9th Meeting of the IHO Inter-Regional Coordination Committee (IRCC9)

Paramaribo, Suriname, 12-14 June 2017

Draft New Edition 1.0.0 of the IHO Publication S-8B *Standards of Competence for Category "B" Nautical Cartographers*

Submitted by:	IBSC Chair
Related Documents:	a) CL 57/2016 b) IRCC9-07H1 c) IRCC9-07H2 d) IHO Resolution 2/2007
Related Projects:	Task 3.3.9 of the IHO 2013-2017 Work Programme

Background:

1. The FIG/IHO/ICA International Board on Standards of Competence for Hydrographic Surveyors and Nautical Cartographers (IBSC) developed a draft New Edition 1.0.0 of the IHO Publication S-8B *Standards of Competence for Category "B" Nautical Cartographers*, in accordance with task 3.3.9 of the IHO 2013-2017 Work Programme.

New standards development:

2. The development of the new set of Standards of Competence was done mainly intersessionally complemented by working group meetings as reported in *doc. IRCC9-07H1*. In accordance with the IHO Resolution 2/2007, the IBSC organized stakeholders' seminars in conjunction with other events in order to get comments and feedback from the broad hydrographic community in order to assure the new draft S-8B is fit for purpose.

3. The first draft S-8B was made available in the IHO website under *Draft Publications for discussion* and the IHO Circular Letter 57/2016 *Call for comments on draft new edition 1.0.0 of IHO Publication S-8B Standards of Competence for Category "B" Nautical Cartographers* sought feedback from IHO Member States and Stakeholders.

4. Comments arising from Circular Letter 57/2016 were reviewed by the Board during IBSC40 (New Zealand, 20-31 March 2017). The comments and the Board responses are available in the Annex.

5. The revised draft New Edition 1.0.0 of S-8B took into consideration the comments received and the feedback received from institutions holding recognized programmes is now available under *Draft Publications for discussion* at:

www.iho.int → Standards & Publications → Download

6. The Board seeks the endorsement of the IRCC to the draft New Edition 1.0.0 of the IHO Publication S-8B *Standards of Competence for Category "B" Nautical Cartographers* and subject to this endorsement, requests the approval of the IHO Member States, in accordance with the Assembly Decision 15.

Actions Required of IRCC:

7. IRCC is invited to:

a) **Note** the report;

b) **Endorse** the draft New Edition 1.0.0 of the IHO Publication S-8B *Standards of Competence for Category "B" Nautical Cartographers*;

c) **Request** the IHO Secretariat to seek approval of the IHO Member States of the IHO Publication S-8B *Standards of Competence for Category "B" Nautical Cartographers*;

d) **Take** any other actions as appropriate.

MEMBER STATES' RESPONSES TO IHO CL 57/2016 AND COMMENTS FROM THE FIG/IHO/ICA INTERNATIONAL BOARD ON STANDARDS OF COMPETENCE FOR HYDROGRAPHIC SURVEYORS AND NAUTICAL CARTOGRAPHERS (IBSC)

CALL FOR COMMENTS ON DRAFT NEW EDITION 1.0.0 OF IHO PUBLICATION S-8B *STANDARDS OF COMPETENCE FOR CATEGORY "B" NAUTICAL CARTOGRAPHERS*

Note: responses from the IBSC are given along the text in *italics*

BANGLADESH

Certificate Models for Category "B" Nautical Cartographers may be included in the draft S-8B First Edition Version 1.0.0.

IBSC Comment: the IBSC decided that the new Standards will not have templates for the certificates.

CHILE

We have reviewed the draft version of the publication S-8B and we would like to congratulate the IBSC for the effort in producing this version.

IBSC Comment: the IBSC thanks Chile for the support.

At this time we have a couple of suggestions for the IBSC consideration:
- E2.2a Map projections. Under this section (vi) Projection systems and (vii) The UTM projection system are included. We think that as emphasis is made to the UTM projection, it would be recommended to do the same with the Mercator projection. Another approach could be just to leave (vi) Projection systems on the understanding that all relevant projections shall be covered.

