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SPECIFICATION

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Ships and marine technology — Data transfer standard for maritime and intermodal transportation and security

*Navires et technologie maritime — Norme de transfert de données pour
le transport maritime, le transport intermodal et la sécurité*

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ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

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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.

In other circumstances, particularly when there is an urgent market requirement for such documents, a technical committee may decide to publish other types of normative document:

- an ISO Publicly Available Specification (ISO/PAS) represents an agreement between technical experts in an ISO working group and is accepted for publication if it is approved by more than 50 % of the members of the parent committee casting a vote;
- an ISO Technical Specification (ISO/TS) represents an agreement between the members of a technical committee and is accepted for publication if it is approved by 2/3 of the members of the committee casting a vote.

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An ISO/PAS or ISO/TS is reviewed after three years in order to decide whether it will be confirmed for a further three years, revised to become an International Standard, or withdrawn. If the ISO/PAS or ISO/TS is confirmed, it is reviewed again after a further three years, at which time it must either be transformed into an International Standard or be withdrawn.

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/PAS 16917 was prepared by Technical Committee ISO/TC 8, *Ships and marine technology*, Subcommittee SC 10, *Computer applications*.

0 Introduction

0.1 Background

The need to exchange data in electronic form is recognized throughout industry and government. This need has been driven by specific business requirements and has resulted in the initiation of many data-transfer standards. The transportation industry is particularly dependent on the efficient exchange of information among the many participants. These data-transfer requirements cover both the transportation assets needed to perform the transportation as well as commercial information on the cargo transported. To that end, a number of parallel efforts are underway to promote data exchange by way of standards organizations, the United Nations and trade associations. The need to exchange data relative to cargo, ship, intermodal transport, and port security gives urgency to the establishment of an applicable data-transfer standard.

Data-transfer standards and schema have been built around the models of specific business processes and have identified specific data sets requiring exchange. Many of these specific commercial requirements were met by EDI data messages. The exchange of specific technical data for the building of ships is being addressed by STEP (ISO 15303) standards. These standards embed the data definitions in the software, limiting the flexibility for use in other applications. EDI and STEP require the implementation of costly complex software. Both are primarily implemented by large organizations with their trading partners. Worldwide data exchange, including small to medium enterprises, will require low-cost, flexible, Internet-based data-transfer methods. The implementation of new methods will incorporate common data definitions across all systems and will not limit the continued use of EDI or STEP.

New requirements include broad searches of business and security-related data and the ability to link a particular data item to many other data items located in diverse databases. Clearly, the ability to meet new business and government data-transfer needs will require some standard identification of the data elements. The Internet will play a crucial role in data exchange, however, the current primary limitation is a lack of common understanding on the meaning of the data. Therefore, data definitions relative to specific domains must be developed by industry groups with knowledge of the requirements. These Data Dictionary definitions, which may record other locations of the data, may then be linked to participating organization's databases. It does not require any organization to change the format of their own data but allows them to map to the standard Data Dictionary definition to facilitate data exchange.

Advancement in data-transfer technology results in changes in transfer documents and techniques. The separating out of the relatively stable data definitions from the changing data-transfer technology will facilitate the implementation of the new technology.

The data-exchange requirements may start with the building and operation of the equipment involved, from ships to container transport to port facilities. The commercial operation of the equipment requires even larger amounts of data exchange, including cargo documentation and the operation of the transportation equipment and terminals. Governments require the exchange of information concerning the safety of personnel and the environment, as well as the rapid analysis of transportation data to identify potential security risks.

Throughout the whole transportation process, the exchange of information is necessary among all the segments including

- building and operation of ships and equipment,
- building and operation of cargo containers and related equipment,
- building and operation of ports and terminals,
- tracking of cargo and containers (cargo visibility),
- exchange of commercial documents (shippers, brokers, carriers),

- e-commerce in support of transportation (chartering, provisions, bunkers, services),
- monitoring ship and cargo movements, including security checks of cargo, ships, and personnel, and
- collection of customs duties and port dues.

Each of these segments of the transportation process has developed data-exchange procedures to serve their own needs. Their systems were not designed to exchange data with external organizations. Even when the same basic transfer technology was used, the data is recorded in a different manner. World events now require the ability to exchange data across all segments. This Publicly Available Specification addresses the basic requirements to accomplish this using current international standards and without the need to change existing databases.

