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Industrial automation systems and integration — Integration of life-cycle data for process plants including oil and gas production facilities —

Part 6: Rules for the development and validation of reference data of ISO/TS 15926-4

Systèmes d'automatisation industrielle et intégration — Intégration de données de cycle de vie pour les industries de "process", y compris les usines de production de pétrole et de gaz —

Partie 6: Règles relatives à l'élaboration et à la validation des données de référence de l'ISO/TS 15926-4

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 184, *Automation systems and integration*, Subcommittee SC 4, *Industrial data*.

This first edition cancels and replaces the first edition of ISO/TS 15926-6:2013, which has been technically revised.

The main changes are:

- update of the normative references;
- deletion of Clause 8 on the administration of a reference data library;
- deletion of rules for external reference data libraries;
- grouping of all rules under one clause with the subclause numbers in the order of the attributes to improve readability;
- improvement of the separation between the factual rule for an attribute and the options that would exist to choose from;
- improvement of Clause 4 for providing the general principles of the attributes to navigate the user;
- deletion of pieces of text that would be more appropriate in a separate knowledge document.

A list of all parts in the ISO 15926 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

The ISO 15926 series provides a representation process of industry facility life-cycle information. This representation is specified by a generic, conceptual data model that is suitable as the basis for implementation in a shared database or data warehouse. The data model is designed to be used in conjunction with reference data, i.e. standard instances that represent information common to a number of users, production facilities, or both.

Most reference data are in ISO/TS 15926-4. This document specifies the rules that are required for the development and validation of reference data items of ISO/TS 15926-4. This document also contains examples of reference data items.

Some reference data are in ISO/TS 15926-11, ISO/TS 15926-12, or ISO 15926-13. The support for a specific life-cycle activity depends on the use of appropriate reference data in conjunction with the data model.

NOTE A reference data library used with the ISO 15926 series can be standardized or proprietary. A reference data library which is initially proprietary can subsequently be submitted for standardization. Classes contained within a reference data library can be more or less generic. Generic core classes and commodity classes are likely to be standardized, but specific manufactured product classes are unlikely to be standardized.

Industrial automation systems and integration — Integration of life-cycle data for process plants including oil and gas production facilities —

Part 6: Rules for the development and validation of reference data of ISO/TS 15926-4

1 Scope

This document specifies technical requirements for the structure and content of a reference data library for ISO/TS 15926-4.

NOTE This document can also be applied to reference data libraries other than ISO/TS 15926-4.

The following are within the scope of this document:

— identification of a reference data item as specified in ISO/TS 15926-4;

— information that defines a reference data item;

— the way identifying and defining information is recorded using ISO 15926-2;

— the reference data library that contains the reference data items necessary to record identification and defining information;

— the representation of the reference data library that is defined by this document as a spreadsheet.

The following are outside the scope of this document:

— administrative information about the source, the history of changes, and the current status of a reference data item and a reference data library;

— the way administrative information is recorded using ISO 15926-2;

— the reference data library that contains the reference data items necessary to record administrative information;

— defining the scope of reference data libraries within the ISO 15926 series;

— methods and guidelines for implementing ISO 15926-2;

— procedures for maintaining reference data libraries;

— requirements for the representation of a proprietary reference data library.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes the requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 15926-2, *Industrial automation systems and integration — Integration of life-cycle data for process plants including oil and gas production facilities — Part 2: Data model*

ISO 80000-1:2022, *Quantities and units — Part 1: General*

3 Terms, definitions, symbols and abbreviated terms

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

3.1 Terms and definitions

3.1.1
administrative information
information (3.1.5) about the administration of an item in a *reference data library* (3.1.17)

EXAMPLE Creation date, last change date, origin, change description, explanatory comment.

[SOURCE: ISO/IEC 11179-3:2023, 3.2.67, modified — The domain has been removed and "registry" has been replaced by "reference data library".]

3.1.2
attribute
data (3.1.4) element for the computer-sensible description of a *property* (3.1.10), a relation or a *class* (3.1.3)

Note 1 to entry: An attribute describes only one detail of a property, class, or relation.

EXAMPLE The name of a property, the code of a class, the measure unit in which values of a property are provided.

[SOURCE: ISO 13584-42:2010, 3.3]

3.1.3
class
category or division of *things* (3.1.22) based on one or more criteria for inclusion and exclusion

Note 1 to entry: A class need not have any members (things that satisfy its criteria for membership).

