INTERNATIONAL STANDARD

ISO 15926-1

First edition
2004-07-15

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

Part 1: Overview and fundamental principles

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 1: Vue d'ensemble et principes fondamentaux

Reference number
ISO 15926-1:2004(E)

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Published in Switzerland

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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75% of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 15926-1 was prepared by Technical Committee ISO/TC184, *Industrial automation systems and integration*, Subcommittee SC4, *Industrial data*.

ISO 15926 consists of the following parts, under the general title *Industrial automation systems and integration — Integration of life-cycle data for process plants including oil and gas production facilities*:

— *Part 1: Overview and fundamental principles*

— *Part 2: Data model*

0 Introduction

0.1 Background

Information concerning the engineering, construction and operation of process plants is created, used and modified by many different organizations throughout a plant's life. Economic, safety and environmental considerations demand that this information is available to owners and operators of facilities, contractors, and regulatory bodies in a consistent, integrated form. This requirement can be satisfied by specifications that prescribe the structure and meaning of data that is shared by organizations and disciplines involved in all stages of a plant's life-cycle.

The need to increase the cost efficiency of process plants is leading to business practices that depend on the efficient integration and sharing of plant information in a computer processable form. These business practices include the following.

— Many users' needs now span more than one of the traditional information views. Safety and environment are two examples of this.

— Concurrent engineering requires design work to progress in parallel, with the state of the design being available electronically, in computer processable form, to other engineering, planning, purchasing and logistical activities.

— Significant cost savings are expected from standardization of component specifications. The information about these specifications is required in computer processable form for easy incorporation into plant designs and requirements.

— In the past, hand-over of plant design information was often restricted to design drawings and paper documents. Use of this information in managing the operation and modification of the plant was restricted to manual processes, or the information had to be redefined in a format suitable to the required application. Having the plant design and equipment information in computer processable form increases the efficiency and effectiveness of the operational phase of the plant.

— Accurate computer processable information about a plant's performance throughout its lifetime is of high value, for optimising future modifications to the plant and for designing new plants on the basis of experience with existing plants.

By using a consistent context for data definitions, the information used in the various aspects of the plant's life-cycle can be brought together. This allows information to be integrated, shared and exchanged in a consistent, computer processable form.

0.2 Purpose of ISO 15926

The purpose of this International Standard is to facilitate integration of data to support the life-cycle activities and processes of process plants. To do this, this International Standard specifies a data model that defines the meaning of the life-cycle information in a single context supporting all the views that process engineers, equipment engineers, operators, maintenance engineers and other specialists may have of the plant.

Traditionally, data associated with a process plant have been concentrated on some individual view of the plant at a point in time. Such data are usually defined and maintained independently of other groups of users, resulting in duplicated and conflicting data that cannot be shared either within an enterprise or with business partners of an enterprise.

0.3 Description of ISO 15926

ISO 15926 is an International Standard for the representation of process plant 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, process plants, or both. The support for a specific life-cycle activity depends on the use of appropriate reference data in conjunction with the data model.

ISO 15926 is organized as a series of parts, each published separately. This part of ISO 15926 provides an overview. It specifies the contents and functions of the different parts of ISO 15926 and the relationships between them, and describes:

— an overview of ISO 15926;

— the fundamental principles that are the basis of ISO 15926;

— the relationship of ISO 15926 to other industrial data standards;

— definitions of terms used throughout ISO 15926.

0.4 Typographical conventions

The following typographical conventions are used in this International Standard.

A numbered reference enclosed in brackets (for example, "[2]") is a reference to a document that is listed in the Bibliography.

In this International Standard the same English language words may be used to refer to an object in the real world or to a concept, and as the name of an EXPRESS data type that represents this object or concept. The following typographical convention is used to distinguish between these. If a word or phrase occurs in the same typeface as narrative text, the referent is the object or concept. If the word or phrase occurs in a bold typeface, the referent is the EXPRESS data type. Names of EXPRESS schemas also occur in a bold typeface.

The name of an EXPRESS data type may be used to refer to the data type itself, or to an instance of the data type. The distinction between these uses is normally clear from the context. If there is a likelihood of ambiguity, the phrase "entity data type" or "instance(s) of" is included in the text.

Double quotation marks " " denote quoted text. Single quotation marks ' ' denote particular text string values.

Some components of this International Standard are available in electronic form. This access is provided through the specification of Universal Resource Locators (URLs) that identify the location of these files on the Internet. If there is difficulty accessing these files contact the ISO Central Secretariat, or contact the ISO TC 184/SC4 Secretariat directly at: sc4sec@tc184-sc4.org.

0.5 Target audiences

The target audiences for this part of ISO 15926 are as follows:

— technical managers wishing to determine whether ISO 15926 is appropriate for their business needs;

— implementers wishing to obtain an overview of the contents of ISO 15926.

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

Part 1: Overview and fundamental principles

1 Scope

This International Standard specifies a representation of information associated with engineering, construction and operation of process plants. This representation supports:

— the information requirements of the process industries in all phases of a plant's life-cycle;

NOTE 1 The process industries include those involved in oil and gas production, refining, power generation, and manufacturing of chemicals, pharmaceuticals, and food.

— sharing and integration of information amongst all parties involved in the plant's life-cycle.

The following are within the scope of ISO 15926:

— a generic, conceptual data model that supports representation of all life-cycle aspects of a process plant;

— reference data that represents information common to many process plants and users;

— scope and information requirements for additional reference data;

— methods for the analysis of requirements and development of reference data;

— procedures for registration and maintenance of reference data;

— templates for the exchange of data used in a particular context and their mapping to the conceptual data model;

— methods for the development of such templates and their mapping to the conceptual data model;

— conformance to the requirements of this International Standard.