IBSC Comment: E2.2b v is considered as covering Mercator under specific map projections. The ILO will be amended to emphasize the projection system in 2.2a.

- E2.7 Color (B) and E10.5 Color management (B). We suggest that these two elements be merged in one to concentrate the subject under just one label, probably "Colors and its management" under E10.5.

IBSC Comment: noted but the general flow of learning from basics and construction through process to the production are felt appropriate.

COLOMBIA

With reference to the request for comments on the draft new edition 1.0.0 of IHO publication S-8B - *Standards of Competence for Category "B" Nautical Cartographers*, with full attention, the Maritime General Directorate, responsible for the Hydrographic Service of Colombia, recommends to the IBSC to include the following topics:
"Complementary hydrographic data, such as satellite derived bathymetry (SDB)"; and "Crowd-sourced Bathymetry (CSB)". Likewise, it is suggested to take into account the general comments received in the publication of S-5A and S-5B.

IBSC Comment: satellite derived bathymetry included in E5.1 and E5.5 but crowd-sourced bathymetry was not considered for Category "B". The general comments received for S-5A and S-5B were taken into consideration.

ESTONIA

1. As the companion document for S-8B - Guidelines for the Implementation of the Standards of Competence for Hydrographic Surveyors and Nautical Cartographers is not available yet, the whole picture of the standard is missing.
2. Page 4, 3. Programme preparation and submission Not clear about what cross reference table it is written and where on www.iho.int it is possible to find it.
3. There could be added subjects like ENC scales, SCAMIN, relationship between ENC and paper chart (same data, same updates etc.), text and picture files added to ENC, data assessment in NtM, ENC updates and navigational warnings context, WEND, gaps and overlaps, data harmonization between neighbouring countries.

IBSC Comment: the amended Guidelines for the Implementation of the Standards of Competence for Hydrographic Surveyors and Nautical Cartographers is available from the IHO website.

FRANCE

As requested in the reference, please find attached the comments from SHOM to the draft New Edition 1.0.0 of the IHO Publication S-8B – Standards of Competence for Category "B" Nautical Cartographers. The more important aspects are the following:

- Geodesy: In the course of their work the cartographers are compelled to compile recent and old data. It is therefore essential that they have a good knowledge of modern geodetic systems but also of the old geodetic systems;
- Hydrography: same remark as above; Cartographers must be familiar with modern hydrographic techniques, but also with the old ones;
- Information and communication technology: Category "B" cartographers use standardized software and there is no use in knowing programming methods and languages.

ANNEX

B1.6 Errors and Statistics

- Current: Describe possible sources of error as a result of utilization of a chart (i.e. measurement, digitization).

  Suggested: Describe and classify possible sources of error as a result of utilization of a chart (i.e. measurement, digitization).

IBSC Comment: noted and accepted.

B1.7 Least squares

- Current: Perform a least square calculation and interpret results.

  Suggested: Describe the least square calculation method and give examples of the use.

IBSC Comment: noted but consider the current description "Perform" appropriate for the level of knowledge.

B2.3 Programming

- Write software programs for simple data format conversion and/or basic algorithm computation.
- Perform simple computations using common application environments.

  Suggested: Describe scripting methods and give examples.

(i) Basic operations of a computer program or script
(ii) Algorithms (loops, conditional instructions)
(iii) Programming languages (Visual Basic, Visual C++, Python, Java)
(iv) Scientific computation environments (e.g. Matlab)
(v) Application to data exchange, file and format conversion

Suggested: Scripting methods. Application to data exchange, file and format conversion.

IBSC Comment: noted, however as the Intermediate knowledge level is required no change is made.

B3.2 Marine geomorphology and marine geographic features

- Explain the concept of marine geomorphology.

(i) Marine Geomorphology
• concepts

Suggested: Not for Category "B".

IBSC Comment: noted and some amendments have been made.

B3.3 Marine geophysics

(i) Marine geophysics
• concepts
• definitions

Suggested: Notion of gravity, seismic and magnetism.

