

Paper for Consideration by WENDWG**DE report on new ENC schema**

Submitted by:	Germany
Executive Summary:	Germany shares the rational and the experiences made by replacing the old ENC coverage by a sophisticated gridding schema.
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Introduction/Background

Some years ago, the BSH decided to replace the paper chart production by a new system based on standardized DIN A0 and DIN A4 formats. This replacement came together with a full restructure of the chart scales and coverages.

Considering that the ENC production at this time was also based on these old chart coverages, BSH took the opportunity to start restructuring the old ENC coverage scheme with a new gridded scheme. These new scheme would bring our ENC production to the next level. The scheme is flexible, it avoids paper chart based overlaps, and finally, would simplify the ENC production process. By avoiding ENC overlaps, the new scheme will support a simpler shift to the S-101 ENC production in the future.

A further reason was the start of the bENC production with a regular grid. bENC is a national product for operative use providing high-density depth information.

It was the intention to create a general and flexible system for the ENCs that is suitable for both the North Sea and the Baltic Sea areas. Ultimately, BSH established a system that:

- is flexible and easy to understand,
- supports our data-base-related processes, and
- fits nicely in a new S-100 based production environment.

Analyses/Discussion

The ENCs scheme is based on the above mentioned bENC regular grid with an extent of 2x2 minutes.

The coordinate origin for the new General, Coastal and Approach ENC grid is located at 55° 58' N and 003° 16' E, which is near the northwesternmost point of the German EEZ in the North Sea.

Each new Approach ENC is a multiple of the bENC 2x2 minutes' grid. The Approach ENC grid schema forms the basis of the entire ENC grid for German waters.

Every Approach ENC has an extent of 10x20 minutes and every Coastal ENC has an extent of 60x80 minutes.

BSH did not apply the gridding schema for Overview, Harbour and Berthing ENCs. Following the gridding scheme, the current spatial extent of the Overview ENC is too large for applying a 2x2 minutes' grid. Most of the Harbour and Berthing ENCs are too small for applying the 2x2 minutes raster. However, we used the raster for harbour ENCs if considered appropriate.

For edge matching purposes at the outer limit of the German EEZ, we managed together with our neighbouring HOs a sufficient 5 metres overlap, and we ensured that no gaps between the bordering ENC's exist. In addition, a close contact with the RENC is important to coordinate the validation and release of the new ENC's, as well as the cancellation of the old ENC's.

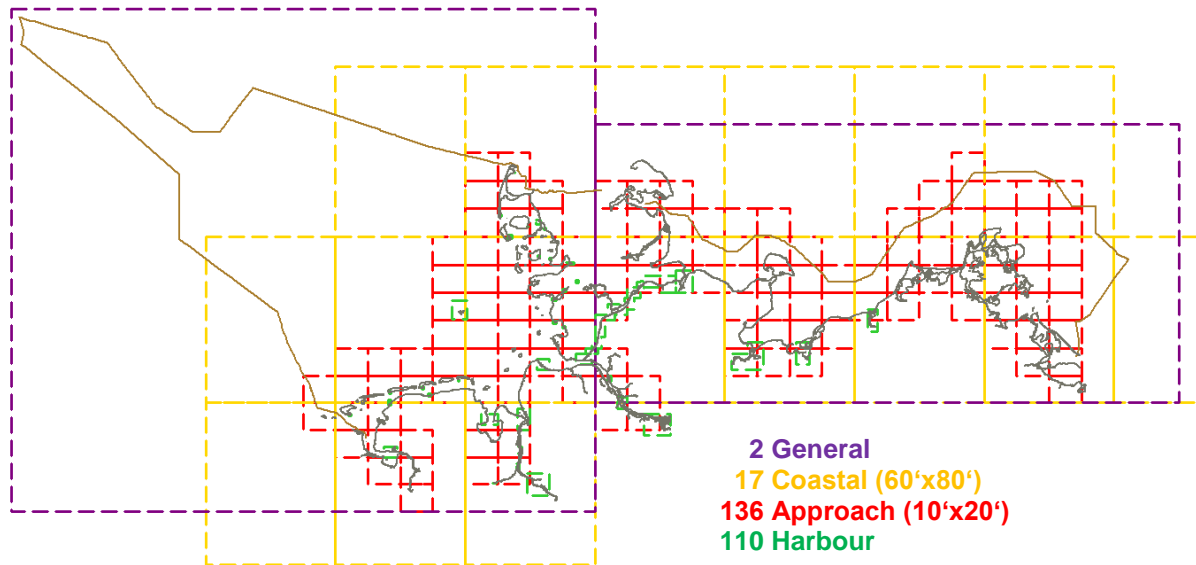


Figure 1 Initial idea of the new ENC Scheme of all ENC Usage Bands (2019)

BSH also introduced a new nomenclature, which is easy to understand and which also provides the necessary flexibility. The new ENC name for an Approach ENC is for example **DE4NO14P**. The first two letters **DE** stand for the producing agency (BSH). The following number **4** stands for the usage band (Approach) and the next two letters **NO** stand here for the region (North Sea). The next number **14** stands for the row in the grid and the last letter **P** stands for the column of the grid.

