
Heiner Temmen, DEXPI, Germany, Evonik 1989 – 2020

temmen.rhede@online.de
Common view on the plant lifecycle in the Process Industry

Need of classification standards instead of coding standards

Alignment between different standards: ISO, IEC, ...
Plant lifecycle view in the Process Industry
ISO 15926 Lifecycle stages network model with pump example

O/O Process with activities & streams

O/O or EPC Plant with functional & physical objects

O/O Assets as physical objects & actual individuals

PUMPING as a process step

PUMP and CENTRIFUGAL PUMP as a plant object

A CENTRIFUGAL PUMP as an installed object

CENTRIFUGAL PUMPs, which can be bought

https://15926.org/topics/plant-lifecycle-model/index.htm

2023-06-15
DEXPI lifecycle model – 3 structures, 4 aspects

Functional Requirements

Functional Design

Asset Specification

Asset in Operation

Process Structure

Plant Structure

Asset Structure

2023-06-15
Lifecycle in CFIHOS data model 1.5

- Tags, Equipments, Model parts
- Process was added

2023-06-15
Functional location

Definition
The business object functional location is an organizational unit within Logistics, that structures the maintenance objects of a company according to functional, process-related or spatial criteria. A functional location represents the place at which a maintenance task is to be performed.

Example of a Function Location: Clarification Plant

Equipment

Definition
The business object "Equipment" is an individual, physical object that is to be maintained independently. It can be installed in a technical system or part of a technical system. You can manage all types of devices as pieces of equipment (for example, production utilities, transportation utilities, test equipment, production resources/tools, buildings, PCs). Since many of these physical objects are managed as "assets" in Asset Management, the term "piece of equipment" was chosen for objects defined from a technical perspective, in order to avoid confusion with the activated tangible assets.

You define and manage each piece of equipment in the Plant Maintenance (PM) System in a separate master record and can set up an individual maintenance history for each one.
ISO / IEC 81346 – lifecycle approach

Major aspects
- function
- product
- location
ISO 15926 part 11 - Simplified industrial usage of reference data based on RDFS methodology

Figure 5 – Fundamental lifecycle quadrants supporting Systems Engineering
Using AAS DEXPI-Plant Model to manage detail engineering and procurement process

Figure C.4 – Data exchange throughout the life-cycle of a device

From IEC 61987 part 10
Location structure via BIM - IFC

- Enterprise
- Site
- Building
- Storey
- Room
- ...
- x, y, z coordinates
A common view!? 

- **O/O Process** with activities & streams 
- **O/O or EPC Plant** with functional & physical objects 
- **O/O Asset** as physical object & actual individual 
- **Vendor Product** as physical object & actual individual 

**Location** of functional & physical & actual individual objects
Conclusion: Plant lifecycle view in the Process Industry

Many standards fit together:
- ISO 15926 Lifecycle Model
- CFIHOS
- DEXPI
- SAP/PM
- ...

ISO 15926 part 11 fits nearly with the standards above

ISO / IEC 81346 has only two aspects (function and product) for 4 structures and is not aligned with the standards above
Classification and coding - 2 examples
Classification instead of coding: example 1: ISO 14224

**EQUIPMENT BOUNDARY & HIERARCHY**

Important boundary and maintainable item concepts
### Taxonomy Classification: Compressor

<table>
<thead>
<tr>
<th>Equipment class</th>
<th>Type</th>
<th>Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
<td>Code</td>
<td>Description</td>
</tr>
<tr>
<td>Compressor</td>
<td>CQ</td>
<td>Centrifugal</td>
</tr>
<tr>
<td>Reciprocating</td>
<td>RE</td>
<td>Gas processing</td>
</tr>
<tr>
<td>Screw</td>
<td>SC</td>
<td>Gas export</td>
</tr>
<tr>
<td>Blowers/fans</td>
<td>BL</td>
<td>Gas injection</td>
</tr>
<tr>
<td>Axial</td>
<td>AX</td>
<td>Lift gas compression</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Compressed air</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Refrigeration</td>
</tr>
</tbody>
</table>

**Classification:**

- Compressor
- Centrifugal
- Reciprocating
- Screw
- Blowers/fans
- Axial

**Coding / Naming:**

- CQ
- RE
- SC
- BL
- AX
- GP
- GE
- GI
- GL
- RE
Classification and coding: example 2: ISO / IEC 81346


Contents [edit]
- Part 1: Basic rules (IEC 81346-1:2022) [3]
- Part 2: Classification of objects and codes for classes (IEC 81346-2:2019) [4][5]
Classification and coding: example 2: ISO / IEC 81346

IEC 81346-2:2019
Industrial systems, installations and equipment and industrial products — Structuring principles and reference designations — Part 2: Classification of objects and codes for classes

Abstract
IEC 81346-2:2019 establishes classification schemes with defined object classes and their associated letter codes, and is primarily intended for use in reference designations and for designation of generic types. The classification schemes are applicable for objects in all technical disciplines and all branches of industry. IEC 81346-2:2019 is a horizontal publication also intended for for use by technical committees in preparation of publications related to reference designations in accordance with the principles laid down in IEC Guide 108. IEC 81346-2:2019 cancels and replaces the first edition published in 2009. This edition constitutes a technical revision. This edition includes the following significant technical changes with respect to the previous edition: a) The entry classes of the classification scheme have been defined to reflect the "inherent function" of the object classified; b) The classes are defined to align with the principles of ISO 22274 and ISO 704; c) A three-level classification scheme has been defined, which provides a greater flexibility for the designer in some technical fields; d) Classes are defined by their definition and provided with a preferred term. Examples are provided if needed; e) A separate classification scheme for spaces has been provided.

Coding / Naming
Classification
Classification and coding

ISO 15926 part 4
- Classification

ISO / IEC 81346
- Classification
- Coding
- Concepts

ISO 14224
- Classification
- Coding
- Concepts

not aligned
Coding standards

+

➢ Every plant needs a coding standard
➢ Every company should have one for new plants
➢ A coding standards supports the engineers

-

➢ Many companies have plants with different coding standards
➢ It is a big challenge to implement and maintain coding standards in software
➢ Coding standards are often language dependant
➢ There are many incompatible coding standards

➢ Aligned classification standards are the future
Alignment between different standards: ISO, IEC, ... - 3 examples
SKOS mapping results between IEC 61987 and ISO 15926 (result of a project in 2022)

- exactMatch 16%
- closeMatch 36%
- narrowMatch 11%
- broadMatch 27%
- relatedMatch
- without mapping

Not good enough for daily work
Alignment between ISO / IEC 81346 and ISO 14224

ISO / IEC 81346
➢ Classification
➢ Coding
➢ Concepts

ISO 14224
➢ Classification
➢ Coding
➢ Concepts

not aligned

not aligned
Alignment between ISO 15926 part 11 and IDO ISO ????

IDO:

**installedAs**
relation between a specification individual and concrete installed individuals

**realizedIn**
..., we characterise a disposition (resp., capability; function) of an object by the kinds of activities that count as its realisations. For example, the function of a pump is realised when it participates in a pumping activity, providing pressure increase within the intended range.

Part 11:

They should fit together
Conclusion

To enable digitalization and interoperability the Process Industry needs aligned and global standards

Several standards have to be revised (or partly withdrawn) to get on a higher level, e.g. to leave the coding level and support a global classification level