IBSC Comment: noted and amended.

B3.4 Ocean properties and dynamics

- Describe ocean dynamics.

Suggested: Describe ocean dynamics (Including tides, currents).

(ii) Ocean Dynamics
• motion

Suggested: Motion and general dynamics.

IBSC Comment: noted and amended on the basis of comments.

E1.1 Introduction to geodesy

- Describe the figure of the Earth as a geoid, an ellipsoid of revolution and a sphere.
- Describe the geometry of lines on the sphere and the ellipsoid.
- Describe and specify the characteristics of loxodrome and orthodrome.

Question: Geodetic lines?

IBSC Comment: noted by the IBSC considered there is no need to change.

Suggested: Add: Describe frame and coordinate transformations and apply using available software

IBSC Comment: covered in E1.3.

E1.2 Coordinate systems, frames and datums

- Describe and specify modern geodetic reference systems and associated reference frames.

  Suggested: Add: former (traditional) geodetic reference systems and datums

IBSC Comment: Noted. Amended by removing apply and inserted traditional.

E1.3 Geodetic transformations and associated computations

- Describe and apply horizontal and vertical datum transformation methods using available software.

  Suggested: Describe horizontal and vertical datums transformation methods and apply using available software

IBSC Comment: noted by the IBSC considered there is no need to change.

E2.2a Map projections

- Describe the UTM projection system.

  Suggested: Add Mercator, lambert projection system

IBSC Comment: this is not applicable for projection systems.

(vii) The UTM projection system

Suggested: Describe common projections used in cartography

IBSC Comment: noted (referred in E2.2b).

E2.2b Study of map distortions

Suggested: E2.2b should be merged with E2.2a

IBSC Comment: noted but considered different topics at different knowledge levels.

(ii) Tissot's theorem

Comment: Notion on Tissot's Indicatrix is sufficient at Category"B" level

IBSC Comment: noted but the IBSC considered both necessary.

E2.3 Abstract representation and generalization

- Explain the rationale for generalization.

  Suggested: Detail the rationale for generalization

IBSC Comment: noted, however explain is considered the appropriate taxonomy term for the level.

- Perform generalization of point, line and polygon features using appropriate generalization algorithms and associated parameters' values.

  Suggested: Add: Perform manually generalization …

IBSC Comment: noted and amended accordingly.

E2.4 Relief representation

(iv) Digital representation of the relief - Digital Elevation Models [DEM] and methods of interpolation (Inverse distance, TIN, GRID, Kriging).

Suggested: Delete

IBSC Comment: noted but the IBSC decided to retain the text for guidance.

E2.5 Cartographic data measurement

Suggested: See E2.1 (IV) ???

IBSC Comment: noted and amended the text to clarify.

E2.6 Symbolization

- Explain the rationale for symbolization.
- Describe visual variables.

Suggested: Detail

IBSC Comment: the IBSC decided not to change.

E2.7 Color

- Explain the rationale, role and importance of color and its use in mapping and charting.

Suggested: Detail

IBSC Comment: the IBSC decided not to change.

- Differentiate color for various computer graphics and lithographic applications.

Suggested: Delete

IBSC Comment: noted and "lithographic" altered to "printing".

E2.8 Map/chart lettering and toponymy

- Explain the rationale and the functionality of toponymic display.

Suggested: Detail

IBSC Comment: the IBSC decided not to change.

- Describe appropriate use of lettering in relation to the inherent characteristics of cartographic features.

  Suggested: Describe and apply

IBSC Comment: noted and amended to "describe and demonstrate".

E2.9 Cartographic design

- Describe the principles and characteristics underpinning good cartographic design.

  Suggested: Describe and apply

IBSC Comment: the IBSC decided not to change.

- Identify selected maps/charts in terms of the principles of good cartographic design (with proper justification).

  Suggested: Delete

IBSC Comment: the IBSC decided not to change.

E2.10 Map/chart compilation and composition

- Describe the logical process of cartographic compilation and composition identifying discrete stages.

