat Exchangers from ISO 13706, where properties are group into "Basic design data" and "Performance data – tube side".

ISO 13706:2011(E)

AIR-COOLED HEAT EXCHANGER DATA SHEET (SI UNITS)

Job No. _____ Item No. _____
Page 1 of 2 By _____
Date _____ Revision _____
Proposal No. _____ Contract No. _____
Inquiry No. _____ Order No. _____

Manufacturer _____ Heat exchanged, kW _____
Model No. _____ Surface/item-finned tube, m^2 _____
Customer _____ Bare tube, m^2 _____
Plant location _____ MTD, eff., °C _____
Service _____ Transfer rate-finned, $W/m^2 \cdot K$ _____
Type draught O Induced O Forced Bare tube, service, $W/m^2 \cdot K$ _____
Bay size (W × L), m _____ No. of bay/items _____ Clean, W/m^2 _____

Basic design data

Pressure design code _____ Structural code _____
Tube bundle code stamped O Yes O No Flammable service O Yes O No
Heating coil code stamped O Yes O No Lethal/toxic service O Yes O No

Performance data — Tube side

		In	Out
Fluid name			
Total fluid entering, kg/h	Temperature, °C		
Dew/bubble point, °C /	Total flow rate (liq./vap.), kg/h	___/___	___/___
	Water/steam, kg/h	/	/

Figure 6: Example on Datasheet showing property groups

5.4 Rules for assigning properties to classes

P.18 P18. Properties can be assigned to a Tag, Equipment or Model Part. The property must

appear on an international or industry standard or datasheet for the class to be assigned.

P.19 P19. For new properties, the international or industry standard or datasheet defining the relationship between the class and the property must always be identified.

P.20 P20. Default units of measure will be assigned based on the values from the relevant standard.

See the CFIHOS Data Dictionary for latest Meta data. Below are examples:

Name	Definition	Note / comment	Example	Identifier / Mandatory / Optional	Format	"Constraint : Must be present in"	CFIHOS unique id
TAG CLASS PROPERTY	A characteristic, or property, that a tag class has.						CFIHOS 00000016
Tag class name	The full name of the tag class		Example : control panel	Identifier	Text, max 100 characters	LEAF NODE TAG CLASS	CFIHOS 10000040
Property name	A name that uniquely identifies the property		Example : normal operating pressure	Identifier	Text, max 30 characters	PROPERTY	CFIHOS 10000056
Source standard code	A code used to designate the standard used to define requirements like engineering, operations, etc.		Example : ISO 13533	Optional	Text, max 40 characters	SOURCE STANDARD	CFIHOS 10000053
Source standard section	The section of the source standard in which the property is documented		Example : Data Sheet section	Optional	Text, max 40 characters		CFIHOS 10000244
Property name in source standard	The name of the property in the source standard document		Example : Operating pressure, normal	Optional	Text, max 100 characters		CFIHOS 10000245
SI unit of measure code	The symbol that usually used to represent the unit of measure		Example : s	Optional	Text, max 3 characters	UNIT OF MEASURE	CFIHOS 10000173
Imperial unit of measure code	The symbol that usually used to represent the unit of measure		Example : s	Optional	Text, max 3 characters	UNIT OF MEASURE	CFIHOS 10000174

Figure 7: Tag class property metadata

Name	Definition	Note / comment	Example	Identifier / Mandatory / Optional	Format	"Constraint : Must be present in"	CFIHOS unique id
EQUIPMENT CLASS PROPERTY	A characteristic, or property, that an equipment class has.						CFIHOS 00000017
Equipment class name	The full name of the equipment class		Example : RA globe valve	Identifier	Text, max 100 characters	LEAF NODE EQUIPMENT CLASS	CFIHOS 10000047
Property name	A name that uniquely identifies the property		Example : normal operating pressure	Identifier	Text, max 30 characters	PROPERTY	CFIHOS 10000056
Property relevant for equipment indicator	An indicator whether the property should be provided for a given equipment	It is important to distinguish the properties that should be provided by the EPC for an equipment, but e.g. not for a model. For instance, the color of a car is relevant for a given "instance" of a car, but not for the model.	Example : Yes	Mandatory	Boolean (Yes/No)		CFIHOS 10000246
Property relevant for model / part indicator	An indication whether the property must by provided by the EPC (or the manufacturer) for a given model.	Some properties should be reported for the models / parts associated with an equipment class, some for the equipment associated with the equipment class. Those are two separate pieces of data.	Example : Yes	Mandatory	Boolean (Yes/No)		CFIHOS 10000247
Source standard code	A code used to designate the standard used to define requirements like engineering, operations, etc.		Example : ISO 13533	Optional	Text, max 40 characters	SOURCE STANDARD	CFIHOS 10000053
Source standard section	The section of the source standard in which the property is documented		Example : Data Sheet section	Optional	Text, max 40 characters		CFIHOS 10000244
Property name in source standard	The name of the property in the source standard document		Example : Operating pressure, normal	Optional	Text, max 100 characters		CFIHOS 10000245
SI unit of measure code	The symbol that usually used to represent the unit of measure		Example : s	Optional	Text, max 3 characters	UNIT OF MEASURE	CFIHOS 10000173
Imperial unit of measure code	The symbol that usually used to represent the unit of measure		Example : s	Optional	Text, max 3 characters	UNIT OF MEASURE	CFIHOS 10000174