Note 2 to entry: Because a spatio-temporal paradigm is used to define individuals in this document, all classes are non-well-founded sets. These are explained in ISO 15926-2:2003, D.2.4.

[SOURCE: ISO 15926-1:2004, 3.1.1]

3.1.4
data
representation of *information* (3.1.5) in a formal manner suitable for communication, interpretation, or processing by human beings or computers

[SOURCE: ISO 10303-2:2024, 3.1.207]

3.1.5
information
facts, concepts, or instructions

[SOURCE: ISO 10303-2:2024, 3.1.227]

3.1.6
instance
data (3.1.4) that represents, in computer-processable form, some real-world *thing* (3.1.22)

[SOURCE: ISO 15926-1:2004, 3.1.13]

3.1.7
maintenance organization
organizational unit that is responsible for the maintenance of the *reference data library* (3.1.17)

Note 1 to entry: Procedure for the maintenance of ISO/TC 184/SC 4 *reference data* (3.1.11) is described in ISO/TC 184/SC4 N2591[12].

Note 2 to entry: The maintenance organization in this document represents the combination of the ISO/TC 184/SC 4 secretariat, the ISO/TC 184/SC 4/WG 3 and the ISO/TC 184/SC 4/WG 22 together carrying out the task of maintenance of ISO/TS 15926-4 reference data library published as a database using the procedure. The maintenance team (MT) is defined by the ISO/TC 184/SC 4/WG 3 and the validation team (VT) is defined by the ISO/TC 184/SC 4/WG 22.

3.1.8
possible individual
thing (3.1.22) that exists in space and time

Note 1 to entry: This definition is taken from ISO 15926-2, in which "possible_individual" is an entity but not a defined term.

3.1.9
power class
set of all *subclasses* (3.1.21) of a *class* (3.1.3), including the class itself and the empty set

Note 1 to entry: A subclass of a power class selects subclasses that satisfy a specific context. A restricted set of subclasses can be a "facet" or "aspect".

3.1.10
property
aspect or quality of something that can be determined by measurement or observation

Note 1 to entry: The term "property" is used in ISO 15926-2.

3.1.11
reference data
process plant life-cycle *data* (3.1.4) that represents *information* (3.1.5) about *classes* (3.1.3) or individuals which are common to many process plants or of interest to many users

[SOURCE: ISO 15926-1:2004, 3.1.18]

3.1.12
reference data item
thing (3.1.22) that is defined within a *reference data library* (3.1.17)

3.1.13
reference data item definition by text
text, and optionally equations and figures that are intended to be understood by a human, and that is the normative definition of a *reference data item* (3.1.12)

3.1.14
reference data item definition by document reference
normative reference to a document that provides the normative definition of a *reference data item* (3.1.12)

3.1.15
reference data item non-human-interpretable identifier
text that is a unique identifier for a *reference data item* (3.1.12) and that is not intended to be interpreted by a human

Note 1 to entry: The use of a reference data item non-human-interpretable identifier is defined in 5.2.

3.1.16
reference data item human-interpretable identifier
text that is a unique identifier for a *reference data item* (3.1.12) and that is intended to be interpreted by a human

Note 1 to entry: The use of a reference data item human-interpretable identifier is defined in 5.3.

Note 2 to entry: If a reference data item is a *class* (3.1.3), then its reference data item human-interpretable identifier can be a term.

Note 3 to entry: The reference data item human-interpretable identifier is used for all references to a reference data item in natural language text definitions.

Note 4 to entry: Names in natural language and terms in dictionaries are often unique only within a context. A reference data item can be used in many contexts. Hence, a reference data item human-interpretable identifier can be longer than a name in a natural language and contain words that qualify a natural language name to ensure that it is unique.

Note 5 to entry: A *reference data library* (3.1.17) can contain additional terms for a reference data item which are not unique and which are used within particular contexts.

3.1.17
reference data library
RDI
managed collection of *reference data* (3.1.11)

[SOURCE: ISO 15926-1:2004, 3.1.19]

3.1.18
reference data library module
collection of *reference data items* (3.1.12) within a *reference data library* (3.1.17) that shares the same subject area

EXAMPLE Electrical is a reference data library module, represented by a specific spreadsheet, which contains reference data library items (classes) that are of direct interest to the electrical engineering discipline, which in this case is the subject area. In the context of ISO 15926-2, the reference data library module is a *class* (3.1.3) of class with as members all classes contained by the corresponding spreadsheet.