  Suggested: Describe and apply

IBSC Comment: the IBSC decided not to change. Application is covered in the later Nautical Cartography section.

- Develop a digital and an analog compilation worksheet covering a defined region and utilize it for map/chart composition and symbolization.

  Suggested: Covering different types of regions (rocky, flat, rivers, coral…)

IBSC Comment: noted but no change. The term region here refers to a geographical region.

E3.4 Hydrographic surveys

- Describe and explain hydrographic survey operations essential to ensure nautical charting integrity.

  Comment: Fundamental for cartographers to have an accurate view on all legacy survey methods. New and former method

IBSC Comment: noted but considered covered in E3.4, E3.5 and E3.6.

E3.5 Positioning

- Describe different methods and systems used for positioning with respect to their accuracy.

Suggested: Describe different methods and systems used for positioning with respect to their accuracy (including legacy systems)

(i) Evolution of technology in positioning

Suggested: could be: history of positioning technologies

(iii) Relative accuracy of commonly available systems

Suggested: Relative accuracy of commonly available systems and legacy systems

IBSC Comment: noted but the IBSC decided not to change.

E3.6 Depth measurement

(i) Evolution of technology and methodologies for depth measurement

Suggested: history of technologies

IBSC Comment: noted but the IBSC decided not to change.

E4.1 Coastline and topographic data

- Describe different categories of coastline and their depiction.

Suggested: Detail

IBSC Comment: noted but the IBSC decided not to change.

E4.6 Oceanographic data

- Display tidal data on nautical charts.

Suggested: tidal and currents

(iii) Tidal data

Suggested: tidal and currents

IBSC Comment: noted and amended accordingly.

E4.9 Spatial data transfer

- Explain the rationale underpinning spatial data transfer.

Suggested: Explain spatial data transfer and storage

(ii) Methods for spatial data transfer

Suggested: and storage

IBSC Comment: noted and amended (see E6.9).

E4.11 Data for special purpose charting

(ii) Data types:

Suggested: Data examples

IBSC Comment: noted but not changed (now in E4.10).

E5.1 Photogrammetry and remote sensing - application to charting

- Positional control including use of aerial GPS

  Suggested: Positional control

IBSC Comment: noted but not changed.

E5.3 Geometric modelling

- Prepare photogrammetric and remotely sensed imagery for feature extraction.

  Suggested: Explain how to prepare photogrammetric and remotely sensed imagery for feature extraction

IBSC Comment: noted and amended.

E5.5 Shoreline delineation, feature extraction and satellite bathymetry

- Perform shoreline extraction with regard to the state of the tide at the time of imagery.

  Suggested: Explain how to perform shoreline extraction with regard to tide level at the time of imagery.

- Utilize remotely sensed images for bathymetry

  Suggested: Discuss the use remotely sensed images for deriving bathymetry

- Extract hydrographic features: reefs, rocks, hazards, sea-bed features.

  Suggested: Explain how to extract hydrographic features: reefs, rocks, hazards, sea-bed features.

IBSC Comment: noted but not changed.

E6.4 Geospatial data transformations

(iv) Problems associated with geospatial data transformations

Question: What does that mean?

IBSC Comment: noted and amended to reflect this point.

E6.5 Geospatial and cartographic databases

- Build and populate a spatial database in a DBMS and use it to support cartographic composition.

  Suggested: Populate a spatial database in a DBMS and use it to support cartographic composition.

IBSC Comment: noted and amended accordingly (see E6.6).

E6.7 Raster data compression

(i) Raster data compression methods
•Run-length encoding
•Freeman chain codes
•Quad tree encoding
•JPEG compression

Suggested: Raster data compression methods

IBSC Comment: noted but not changed (see E6.8)

E7.3b Data sources

- Analyze methods applied for the appropriate selection and homogenization of source data.

  Suggested: Describe methods applied for the appropriate selection and homogenization of source data

IBSC Comment: noted but verb used is appropriate for the knowledge level and text not changed.

E7.3g Mapping on demand

Question: Utility?

IBSC Comment: noted but no change. Mapping to customer requirements is considered relevant.