Figure 8: Equipment class property metadata

Name	Definition	Note / comment	Example	Identifier / Mandatory / Optional	Format	"Constraint : Must be present in"	CFIHOS unique id
MODEL PART PROPERTY	A characteristic, or property, than an equipment model has.						CFIHOS 00000014
Manufacturer company name	A name used to uniquely identify the company who manufactures the model / part		Example : Flowserve	Identifier	Text, max 30 characters	MODEL PART	CFIHOS 10000158
Model part name	A unique name to identify the model part of the manufacturer.		Example : A4 V726 PN 40	Identifier	Text, max 100 characters	MODEL PART	CFIHOS 10000159
Property name	A name that uniquely identifies the property		Example : normal operating pressure	Identifier	Text, max 30 characters	PROPERTY	CFIHOS 10000056
Model part property value	The value of the property for that model part.	The value of the property should be qualified by a unit of measure if it is numeric. If it is not numeric, and that the property is associated with a pick list, then the value of the property should be one of the valid pick list values.	Example : 220	Mandatory	Text, max 100 characters		CFIHOS 10000249
Unit of measure code	A code that uniquely identifies the unit of measure		Example : SEC	Optional	Text, max 3 characters	UNIT OF MEASURE	CFIHOS 10000237
Reason for deviating from standard unit of measure	The reason why the unit of measure as prescribed by the source standard as not been used to report the model part property value		Example : Size of the value	Optional	Text, max 255 characters		CFIHOS 10000242

Figure 9: Model Part class property metadata

Annex 1- Tagging Criteria

The table below provides a high-level comparison of typical Owner Operator's Tagging Requirements.

	BP	Chevron	Shell	TotalEnergies
Operations	to identify specific equipment for isolation purposes (electrical and process) in relation to operational procedures.	requires identification in one or more operational procedures. Subject to isolation procedures such as permit to work (PTW) (e.g., electrical equipment, manual valves, and piping specialty items).	to identify specific equipment for isolation purposes (electrical, process and utilities) in relation to operational procedures.	Tags shall be allocated to Asset objects up to a certain level of the Asset decomposition, allowing to manage efficiently & in a practical way Company activities and associated technical information. Tags can be allocated to single objects or group of objects, subject to site construction/installation, pre/commissioning, operations, inspection and/or maintenance. • All Safety Critical Elements shall be tagged. • Any other item or object installed permanently at a worksite, which is handled during one or several of above activities shall be allocated a dedicated tag by Contractor. • Temporary items or objects supporting some of above activities may also be tagged for close follow up of their status over time
Maintenance	the need to perform maintenance activities on an equipment item, that will require scheduling of maintenance and/or equipment history recording at that level of detail.	subject to inspection, maintenance, or history. Includes pipe supports with maintainable components (e.g., springs, dampers, and polytetrafluoroethylene [PTFE] guides).	the need to handle or perform maintenance activities on an equipment item or line that will require scheduling of maintenance, inspection and/or equipment history recording at that level of detail.	
Certification	pressure regulation, mechanical handling safe working load, etc. requirements for specific equipment. All EX certified electrical equipment within sub-contractor and/or supplier packages or modules must be allocated a project tag number except for IS barriers and cable glands.	are EX-rated, used in a hazardous area, or used for mechanical handling). Subject to compliance or regulations.	pressure regulation, hazardous area rated, mechanical handling safe working load, etc. requirements for specific equipment.	
Safety	equipment which performs a safety function, e.g. pressure relief valves and over-pressure protection devices.	Related to safety, including both process safety and life support	'Equipment items' that perform a safety function, e.g. pressure relief valves, over-pressure protection devices, safety instrumented systems and fire-fighting devices.	
Commissioning	The need to perform detailed functional checks and system start-up activities.			

