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Ships and marine technology — ECS databases — Content, quality, updating and testing

Navires et technologie maritime — Bases de données ECS — Contenu, qualité, mise à jour et essais

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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 19379 was prepared by Technical Committee ISO/TC 8, *Ships and marine technology*, Subcommittee SC 6, *Navigation*.

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Introduction

This International Standard covers the content, quality, updating and testing of an Electronic Charting System (ECS) Database. This International Standard does not cover the system (hardware and operating software) on which the ECS Database is used. Its purpose is to clearly define the *minimum* acceptable requirements for electronic chart data to support a system of electronic charts with maximum safety, efficiency and convenience. The three requirements, contents, quality and updating, seriously impact the safety of navigation. Hence the provisions of this International Standard that define these requirements are made with care, consistent with concerns for navigational safety. All three of the requirements lend themselves to precise description, definition and measurement. Hence it is reasonable to rely on a Standard to assure a major contribution to navigation safety when using a compliant electronic chart.

ECS are Electronic Chart Systems that electronically display the real-time vessel position and relevant nautical chart data and information from the ECS Database on a display screen, but do not meet all of the IMO requirements for ECDIS and are not intended to satisfy the SOLAS Chapter V requirement to carry a navigational chart.

National regulatory authorities may wish to require compliance with this International Standard for data used in ECS or other electronic navigation systems regulated by their countries.

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Ships and marine technology — ECS databases — Content, quality, updating and testing

1 Scope

This International Standard contains the requirements and test methods for the production of an ECS Database. It addresses the elements of the database relevant to safety of navigation including content, quality and updating.

This International Standard provides guidance on production and testing of an ECS Database. It does not provide detailed coverage of the methods and techniques required for database design and development, nor does it address specifc quality management procedures.

The main users of this International Standard will be ECS Database producers. ECS manufacturers and national regulatory authorities may find the guidance in this International Standard relevant.

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.

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ISO 9000:2000 (all parts), *Quality management and quality assurance standards*

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3 Terms and definitions

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

3.1
Electronic Chart Display and Information System
ECDIS
navigation information system which is defined in the IMO Performance Standard for ECDIS (IMO Resolution A.817(19), as amended)

3.2
Electronic Chart System
ECS
navigation information system that electronically displays vessel position and relevant nautical chart data and information from the ECS Database on a display screen, but does not meet all the IMO requirements for ECDIS and is not intended to satisfy the SOLAS Chapter V requirement to carry a navigational chart

3.3
ECS Database
database, standardized as to content, quality and updating, issued for use with an ECS

3.4
vector data presentation
method of representing individual chart features digitally by points, lines and polygons and text given through their coordinates, attributes and appropriate code(s)

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3.5
raster data presentation
method of representing all, or part, of a chart digitally by a matrix-like scheme of pixels or grid points

3.6
Nautical Chart or Nautical Publication
special-purpose map or book, or a specially compiled database from which such a map or book is derived, that is issued officially by or on the authority of a Government-authorized Hydrographic Office or other relevant government institution and is designed to meet the requirements of marine navigation

3.7
working database
database, separate from or in addition to the ECS Database, containing additions, changes and updates to the ECS Database

3.8
conspicuous features
objects, either natural or artificial, that are distinctly and notably visible

3.9
source document
any material, in printed (i.e. paper) or electronic (i.e. digital) form, used as a source of information for compiling the ECS Database

3.10
resolution
size (at the scale of the source document) of the smallest unit used to store positions

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NOTE For vector data, resolution corresponds to the size of the smallest coordinate unit or sub-unit. For raster data, resolution corresponds to the size of the pixels that comprise the raster image. In either case, resolution indicates the size of the smallest spatial feature that can be discriminated, or the minimum distance between two spatial features collected as separate entities

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3.11
reproduction accuracy
true distance (at the scale of the source document) between the geographic position of a given feature, as provided by the source, and the position of the corresponding entity as reproduced in the ECS Database

3.12
encoding error
discrepancy between the ECS Database and the source document (or documents) from which it is compiled, including all Notices to Mariners applied to the ECS Database in the form of updates

4 Requirements

4.1 ECS Database contents

4.1.1 Contents in general

4.1.1.1 The ECS Database shall contain, at a minimum, the same level of data and information relevant to the safety of navigation that is available from the latest edition of the Nautical Chart.

4.1.1.2 The ECS Database may be compiled from multiple sources.

4.1.1.3 Data and information derived from the Nautical Chart may be integrated with data from other sources, provided that such integration does not degrade the data or information from the Nautical Chart and the ECS Database is identified as using data or information not derived from the Nautical Chart.

4.1.1.4 The ECS Database producer shall maintain a traceable record of source documents used.

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4.1.1.5 The ECS Database producer may include a generalization of the ECS Database, provided that the generalised Database cannot be used separate from the non-generalized portion of the ECS Database, i.e. the ECS user can always zoom in to check best detail.

4.1.2 Details of contents

See 5.3.2 and 5.3.5 for test provisions related to the contents of the ECS Database.