E7.4a Commercial Systems

- Identify common commercial systems used for map/chart composition.

  Suggested: Describe common commercial systems used for map/chart composition.

- Identify commercial graphic and image processing systems.

  Suggested: Describe commercial graphic and image processing systems.

IBSC Comment: noted but no change for basic level awareness.

E8.3 Law of the Sea

Add: Explain the methods to calculate those limits

IBSC Comment: noted but not felt appropriate for the knowledge level.

INDIA

The syllabus for the Category 'B' Nautical Cartographers has been well drafted and all the relevant topics are adequately covered. INHO has no objection for adoption of S-8B (Version 1.0.0).

IBSC Comment: the IBSC thanks India for the support.

ITALY

Italy has no comments on draft new edition 1.0.0 of IHO publication S-8B

IBSC Comment: noted.

MEXICO

The content of the publication was reviewed and considered complete with respect to the proposed topics, observing that the topic of legal matters related to nautical cartography deals with issues like the law of the sea (UNCLOS), as relevant topics to take into account during the cartographic production.

IBSC Comment: noted and included in E8.3.

It is generally considered that the structure of the items and sub-items in terms of content is correct and appropriate, however it is suggested to add a sub-item on Web Map Services - WMS, due to the fact that there are currently an increasing number of geographic data resources that can serve as basis for the production of nautical charts and thus solve the problem that some countries may have because with the lack of information for the construction of nautical charts. I suggest that the above topic (WMS) could be included in one of the following topics:
a. E6.5 Geospatial and cartographic databases.
b. E7.4 Map/Chart production systems.

IBSC Comment: noted. Inserted at E6.11 Web services.

PERU

I am pleased to address to you both to greet you and to refer to your Circular Letter N° 57/2016 dated 10 October 2016, in which you require the Member States' comments about the draft new Edition 1.0.0 of IHO Publication S-8B - *Standards of Competence for Category "B" Nautical Cartographers*.

To this respect, I would like to inform you that this Directorate agrees with the concerned project and recommends the approval of the IHO Publication S-8B new Edition, in which are considered the necessary courses for Category "B" Nautical Cartographers' training.

IBSC Comment: the IBSC thanks Peru for the support.

SPAIN

For the convenience of the subjects' validation and of the programmes development and taking into consideration that the contents of the publications are identical, we propose to modify the numbering of the contents of S-5B and S-8B, as follows:

Subject B1. Mathematics, Statistics and Theory of Errors:
In the S-8B, we propose that items: "B1.3 Linear Algebra, B1.4 Differential Calculus, B1.5 Trigonometry, B.1.7 Least Squares and B1.8 Interpolation" should be renamed in the following way (that would match with the naming in the S-5B): "B.1.1 Linear Algebra, B1.2 Differential Calculus, B1.3 Trigonometry, B1.6 Least Squares and B1.7 Interpolation".

Concerning the issue of the B2. Communication and Information technology:
In the S8 B, where it reads: "The UD B2.4 Databases, B2.5 Web and network Communications", we propose likewise that they have the same naming as in the S-5B, which would be: "B2.4 Web and Network Communications, B2.5 Databases".

IBSC Comment: noted but not changed. The documents are prepared to stand each independently. Some subtle differences are unavoidable.

UNITED KINGDOM

With regards to the above Circular Letter, the UKHO have reviewed the content of S-8B: the inclusion of the Comprehensive Chart Project into the standards of competence for category "B" nautical cartographers and fully support this draft proposal.

IBSC Comment: the IBSC thanks the United Kingdom for the support.

URUGUAY

I have the pleasure to address you in reference to the Circular Letter Nº 57/2016 to express my compliments to all that participated in the preparation of the Standards of Competence for Category "B" Nautical Cartographers, IHO Publication S-8B under the supervision of the IBSC.

IBSC Comment: the IBSC thanks Uruguay for the support.