0.2 Purpose of ISO 16917

The purpose of this Publicly Available Specification is to facilitate the efficient transfer of data between various organizations involved with maritime and intermodal transportation and security. Transportation-security information requires an even wider access to data including trucks, trains and air shipment. This Publicly Available Specification will provide a method of linking databases on a worldwide basis so that data may be exchanged from computer to computer without manual intervention or need to change the way the data is stored. This Publicly Available Specification does not propose to define the commercial or government documents used in international trade, as a number of standards under development address this requirement. This Publicly Available Specification defines data elements in clear concise terms that can be used in multiple-data-transfer documents and to define the data elements in Data Dictionaries in a standardized way separate from the transfer documents. It will also define how the data dictionaries will be structured and maintained and how they may be used to link similar data around the world. The data-transfer may apply to the data exchange in the normal course of maritime business for both commercial and military transportation or to the collection and exchange of data in the security process from many diverse databases around the world. The data search and transfer process should be efficient and low cost with access through the Internet, along with a method of linking databases with different data structures by mapping to common data elements located in data dictionaries.

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0.3 Description of ISO 16917

ISO 16917 is a Publicly Available Specification for the definition and structuring of meaningful data that is required to be readily exchanged in the maritime and intermodal transportation process. The meaning and structure of the data will be defined to a level that allows electronic exchange without the need for manual validation. The data elements will be defined in data dictionaries representing specific business domains. Data-transfer will be accomplished using some data-transfer messaging protocol (i.e. EDI, STEP/EXPRESS, XML). A Reference Data Library consisting of Data Dictionaries of metadata required in specific domains will be defined. Reference linking will be provided between data defined in Domain Data Dictionaries. This Publicly Available Specification will include a common method of indexing, structuring, and linking the data using a data model for both the data dictionary and the business domain, and it will support the exchange of data for the life cycle of the transportation equipment and its commercial use. This Publicly Available Specification makes reference to ISO/IEC 11179 and uses this International Standard as the basis for the data dictionaries.

This Publicly Available Specification describes four elements:

- a) definition of the data in a standard form (Data Dictionaries), see Clause 4;
- b) modeling of the data for reference indexing and searching (e.g. XML modeling and Topic maps), see Clause 5 and 6;
- c) method of mapping data to other instances of the same data (e.g. Topic maps), see Clause 6;
- d) electronically transmitting the data between computer systems incorporating rapidly evolving XML and EDI standards and dialects, see Clause 7.

Ships and marine technology — Data transfer standard for maritime and intermodal transportation and security

1 Scope

This Publicly Available Specification specifies a representation of information associated with the surface (marine, highway, rail) transportation of cargo and personnel. It supports the following:

- definition of information required to be exchanged in the building and operation of transportation equipment throughout its life cycle (see Figure 1);
- definition of information required to be exchanged in the commercial operation of transportation equipment and the movement of cargo (see Figure 2).



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Figure 1 — Transportation equipment life cycle

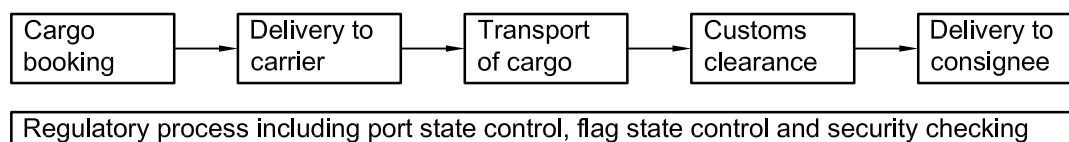


Figure 2 — Cargo transportation process

This Publicly Available Specification identifies the information that may be exchanged in both the production and operation of the assets needed in the transportation process as well as the information needed in the commercial transportation process and the regulatory information relating to each. Asset procurement and operation, as well as commercial transactions, are needed to support international trade. Continuous exchange of information between the equipment operators and the commercial operators are part of the transportation process. The above diagrams show the various processes and stages involved with maritime and intermodal transportation requiring data exchange.

This Publicly Available Specification is applicable to the implementation of databases and data warehouses that enable data sharing among the various participants in the transportation process.

The purpose of the Data Dictionary definitions is to allow the mapping of data that relates to the base definitions, with multiple occurrences of the data within industry and government databases.

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 11179 (all parts), *Specification and standardization of data elements*

3 Terms and definitions

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

3.1 General terms and abbreviations

3.1.1

EDI

Electronic Data Interchange

3.1.2

STEP

standard for exchange of product model data according to ISO 10303

3.1.3

Data-Transfer Document

set of data elements in some standard protocol (EDI, XML, etc.)

3.1.4

XML

extensible markup language

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3.2 Terms taken from ISO/IEC 11179-1:1999

NOTE Certain terms have been adapted.

