

This article is intended for leisure sailors and masters of small fishing vessels. More comprehensive information is given in the document, *Facts about chart and carriage requirements*, which has been compiled by the Hydrographic Offices of Denmark, Finland, France (SHOM), Germany, Norway, Sweden and the United Kingdom. This document is available at www.primar-stavanger.org, www.shom.fr and www.ic-enc.org, and is kept up-to-date on a regular basis.

Regulations

The International Convention for the Safety of Life at Sea (SOLAS) created by the International Maritime Organisation (IMO) requires the carriage of official nautical charts and publications appropriate to a vessel's intended voyage. This requirement applies to all vessels and may be satisfied in full or part by electronic means.

Which regulations apply to vessels (leisure and small fishing boats)?

It is those of the nation where the vessel is registered (the vessel's Flag State).

In France the SOLAS convention has been implemented within the French safety of shipping regulations. Vessels registered in France must comply with the appropriate sections of these regulations. For example the regulations applicable to the French leisure boats and small fishing boats, both of less than 24 metres in length, are laid out in sections 224, and 226 and 227 respectively.

Since 1st January 2005 French leisure sailors have been able to use electronic chart systems to meet these requirements in lieu of paper charts

Electronic Charts

What are the differences between official electronic charts and electronic charts produced by the private sector?

Charts (including electronic charts) that meet the requirements of SOLAS have been defined by IMO as those "produced by, or on the authority of a government, authorised hydrographic office or other competent government institution"; such charts are often called 'official'. Official charts are maintained by a regular update service and are the only charts that carry a guarantee of quality and integrity backed by government institution.

All other charts are, by their nature, non-official and are often called 'private charts'.

Whilst private charts are often based on official charts and sometime carry the same numbering, they are not in any way controlled, or validated (for quality, integrity or correctness of the information), by a government organisation. Moreover the companies producing private charts may disclaim liability in the case of an accident caused by errors or omissions on the chart. See section "What is the quality of privately produced electronic charts?" below.

What are the different types of electronic charts?

There are two main types of electronic charts – vector charts and raster charts.

Official vector charts are called **ENCs** (Electronic Navigational Charts) and official raster charts are called **RNCs** (Raster Navigational Charts).

It should be noted that all ENCs are geographically referenced to WGS84 datum and are therefore compatible with GPS positioning systems. This is not always the case for RNCs (or private charts – vector or raster) which may be referenced to other horizontal datums or be of unknown datum. In these cases mariners should be aware that the vessel position derived from GPS and displayed on the electronic chart may be incorrect and should use appropriate caution.

The terms ENC and RNC are not protected and in some cases they have been used inaccurately to describe privately produced charts. To avoid confusion the term 'official' is often added as a qualifier to ENC and RNC to distinguish them from private charts.

ENCs and RNCs -

The picture next page shows the difference of presentation between a paper chart an RNC and an ENC. Some of the differences are due to the shape of billing, chosen among those offered by the system of visualization of ENC.

Who produces ENCs and RNCs?

ENC. ENCs conform to IHO Transfer Standard for Digital Hydrographic Data (S-57). National hydrographic offices are responsible for producing the ENCs of waters under their jurisdiction (coastal waters and other areas for which they have charting responsibility). For example French waters are covered by ENCs produced by the French Hydrographic Office (SHOM, Service Hydrographique Oceanographique de la Maritime) whilst ENCs of UK waters are produced by the UK Hydrographic Office (UKHO). Each nation produces ENCs only to the agreed international boundary to avoid overlap of data and thus **for one geographic area at a set scale there is a single unique ENC**. ENCs are therefore, in a way, national; however there are some exceptions to this rule :

— the rules of the International Hydrographic Organisation (IHO) allow member states to share the responsibility, and burden of work, for producing ENCs at small scales of broad ocean areas. To avoid unnecessary duplication of effort that can be detrimental to safety of navigation a single nation will sometimes produce a small scale ENC that covers other nations waters, and so to produce only a single ENC for one geographic area and one scale ;

— the cell limits of ENCs produced by adjoining nations may occasionally overlap; however the data contained within these cells does not. The actual limits of the ENC coverage can be agreed between the hydrographic offices of adjoining nations. These limits are often defined by meridians and parallels taking into account of the features used for navigation (points, headlands or conspicuous marks); these are often very different to the maritime boundaries between nations;

— finally, under bilateral agreements, it is permitted for a nation that has ENC production capacity to assist another that doesn't currently have the capability by producing ENCs on their behalf.