STAKEHOLDERS

IIC TECHNOLOGIES

IC Academy Comments on draft new edition 1.0.0 of IHO/FIG/ICA publication S-8B Standards of Competence for Nautical Cartographers

B.l & B.2 (Mathematics, Statistics, Theory of Errors; and Information and Communication Technology)
1. The syllabus outlined under the sections B.l and B.2 will normally have been covered by the participants to the course in their qualifying examination. The higher secondary grades in school syllabi include all the topics elucidated in B.l and B.2 in great depth. Therefore, if the participants possess qualifications to evidence that these portions have been covered by them, should be treated as a valid reason to waive off the requirement of covering the sections B.l and B.2 as part of the formal S-8B course.

IBSC Comment: this is in line with the Exemption policy in the guidelines.

2. The prime consumers of the S-8B course will be the millennial, who are expected to be net-savvy and well versed with the basics of computer and web technologies. Although the relational Data Base Management System *(B.2A)* forms a good foundational material, the world is rapidly progressing towards Big Data and absorbing technologies as Multi-dimensional data models and business intelligence tools. Such advances will further spur the scope and growth of marine data by way of Marine Spatial Data Infrastructure. Therefore, the topics elucidated in the section B.2 must significantly emphasize on such technological developments, including cloud-managed database services.

IBSC Comment: as the Standards represent a minimum level and acknowledging the new technology and its utilization we are not yet able to state that cloud based storage is going to be commonly adopted for the future.
An amendment to B2.1 item 4 ill now include "Describe and interact with the most commonly used data storage devices and the cloud.

B.3 (Earth Sciences and Marine Geography)
3. Well covered. The topics covered in B.3 would enable nautical cartographers to understand various processes involved on the planet Earth, with emphasis on the marine environment.

IBSC Comment: noted.

E.l & E.2 (General Geodesy; and General Cartography)

4. Well covered. No comments.

IBSC Comment: noted.

E.3 Hydrography
5. Suggest, rename the title as 'Hydrography and nautical products' to reflect the content covered therein.

IBSC Comment: noted and accepted.

E.4 and E.5 (Data for Nautical and Special Purpose Charting; and Photogrammetry and Remote Sensing)
6. Well covered. No comments.

IBSC Comment: noted.

E.6 Geospatial Information and Processing
7. Well covered to reflect current geospatial data management concepts. Section *B.2A* may be dovetailed with this section and may include the advances in data management and analysis technologies elucidated in paragraph 2 of this document.

IBSC Comment: B2.4 is about databases whilst E6 refers to the processes and it's not considered necessary to amend.

E.7 Nautical Cartography
8. This section is well covered. However E.7.3 "Nautical Chart Production" may be renamed as "Nautical Chart Compilation" to match the topics covered.

IBSC Comment: amended to Nautical Chart Compilation and Production.

E.8 Legal aspects (relating to nautical cartography)
9. Well covered. No comments.

IBSC Comment: noted.

E.9 Special Purpose Charting
10. We would appreciate knowing more of the context for the inclusion of this section as a mandatory part of the syllabus rather than as an option. For IIC as a commercial company we deal with each of the survey types and it poses no problem. We would defer to our HO colleagues and their views on its inclusion. We would offer the opinion that in our experience knowledge of engineering-type special purpose charting is more useful in understanding data quality and utility than in presentation. Examination of the standards deployed in engineering type standards may be of greater value if placed within the context of E4.2 and 4.11 with a focus on data quality and utility rather than presentation. The latter may be better placed in *SS.*

IBSC Comment: noted: In seeking comment from the broader hydrographic community, the Board was presented with argument that Nautical Cartography is not only about nautical charting. Guidance for presentation aspects of special purpose charting was strongly suggested. It was decided that insertion of a section as BASIC presentation guidance would permit submissions to emphasize, or not, their requirement appropriately. The approach is in accord with the approved philosophy for the development of the revised documents. Data quality and processes from a cartographic viewpoint permeates the document.

E.10 Map/Chart Reproduction
11. No comments.

IBSC Comment: noted.

Comprehensive Cartographic Project
12. Well covered and we welcome the clarity.

IBSC Comment: noted.