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Industrial automation systems and integration — Product data representation and exchange —

Part 215: Application protocol: Ship arrangement

Systèmes d'automatisation industrielle et intégration — Représentation et échange de données de produits —

Partie 215: Protocole d'application: Aménagement des navires

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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.

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 part of ISO 10303 may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

This part of ISO 10303 was prepared by Technical Committee ISO/TC 184, *Industrial automation systems and integration*, Subcommittee SC 4, *Industrial data.*

ISO 10303 is organized as a series of parts, each published separately. The structure of ISO 10303 is described in ISO 10303-1.

Each part of ISO 10303 is member of one of the following series: description methods, implementation methods, conformance testing methodology and framework, integrated generic resources, integrated application resources, application protocols, abstract test suites, application interpreted constructs, and application modules. This part is a member of the application protocols series.

A complete list of parts of ISO 10303 is available from the Internet:

<http://www.tc184-sc4.org/titles/>

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Introduction

ISO 10303 is an International Standard for the computer-interpretable representation of product information and for the exchange of product data. The objective is to provide a neutral mechanism capable of describing products throughout their life cycle. This mechanism is suitable not only for neutral file exchange, but also as a basis for implementing and sharing product databases, and as a basis for archiving.

This part of ISO 10303 is a member of the application protocol series. This part of ISO 10303 specifies an application protocol (AP) for the exchange of product data representing a ship's internal subdivision information between different organizations with a need for that data. Such organizations include ship owners, design agents, fabricators, and classification societies.

This part of ISO 10303 is one of a series of shipping industry application protocols that together aim to provide an integrated computer interpretable product model for ships.

The series of shipping industry application protocols assumes that the ship product model can be divided into separate ship systems that each cover a key element of the ship for its whole life cycle. These key elements are: ship moulded forms, ship arrangement, ship distribution systems, ship structures, ship mechanical systems, ship outfit and furnishings, and ship mission systems. Each separate system is described by one or more different application protocols. The full series of ship application protocols is shown in Figure 1. Those aspects of the ship product model that are common to each shipbuilding application protocol are described consistently and identically in each application protocol. Annex K provides additional information on the shipbuilding application protocols and their elements. It also contains information on data common to the shipbuilding application protocols.

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This application protocol has been developed to support the shipbuilding activities and computer applications associated with the functional design, detail design, production engineering, and operations life cycle phases for commercial or military ships. The types of design activities and computer applications supported include the arrangement of spaces within a ship, definition of the intended function of the compartments and zones, detail design of the compartments and zones, geometric representation of compartments and zones, compartment property requirements, compartment property as-designed and as-built values, identification of the outfitting items contained in a compartment, definition of cargoes, association of cargoes to a compartment, definition of design and operating loading conditions, and damage stability analysis. Figure 2 illustrates the major types of data supported by this application protocol. This planning model was created from the in-scope data from the activities of the application activity model (AAM) and grouped into logical units of functionality. This planning model is used as a guide in developing the application reference model (ARM).

This application protocol defines the context, scope, and information requirements for the exchange of ship arrangement definitions, geometric representations of compartments and zones, compartment properties, cargoes, cargo assignments, loading conditions, and damage stability information, and specifies the integrated resources necessary to satisfy these requirements.

Application protocols provide the basis for developing implementations of ISO 10303 and abstract test suites for the conformance testing of AP implementations.

Clause 1 defines the scope of the application protocol and summarises the functionality and data covered by the AP. Clause 3 lists the words defined in this part of ISO 10303 and gives pointers towards defined elsewhere. An application activity model, that is the basis for the definition of the

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scope, is provided by annex F. The information requirements of the application are specified in clause 4 using terminology appropriate to the application. A graphical representation of the information requirements, referred to as the application reference model, is given in annex G.

Resource constructs are interpreted to meet the information requirements. This interpretation produces the application interpreted model (AIM). This interpretation, given in 5.1, shows the correspondence between the information requirements and the AIM. The short listing of the AIM specifies the interface to the integrated resources and is given in 5.2. Note that the definitions and EXPRESS provided in the integrated resources for constructs used in the AIM may include select list items and subtypes which are not imported into the AIM. The expanded listing given in annex A contains the complete EXPRESS for the AIM without annotation. A graphical representation of the AIM is given in annex H. Additional requirements for specific implementation methods are given in annex C.