	BP	Chevron	Shell	TotalEnergies
Engineering		Connected to permanent cables. Includes inline piping equipment, devices, and components (e.g., manual valves and piping specialty items).		
Spares			'Equipment items' that require tag numbers to allow Bills of Materials to be related to them.	
Technical Documentation			Technical documents require references to Tags to be collected to facilitate finding key information in the Operate Phase	

Annex 2- Tag (Functional) Vs Equipment (Physical) Classification

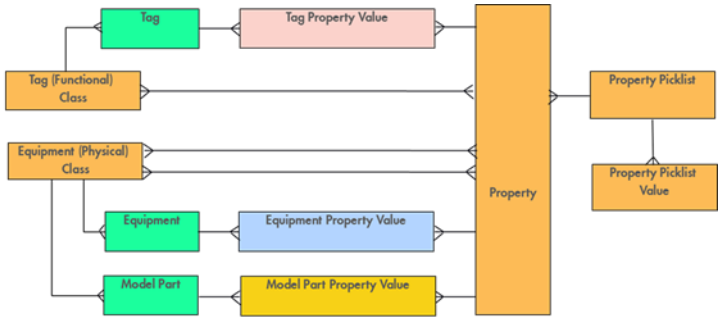
PROJECT REQUIREMENTS

During a Project the design of the asset is progressively decomposed into functional items until a sufficient level of granularity is achieved to enable procurement of equipment. These lowest level functions are allocated a unique identification number per plant, known as a Tag.

Different functions have different requirements, for an example a pump and a motor will be represented with different symbols, have different tag formats and have different data and document requirements to progress the design and subsequent execution of the project. To allow these differences to be managed the Tags are classified.

The classification of the Tag may become more explicit as the Project progresses, so in FEED it may be known that a pump function is required but only when further specification of the requirements are defined in EXECUTE will it become clear that a centrifugal pump is most suitable for the required function. This will result in a functional specification defining the design and operating conditions that can be used to determine the physical items that most effectively meet the functional requirement for procurement.

Example SI data sheet from ISO 13706 Air Cooled Heat Exchanger is shown below with Tag (functional), Equipment and Model Part (physical) properties highlighted.



Note: the highlighted colours match the colours in the data model diagram.

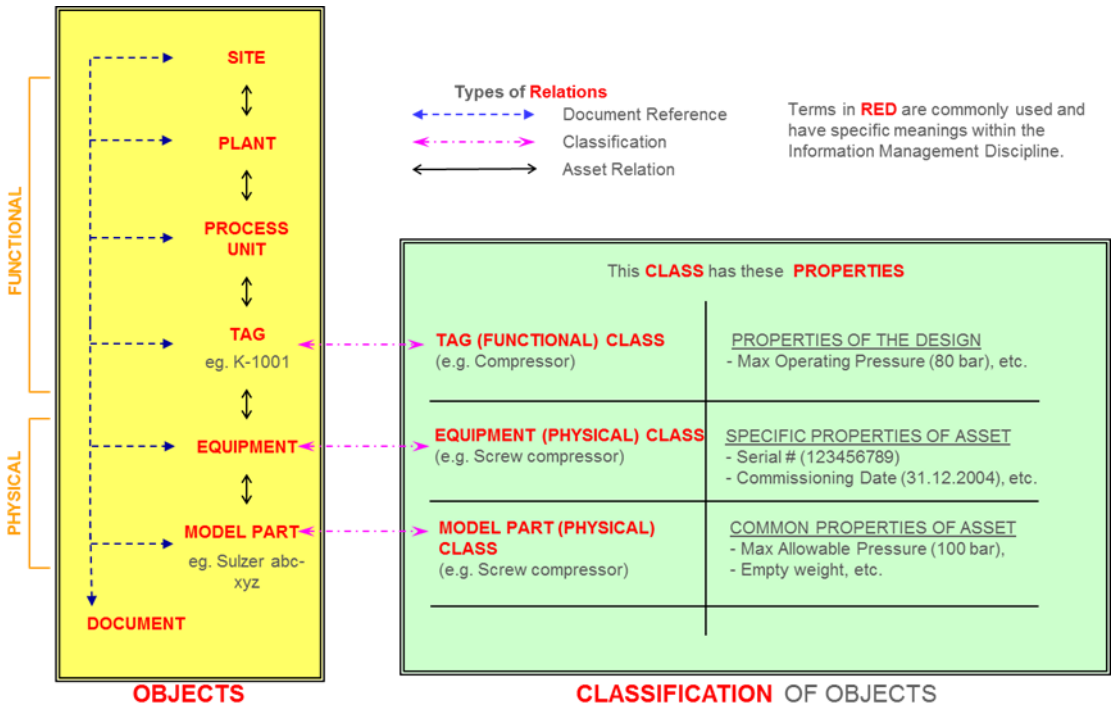
AIR-COOLED HEAT EXCHANGER DATA SHEET (SI UNITS)

Job No.		Item No.	
Page	1 of 2	By	
Date		Revision	
Proposal No.		Contract No.	
Inquiry No.		Order No.	