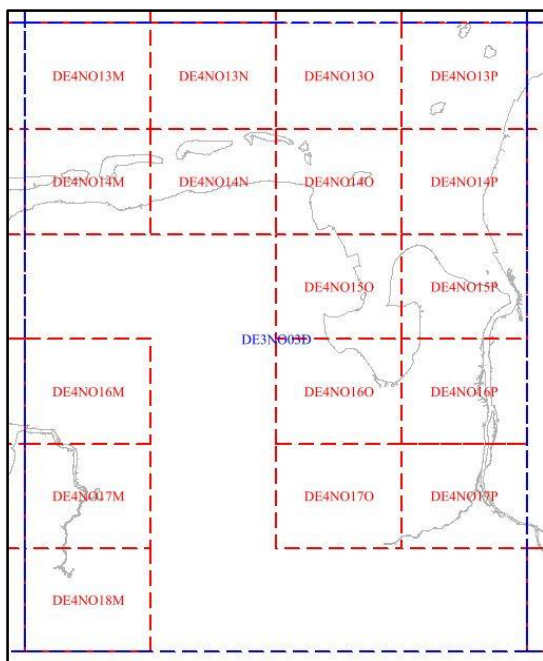


Figure 2 Diagram presenting the naming of the grid tiles. The red tiles are the Approach ENC's and the blue lines form a Coastal ENC tile

Conclusion

The new gridded system allows simple conversion of the existing ENC coverage. The scheme reduces ENC spatial overlaps. The scheme is a sufficient solution during the forthcoming parallel production of S-57 and S-101 ENCs. It is also suitable for other S-100 related products. First trials with S-122 data are ongoing.

Justifications and impacts

Back in 2019, the way in which BSH produced ENC was not harmonised. The North Sea ENC data were based on real source data, whereas the Baltic Sea ENC data were still remained on paper charts.

Considering the forthcoming challenges in converting the whole ENC scheme, and taking into account that the database content in the North Sea was already based on source data, we decided to start with the North Sea area first. It was necessary to set the data status of the 1:30.000 and 1:50.000 scales content on "VERIFIED" at a fixed time. The full data processing must had to be completed. For a small period, only NtM-relevant changes to the source data were permitted.

Based on this comfortable situation, we were able to adapt the new ENC scheme for each of the usage bands Approach and Coastal in one significant shift.

IC-ENC was requested to release all new Approach ENCs at the same time. In parallel, all old Approach ENCs had to be cancelled. In close cooperation with IC-ENC, we managed to replace the old with new Coastal ENCs a month later in the same way.

Each of the shifts themselves were realised within a timeframe of a day. However, it required a huge amount of preparation work from BSH and IC-ENC to have the necessary staff available.

We have a different situation in the German Baltic Sea area. Considering the North Sea experiences, and noting that the source data collection was ongoing, we decided to apply the new Approach ENC schema iteratively. The shift from the chart based to the gridded schema could only be proceeded gradually. A new Approach ENC could only be produced and released once the source data collection is finished. Then challenge for the ENC production team is to align the old paper chart based ENCs and the new grid based ENCs.

The work on applying the grid schema for the Approach ENCs in the Baltic Sea is ongoing. Once completed, BSH will start to produce Coastal ENCs based on the new grid system.

Applying the grid system to all German Harbour and Berthing ENCs is under consideration. If decided positively, it will not start before 2024.

The pre-preparation work and the "converting all in once" procedure used for the North Sea area needed the following time periods:

Launch week = T

T-7 months	finalising the change setup plan
T-6 months	tuning work items and schedule with IC-ENC
T-5 months	start of new ENC preparation
T-8 weeks	stop source data updates
T-6 weeks	source data are all on "VERIFIED" status
T-3 weeks	final compare of new ENCs (NtM corrections), forwarding new ENCs to IC-ENC
T-2 weeks	resuming source data updates, IC-ENC check of new ENCs
T	Preparing cancellation updates and distribution if IC-ENC check was positive

The iterative process in the Baltic Sea takes much more time and is more complicated. However, it needs less staff involvement and coordination efforts for both BSH and IC-ENC.

Action required of WENDWG:

The WENDWG is invited to:

- a. Note the report.