The scope of business activities that are supported by this International Standard is illustrated in Figure 1, which shows the main activities and data flows associated with the life-cycle of a plant.

NOTE 2 Figure 1 is based on the Process Plant Engineering Activity Model [6].

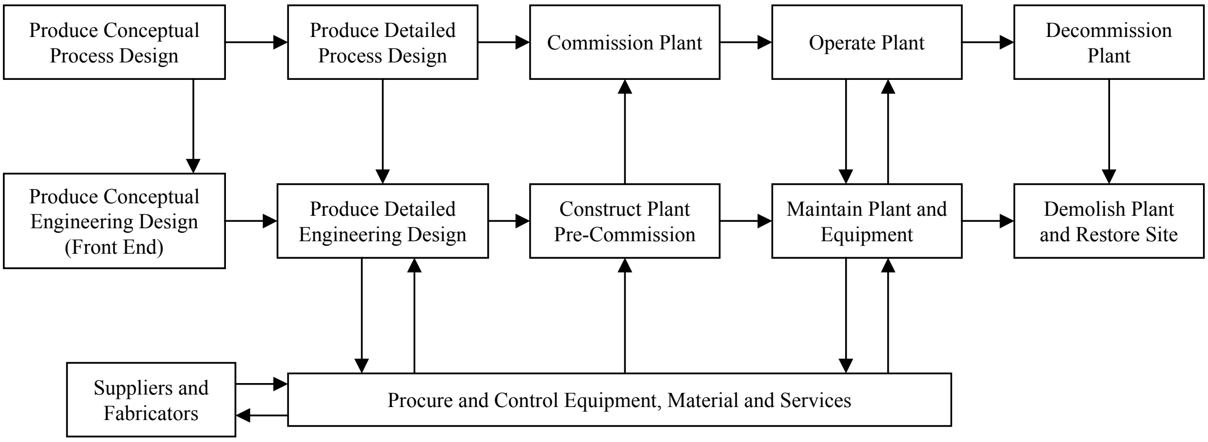

Figure 1 – Activity model of the process plant life-cycle

NOTE 3 The support for a specific life-cycle activity depends on the use of appropriate reference data in conjunction with the data model defined in ISO 15926-2.

EXAMPLE A reference data library covering technical data about process systems, electrical systems and instrumentation systems can support design, engineering and maintenance activities for these systems within a process plant.

The following are outside the scope of ISO 15926:

— commercial, business, and administrative data that are not directly related to the engineering, operation and maintenance of process plants.

This International Standard is applicable to implementation of databases or data warehouses that enable integration and sharing of data amongst different participants in the life-cycle of a process plant. The generic data model specified in ISO 15926-2 provides a suitable conceptual data model for such a database or data warehouse.

NOTE 4 See 5.2 for further information concerning the nature of conceptual data models.

This part of ISO 15926 provides an overview of this International Standard. The scopes of the other parts of ISO 15926 are defined within those parts.

2 Normative references

The following referenced documents are indispensable for the application 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/IEC 8824-1:1995, *Information technology — Open systems interconnection — Abstract syntax notation one (ASN.1) — Part 1: Specification of basic notation*.

ISO 10303-1:1994, *Industrial automation systems and integration — Product data representation and exchange — Part 1: Overview and fundamental principles*.

ISO 10303-11:1994, *Industrial automation systems and integration — Product data representation and exchange — Part 11: The EXPRESS language reference manual*.

ISO 10303-21:1994, *Industrial automation systems and integration — Product data representation and exchange — Part 21: Implementation methods: Clear text encoding of the exchange structure*.

ISO 10303-22:1998, *Industrial automation systems and integration — Product data representation and exchange — Part 22: Implementation methods: Standard data access interface*.

ISO/TS 10303-28:2003, *Industrial automation systems and integration — Product data representation and exchange — Part 28: Implementation methods: XML representations of EXPRESS schemas and data*.

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 13584-1:2001, *Industrial automation systems and integration — Parts library — Part 1: Overview and fundamental principles.*

ISO/TS 18876-1, *Industrial automation systems and integration — Integration of industrial data for exchange, access, and sharing — Part 1: Architecture overview and description*.

ISO/TR 9007:1987, *Information processing systems — Concepts and terminology for the conceptual schema and the information base*.

3 Terms, definitions, and abbreviations

3.1 Terms and definitions

For the purposes of this part of ISO 15926, the following terms and definitions apply.

NOTE Definitions copied verbatim from other standards are followed by a reference to the standard in brackets, such as "[ISO 10303-1]". In these cases the definition in the referenced document is normative; its repetition here is informative and in the case of any discrepancy the definition in the referenced document has precedence. An explanatory note follows definitions that have been adapted from other standards. In these cases the definition given here is normative for the purposes of this part of ISO 15926.

3.1.1
class
category or division of things based on one or more criteria for inclusion and exclusion

NOTE 1 A class need not have any members (things that satisfy its criteria for membership).

NOTE 2 Because of the spatio-temporal paradigm used to define individuals in this International Standard, all classes are non-well-founded sets. These are explained in ISO 15926-2:D.2.4

3.1.2
commodity product class
manufactured product class whose members conform to open agreed standards

NOTE Commodity product classes have sufficient characterisation to indicate suitability of use. They are specializations of one or more de facto classes, standard classes, or both. The resulting specification is non proprietary as no one organization controls it.

EXAMPLE The type of lightbulb known as 60 W 230 V E27 is a commodity product class.