3.2.1

attribute

characteristic of an **object** or **entity**

3.2.2

attribute value

representation of an instance of an **attribute**

3.2.3

certified data element

recorded data element that has met the quality requirements specified in ISO/IEC 11179

3.2.4

classification scheme

arrangement or division of **objects** into groups based on characteristics that the **objects** have in common, e.g. origin, composition, structure, application, function, etc.

3.2.5

classification scheme item

discrete components of content in a **classification scheme**

NOTE These may be the nodes of a **taxonomy**/ontology, the terms of a **thesaurus**, etc.

3.2.6**classified component**

administered component of a **data element** that may be classified in one or more **classification schemes**

NOTE These components include the **object class**, **property**, **representation class**, **data element concept**, **value domain**, and **data element**.

3.2.7**comments**

remarks on the **data element**

3.2.8**concept**

unit of thought constituted through abstraction on the basis of characteristics common to a set of **objects**

[ISO 1087:1990]

3.2.9**context**

designation or description of the application environment or discipline in which a **name** is applied or from which it originates

3.2.10**data**

representation of facts, concepts, or instructions in a formalized manner, suitable for communication, interpretation, or processing by humans or by automatic means

3.2.11**data dictionary**

database used for **data** that refers to the use and structure of other **data**; that is, a database for the storage of **metadata**

[ANSI X3.172-1990]

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See also **data element dictionary**.

3.2.12**data element**

unit of **data** for which the **definition**, identification, **representation**, and permissible values are specified by means of a set of **attributes**

3.2.13**data element concept**

concept that can be represented in the form of a **data element**, described independently of any particular **representation**

3.2.14**data element dictionary**

information resource that lists and defines all relevant **data elements**

See also **register**.

3.2.15**data element facet**

any aspect of a **data element** that is subject to classification

NOTE This includes object class, property, representation, and data element concept.

3.2.16**data element name**

single or multi-word designation used as the primary means of identification of **data elements** for humans

3.2.17

data element registry

information resource kept by a **registration authority** that describes the meaning and representational form of **data elements**, including registration **identifiers**, **definitions**, **names**, **value domains**, **metadata** and administrative **attributes**, etc.

See also **register**.

3.2.18

data element value

value out of a set of permissible values pertaining to a **data element**

See also **data value**.

3.2.19

data identifier

DI

identifier of a **data element** (a string of characters or other graphic symbols) assigned by a **registration authority**

3.2.20

data item

one occurrence of a **data element**

3.2.21

data model

description of the organization of **data** in a manner that reflects an information structure

3.2.22

data steward

person or organization delegated the responsibility for managing a specific set of **data** resources

3.2.23

datatype

format used for the collection of letters, digits, and/or symbols, to depict values of a **data element**, determined by the operations that may be performed on the **data element**

3.2.24

datatype of data element values

set of distinct values for representing the **data element value**

3.2.25

data value

element of a **value domain**

3.2.26

definition

word or phrase expressing the essential nature of a person or thing or class of persons or things: an answer to the question "what is x?" or "what is an x?"; a statement of the meaning of a word or word group [Webster's Third New International Dictionary of the English Language Unabridged, 1986]. Statement that expresses the essential nature of a **data element** and permits its differentiation from all other **data elements**

3.2.27

domain

set of possible **data values** of an **attribute**

[ISO/IEC 2382]

See also **value domain**.

NOTE Also can refer to a business domain.

3.2.28**entity**

any concrete or abstract thing of interest, including associations among things

[ISO/IEC 2382]

See also **object class**.

3.2.29**enumerated domain**

value domain that is specified by a list of all permissible values

3.2.30**form of representation**

name or description of the form of **representation** for the **data element**, e.g. 'quantitative value', 'code', 'text', 'icon'

See also **representation term**.

3.2.31**identifier**

language independent unique identifier of a **data element** within a **registration authority**

See also **data identifier**.

NOTE

This is an unambiguous name for an **object** within a given context.

3.2.32**information**

(In information processing) knowledge concerning **objects**, such as facts, events, things, processes, or ideas, including **concepts**, that within a certain **context** has a particular meaning

[ISO/IEC 2382]

3.2.33**information interchange**

process of sending and receiving **data** in such a manner that the **information** content or meaning assigned to the **data** is not altered during the transmission

3.2.34**international registration data identifier****IRDI**

internationally unique **identifier** for a **data element**

3.2.35**keyword**

one or more significant words used for retrieval of **data elements**

3.2.36**layout of representation**

layout of characters in **data element values** expressed by a character string representation

3.2.37**lexical**

pertaining to words or the vocabulary of a language as distinguished from its grammar and construction

3.2.38**maximum size of data element values**

maximum number of storage units (of the corresponding **datatype**) to represent the **data element value**