RNC. RNCs created by a hydrographic office may cover areas outside of their national waters. For example the United Kingdom Hydrographic Office has, with the agreement of each nation concerned, created a near world wide coverage of RNCs supplied as the Admiralty Raster Chart Service (ARCS) service. RNCs conform to IHO Product Specifications for RNCs (S-61).

How are ENCs distributed, where can you purchase them?

The distribution of ENCs and their updates is entrusted to the Regional ENC Co-ordinating Centres (RENCs). Two RENCs* have been established in Europe, Primar Stavanger and IC-ENC (the International Centre for ENCs).

PRIMAR Stavanger sells ENCs from the majority of ENC producing hydrographic offices through a network of distributors (see list at www.primar.stavanger.org). IC-ENC uses value added retailers for distribution (see list at www.ic-enc.org).

ENCs are sold by the “ cell ” (a cell covering an area approximately equivalent to a paper chart) ; an update service is included for a fixed period (normally one year). They are only sold in encrypted form**

A few nations do not use RENCS for distribution of their ENCs, preferring to make their own arrangements. The IHO website (<http://www.iho.shom.fr/> - follow links to ENC and ENC coverage) provides details of the websites of national hydrographic offices where further useful information may be found.

*The RENCS provide a final quality assurance check on the ENC data and updates provided by hydrographic offices Each of European RENCS makes available the ENCs of their participating nations along with those of the other RENC via a network of distributors or value added resellers.

**The encryption of ENCs (IHO Data Protection Scheme S-63) serves a double function; the authentication of the product (proving it has been supplied by the hydrographic office concerned), and guarantee of product integrity.

Coverage of ENCs.

The extent of ENC coverage can be seen on the web sites of individual Hydrographic Offices and also on those of the RENCS and of the IHO – viz:

- www.primar.stavanger.org and www.ic-enc.org. These web based Chart Catalogues allow the display of effective coverage* and the selection of ENCs by function, for the planned voyage.

- The IHO also maintain a catalogue (www.iho.shom.fr/ - follow the links ENCS, ENC coverage and then ‘browse catalogue’). This catalogue permits a rapid overview of world coverage; it is updated weekly and also shows coverage that is predicted to be available in the near future.