At a minimum, the ECS Database shall contain the following elements when available from Nautical Charts:

4.1.2.1 Information above and below the high water line

a) All depth contours up to and including a depth of 50 m.

b) All spot soundings up to and including a depth of 50 m.

c) Indication and details of all isolated dangers with a depth less than 50 m (or with depth unknown, when considered dangerous to surface navigation), for example: wrecks, rocks, obstructions, offshore platforms, breakers, etc.

d) Navigable canals, navigable rivers.

e) Boundaries, for example: fairways, channels, dredged areas and swept areas.

f) Drying lines.

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g) Coastline, shoreline constructions and man-made flow-control structures, such as dams, locks, weirs and dykes.

h) Bridges, overhead pipelines and cables with horizontal and vertical clearances over navigable water.

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4.1.2.2 Navigation aids

a) Indication and details of all fixed and floating aids to navigation including navigation markings and numbers.

b) Navigation lines.

c) Traffic routing systems and separation schemes.

d) Recommended routes.

e) Conspicuous features.

4.1.2.3 Other features

a) Submarine cables and pipelines.

b) Areas for which special conditions exist such as:

   1) anchorage areas and anchorage prohibited areas;

   2) restricted areas, for example: cautionary areas, prohibited areas, fishing prohibited areas, areas to be avoided;

   3) regulated areas, for example: fishing grounds, offshore production areas, dumping areas;

   4) military practice areas;

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5) international boundaries and national limits.

c) Ferry routes.

d) Nature of the seabed, for example: sand, mud, rocks, sponge, etc.

e) Distance marks.

4.1.2.4 Textual information

a) Indication and contents of cautionary notes relating to safety of navigation.

b) Place names.

4.1.2.5 Metadata

a) ECS Database producer and identification of the source Nautical Chart.

All parts of the ECS Database compiled from sources other than the Nautical Chart or from other official government sources shall contain information in the metadata that the ECS manufacturer may use to generate an appropriate warning to the user.

b) Date the ECS Database is current through.

If the database is produced from multiple Nautical Charts, then the date the ECS Database is current through should be the date associated with the latest update to the least up-to-date Nautical Chart.

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c) Horizontal geodetic datum and offset to WGS-84, if any.

The horizontal geodetic datum of a vector format ECS Database shall be WGS-84. The horizontal geodetic datum of a raster format ECS Database should be WGS-84, but it may be produced in its source datum provided the offset to WGS-84 is provided in the metadata. If the ECS Database includes an area for which the datum is unknown, an indication shall be provided in the metadata.

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d) Sounding datum and vertical datum.

e) Scale boundaries or database resolution boundaries, if different.

f) An indication of the suitability of the ECS Database for a specific intended navigational purpose, based upon the scale and positional accuracy of the source data and the reproduction accuracy, that may be used by the ECS manufacturer to notify the user that the ECS Database is suitable for use in conjunction with a continuous positioning system of an accuracy consistent with the requirements of safe navigation, according to Table 1.

Table 1 — Suitability of the ECS Database for navigational purposes

Navigational purpose	Scale of source data	Horizontal tolerance of ECS Database m
Can be used in restricted waters	$\geqslant$ 1:20 000	$\leqslant$ 10
Can be used to approach a harbour	$\geqslant$ 1:50 000	$\leqslant$ 50
Can be used for coastal navigation	$\geqslant$ 1:100 000	$\leqslant$ 100
Should not be used in conjunction with a continuous positioning system		$>$ 100

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4.1.2.6 Other information

The ECS Database should include other information necessary for the ECS manufacturer to work with the ECS Database, such as horizontal and vertical units of measurement, etc.

4.2 ECS Database quality

The concept of database quality incorporates the process by which the ECS Database is produced, the source materials, the resolution and reproduction accuracy of chart features, and the correctness and completeness of data. These items shall be incorporated in the producer's program of quality management.

4.2.1 Product specification

The producer of the ECS Database shall generate and maintain a product specification for the ECS Database, describing

a) the compliance with any industrial, governmental or International Standard and regulation, when applicable,

b) the type-approval or classification certificates issued for the product, when applicable,

c) the data structure of the ECS Database such as vector, raster, both vector and raster, or other,

d) the properties of the ECS Database, for example: resolution, maximum allowable errors in reproduction accuracy, maximum allowable error in completeness of encoding,

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e) the packaging of the ECS Database, including how the various parts, sections or units that the ECS Database consists of are assembled into individual products,

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f) the way in which the ECS Database can be updated, and

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g) any known limitation in the use of the ECS Database.

4.2.2 Process control

The ECS Database producer shall have in place a quality management system meeting recognized standards, for example: ISO 9000 series. Within the producer's quality management system, there shall be procedures to assure that the ECS Database complies with the producer's product specification and with the requirements of this International Standard, including the following:

a) written procedures for selection, purchasing, inspection and acceptance of source materials;

b) written procedures for all critical phases of the process, including registration of source materials, geo-referencing, geo-rectification, conversion to digital format (raster or vector), and compilation into final product;

c) written procedures for internal quality management for both intermediate and final products, including handling of non-conformities, preventive and corrective actions;

d) encoding specifications providing rules describing which information is captured from source documents and how it is classified in the form of features and geometric primitives in the ECS Database.

NOTE Encoding specifications only apply to an ECS Database containing vector data.

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