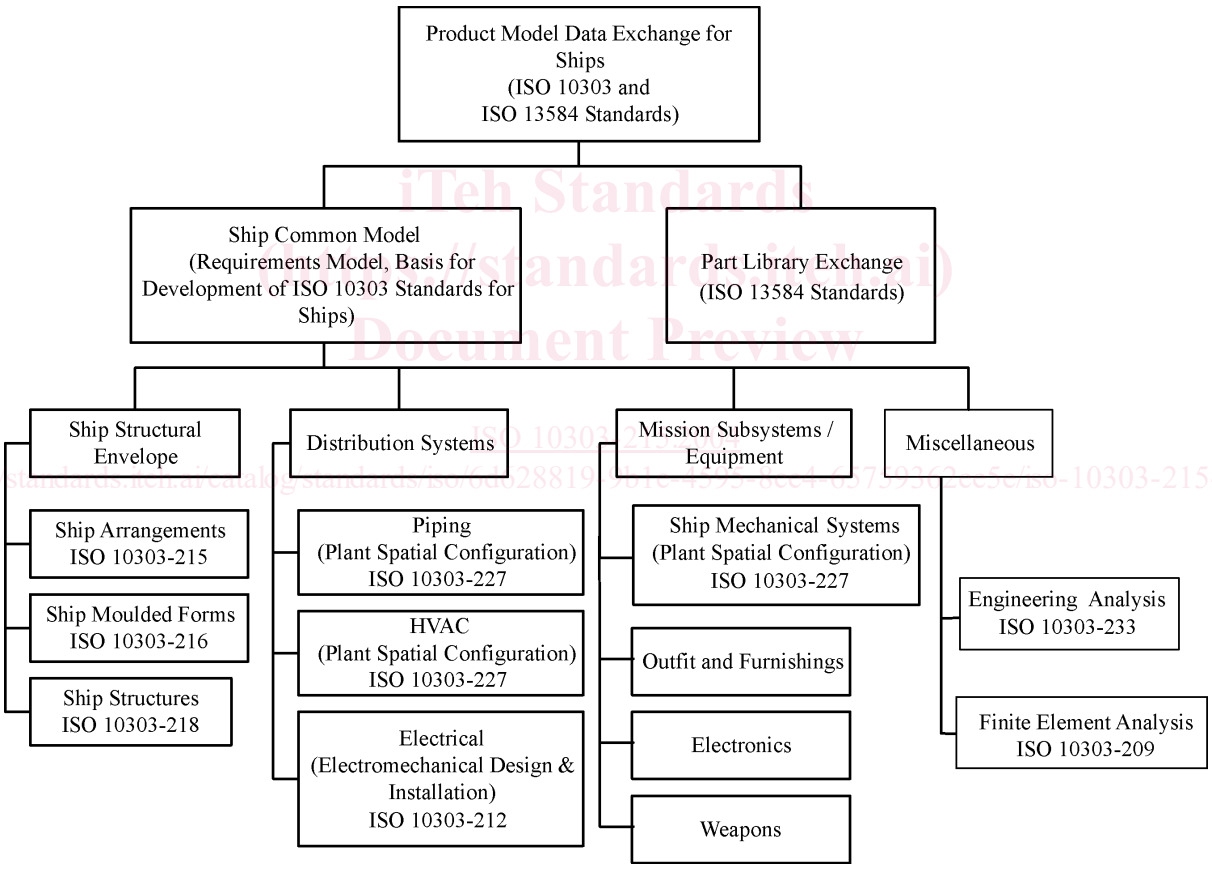

Figure 1 — The full series of ship application protocols

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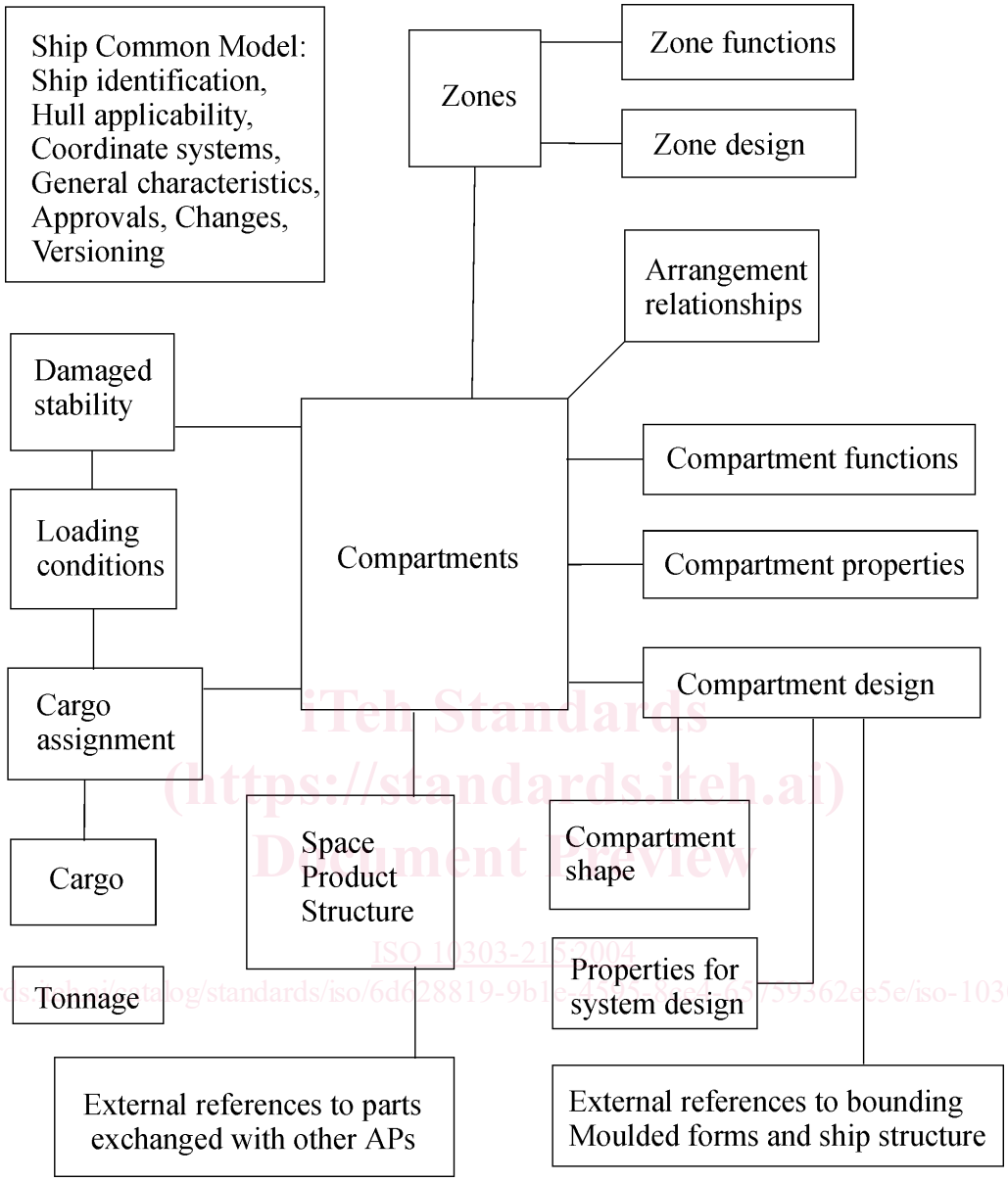

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Figure 2 — Data planning model

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Industrial automation systems and integration — Product data representation and exchange — Part 215: Application protocol: Ship arrangement

1 Scope

This part of ISO 10303 specifies the use of the integrated resources necessary for the scope and information requirements for the exchange of three-dimensional product definition data and its configuration status information for naval and commercial ship arrangements. Configuration in this context pertains to data specific to revision tracking and change history of selected ship spatial entities within the product model. The term exchange is used to narrow the scope to only those data that are transferred between enterprise systems. This is to distinguish it from a data model supporting distributed, multi-user database applications.

NOTE 1 The application activity model in annex F provides a graphical representation of the processes and information flows that are the basis for the definition of the scope of this part of ISO 10303.