Manufacturer		Heat exchanged, kW	
Model No.		Surface/item-finned tube, m^2	
Customer		Bare tube, m^2	
Plant location		MTD, eff., °C	
Service		Transfer rate-finned, $W/m^2 \cdot K$	
Type draught	○ Induced ○ Forced	Bare tube, service, $W/m^2 \cdot K$	
Bay size (W × L), m	No. of bay/items	Clean, W/m^2	

Basic design data

Pressure design code			Structural code		
Tube bundle code stamped	○ Yes	○ No	Flammable service	○ Yes	○ No
Heating coil code stamped	○ Yes	○ No	Lethal/toxic service	○ Yes	○ No

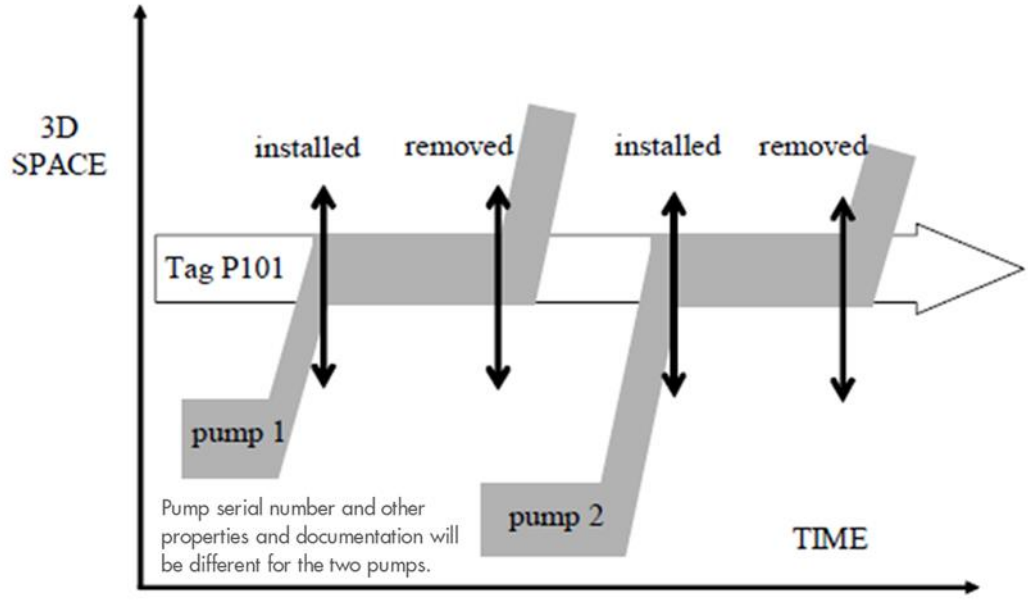


Vendors will offer either a custom designed item or a standard model part that can meet or exceed the functional requirements. This allows the selection of the physical equipment that will be procured to be installed to satisfy the function. These physical items typically have a serial number to uniquely identify them and can be classified with an equipment (Physical) class based on the technology used to satisfy the requirements (a pneumatic motor will have different properties to an electrical motor for example). To complicate matters the data sheets for these different items often mix tag and equipment properties in the same document.

OPERATIONAL REQUIREMENTS

Once the plant is handed over to Operations, the main focus is to ensure that the asset continues to function as designed. Different functions will require different activities to be performed to achieve this based on the likely failure modes. Maintenance and Inspection activities are defined in the Maintenance System and typically scheduled at the functional level with costs and history subsequently recorded.

For some functions, for example pressure vessels, it is difficult to distinguish between the functional and physical. Other functions being able to be replaced, for example a relief valve could be removed and another equivalent relief installed to provide the same function. With this example of a relief valve it is important to ensure that the certification of the specific valve installed is known to ensure it is configured correctly. ISO 15926-2 contains an equivalent example for a pump.



The Tag (function) would only change if there was a plant change to change the functional requirement.

To put very simplistically a Tag is description of the function required, while the equipment is something that can be touched and is installed to satisfy the function.