[SOURCE: ISO/TS 15926-4:2024, 3.1.14]

3.1.19
relationship
connection among model elements

Note 1 to entry: In this document, a relationship is one of: an association, a generalization or a specialization.

[SOURCE: ISO/IEC 11179-3:2023, 3.1.4, modified — The domain has been deleted.]

3.1.20
superclass
class (3.1.3) that is a generalization of one or more other classes

Note 1 to entry: The classes being generalized are known as *subclasses* (3.1.21).

Note 2 to entry: A particular class can be a superclass with respect to one *relationship* (3.1.19) and simultaneously a subclass with respect to another relationship.

[SOURCE: ISO/IEC 11179-3:2023, 3.1.9, modified — The domain and note 2 to entry have been deleted.]

3.1.21
subclass
class (3.1.3) that is a specialization of another class

Note 1 to entry: The class being specialized is known as a *superclass* (3.1.20).

Note 2 to entry: A particular class can be a subclass with respect to one *relationship* (3.1.19) and simultaneously a superclass with respect to another relationship.

[SOURCE: ISO/IEC 11179-3:2023, 3.1.10, modified — The domain and note 2 to entry have been deleted.]

3.1.22
thing
anything that is, or can be thought about, or perceived

Note 1 to entry: This definition is taken from ISO 15926-2, in which thing is an entity but not a defined term, including material and non-material objects, ideas, and actions.

3.1.23
upper camel-case notation
naming convention in which compound words are joined together without spaces, and the first letter of every word is uppercase

[SOURCE: ISO/IEC 39794-5:2019, 3.56]

3.2 Symbols

Symbols used in this document are given in Table 1.

Table 1 — Symbols for set theory operations

Symbol	Usage	Meaning of usage
∪	A∪B	union of sets A and B
∩	A∩B	intersection of sets A and B
¬	¬A	complement of set A
*	A*	power set of set A

3.3 Abbreviated terms

CR Change Request

MT Maintenance Team

OED Oxford English Dictionary

OWL Web Ontology Language

RDL Reference Data Library

UML Unified Modelling Language

UoM Units of Measure

URN Uniform Resource Name

URI Uniform Resource Identifier

VT Validation Team

4 General principles for the content of a reference data library (RDL)

4.1 Structure of the rules for attributes in this document

This document has been structured such that the rules for the attributes are listed in the subclauses of Clause 5. The number of the subclause corresponds to the number of the attribute. The numbering of attributes corresponds to the "Attribute numbers" given in Annex A, where all attributes are listed with the proper reference to the rule's subclauses. Each reference data item shall be defined by assigning values to

the mandatory attributes defined by Table A.1. An explanation of each attribute name is given in Table A.1, together with examples of the attribute.

NOTE Detailed requirements for using attributes are specified in 4.4.3 and subclauses corresponding to each attribute.

Attributes for defining reference data items are categorized into three groups. Those are described in 4.5, 4.6, and 4.7.

4.2 Naming convention for attributes

Attribute names for a reference data item shall be denoted in the upper camel-case notation.

4.3 Presentation convention

For ease of identification, ISO 15926-2 entities, their subclasses and human-interpretable identifiers are formatted using bold font in this document.

EXAMPLE Usage of bold font for ISO 15926-2 entities and their subclasses in the explanations:

In a representation of a reference data library in accordance with ISO 15926-2, a human-interpretable identifier is represented by an instance of **reference_data_item_human-interpretable_identification** (subclass of ISO 15926 entity **class_of_identification**).

4.4 Defining a reference data library

4.4.1 Definition and content of a reference data library

This subclause includes the rules for the reference data library as a whole:

— a reference data library;

— minimum information about a reference data item;

— attribute.

4.4.2 Reference data library and reference data item

A reference data library is a collection of reference data items.

A reference data item is a class corresponding to a typical **thing** that appears in industry data, which can be repeatedly used in engineering documents or various data in information systems in that life cycle. A reference data item is specified with several reference data, and the ISO/TS 15926-4 reference data library is characterized by 25 reference data.

One of the mandatory reference data is an identifier defined in 5.2, and another optional reference data is notes defined in 5.8.

NOTE A reference data item is usually a class but can be a member of **possible_individual**.

EXAMPLE A "**pump**" is a typical physical **thing** in the engineering phase, and "**maintenance**" is also a typical abstract **thing** in the O&M phase.

4.4.3 Minimum information about a reference data item

A reference data item shall be characterised by minimum information which corresponds to specific attributes as follows:

— a URI for the reference data item;

— a unique non-human-interpretable identifier for the reference data item;