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The following are within the scope of this part of ISO 10303:

— data describing the general subdivision of a ship into spatially bounded regions;

— data identifying physical boundaries partitioning the ship into compartments suitable for the stowage of cargo, operation of machinery, and occupancy by crew and passengers;

— data identifying logical boundaries subdividing the ship into zones for the purpose of controlling access, designating design authority, or applying specific design requirements;

— data required for the definition of spatial boundaries based on references to moulded form regions or geometric surfaces;

— configuration management data for identification of versions of compartment designs and for management of changes to the design during the design life cycle phase;

— data identifying the intended functions of compartments and zones;

— data required for recording the volumetric capacities of cargo compartments at various combinations of vessel heel and vessel trim;

— data required for calculation of the magnitude and location of loads acting upon the structural systems of a ship due to the weight of cargoes contained in compartments;

— data required for the determination of adjacency of compartments;

— data identifying spaces related by common functional purpose, position within the ship, or connection by engineering systems;

EXAMPLE Port and starboard wing tank pairs are spaces related by position.

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— data identifying dimensional aspects of spaces;

— data identifying the product structuring of engineering parts and structural parts contained within a space;

— data identifying the product structuring of compartments in an area of the ship;

— data required for the definition of design requirements placed on a space by systems within the ship;

— data required for the identification of cargoes, stores and consumables and allocation of those items to compartments and tanks for design analysis or on specific voyages during the operation of the ship;

— definition of loading conditions for analysis of the floating position of the ship under different cargo loading scenarios;

— data required for the analysis of stability of the ship after damage;

— data applicable to a single ship, or to multiple ships in a hull class.

NOTE 2 Annex K provides additional information pertaining to the industrial use of this part of ISO 10303.

The following are outside the scope of this part of ISO 10303:

— data defining the representation of moulded surfaces of structural or non-structural bulkheads;

NOTE 3 Moulded forms are referenced by external instance references to ISO 10303-216.

— data defining the representation of structural systems and parts;

NOTE 4 Structural systems and parts are referenced by external instance references to ISO 10303-218.

— data defining the location, orientation, or geometry of engineering parts and structural parts within a space.

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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 8501-1, *Preparation of steel substrates before application of paints and related products — Visual assessment of surface cleanliness — Part 1: Rust grades and preparation grades of uncoated steel substrates and of steel substrates after overall removal of previous coatings*

ISO/IEC 8824-1, *Information Technology — Open Systems Interconnection — Abstract Syntax Notation One (ASN.1) — Part 1: Specification of Basic notation*

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

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

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

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

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

ISO 10303-31, *Industrial automation systems and integration — Product data representation and exchange — Part 31: Conformance testing methodology and framework: General concepts*

ISO 10303-41, *Industrial automation systems and integration — Product data representation and exchange — Part 41: Integrated generic resource: Fundamentals of product description and support*

ISO 10303-42, *Industrial automation systems and integration — Product data representation and exchange — Part 42: Integrated generic resource: Geometric and topological representation*

ISO 10303-43, *Industrial automation systems and integration — Product data representation and exchange — Part 43: Integrated generic resource: Representation structures*

ISO 10303-45, *Industrial automation systems and integration — Product data representation and exchange — Part 45: Integrated generic resource: Materials*

ISO 10303-216, *Industrial automation systems and integration — Product data representation and exchange — Part 216: Application Protocol: Ship moulded forms*

ISO 10303-218, *Industrial automation systems and integration — Product data representation and exchange — Part 218: Application Protocol: Ship structures*

ISO 10303-508, *Industrial automation systems and integration — Product data representation and exchange — Part 508: Application interpreted construct: Non-manifold surface*

ISO 10303-511, *Industrial automation systems and integration — Product data representation and exchange — Part 511: Application interpreted construct: Topologically bounded surface*

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IMO ID200E, *International Maritime Dangerous Goods Code (IMDG Code)*

IMO IB520E, *International Convention for the Prevention of Pollution from Ships (MARPOL 73/78), Consolidated edition*

IMO IA701E, *International Convention on Loadlines*

IMO I713E, *International Convention on Tonnage Measurement of Ships*

IMO IA772E, *Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk (BCH Code)*

3 Terms, definitions and abbreviations

3.1 Terms defined in ISO 10303-1

For the purposes of this document, the following terms defined in ISO 10303-1 apply:

— application;

— application activity model (AAM);

— application context;

— application interpreted model (AIM);

— application object;

— application protocol (AP);

— application reference model (ARM);

— computer aided design (CAD);

— computer aided manufacture (CAM);

— conformance class;

— conformance requirement;

— data;

— data exchange;

— implementation method;

— information;

— integrated resource;

— interpretation;

— PICS proforma;

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