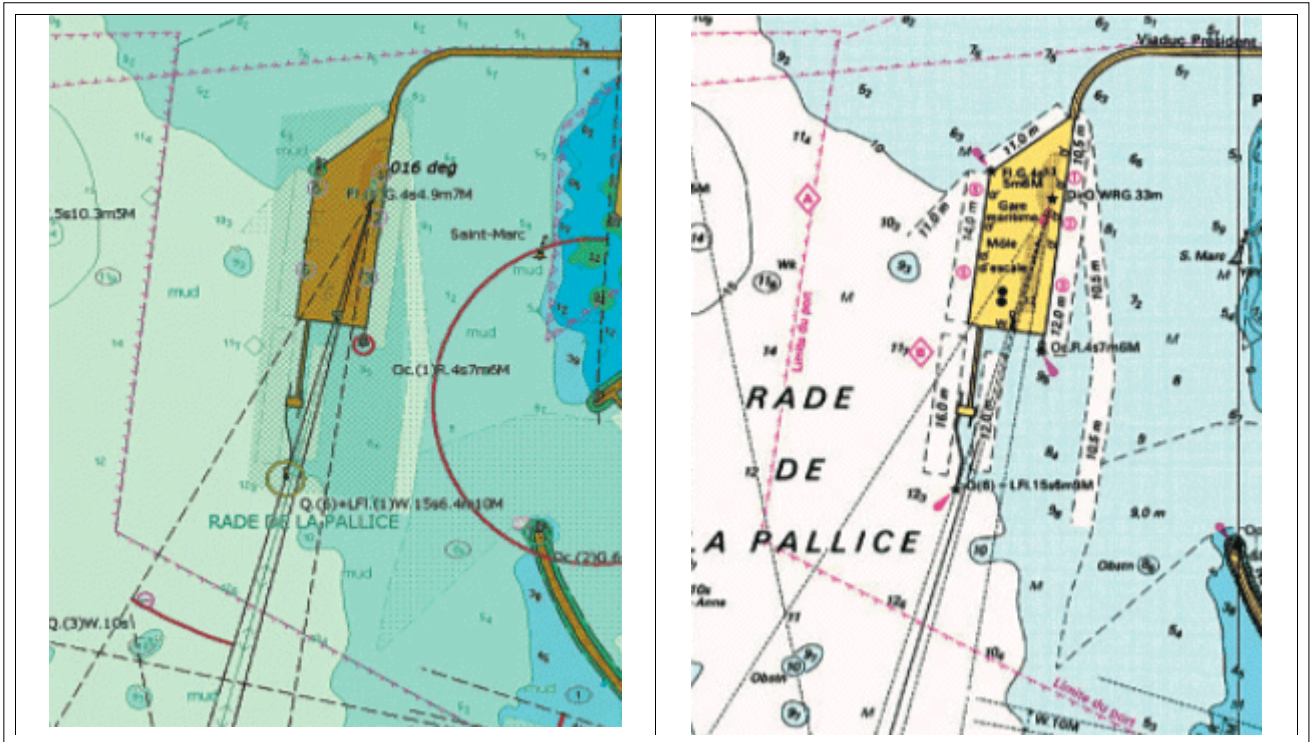
- The SHOM ENC catalogue (www.shom.fr/fr_page/fr_prod_cartes/cc/html/index_f.htm). It shows the coverage of ENCs produced by SHOM both for French coastal waters, other waters under French jurisdiction and for other areas by agreement (*Vue générale de la couverture des ENC en métropole et hors métropole*).

* ENC cell limits are always rectangular, however the limits of data coverage within the cell may only cover a portion of the rectangle and be of any shape.

Update:

ENC Updating: ENC's are normally purchased from distributors with a one year subscription to updates. This service includes the supply of weekly corrections (ERs) and new editions to ENC's. These updates can be obtained either on CDROM or via telecommunications systems such as Inmarsat. Today it is also possible for a subscriber to download these updates by using the " Online PRIMAR " service via the Internet. This service allows a user to automatically update their ENC portfolio without delay for any new nautical information made available by SHOM.

The automatic updating of ENC is now quick, dependable and robust and this improves safety of navigation and reduces the navigator's workload.



Extracts : ENC FR 502270 (to your left) and SHOM chart 7413 (paper / RNC) at paper chart scale 1

What nautical charts should the leisure sailor or fisherman use?

Paper charts or electronic charts?

It's a free choice. However if you do use electronic charts it is wise to maintain a small number of paper charts on board just in case of damage to the display system or electrical failure.

ENC/RNCs or private charts?

Some advice to leisure sailors:

- if you don't use ENC's or RNC's, it is best to navigate with private raster charts rather than private vector charts of uncertain quality.
- the electronic chart needs to be up-to-date. ENC's and RNC's are continually updated; this is not generally the case for private charts (vector or raster).

What is the quality of privately produced electronic charts?

When considering the use of private electronic charts, it is generally wise to carefully check their validity and adequacy for the intended use; for example :

- *the source of the data for the electronic chart* : is it based on an official chart or not?
- *the completeness of the chart* : is it missing any of the elements of information essential for navigation (least depths, buoys etc)?
- *the edition date* : have there been new editions to the official chart used as source since this date?
- *the updating method* : is there an updating service for these electronic charts? What is the frequency of updating (weekly, monthly, yearly)?

- *the horizontal datum of the chart* : is it defined? Is the datum compatible with the display system and the positioning system on the vessel?

Electronic charts and zoom, what accuracy?

Electronic charts are, like paper charts, produced at different scales and the user cannot satisfy all requirements from a single chart. ENC's are classified in one of 6 categories depending on the navigational use for which they are intended (as a reminder paper charts are classified in one of 7 categories)

The scale of an ENC is a guide to the category in which it is assigned, but this is not a rigid rule. The scale ranges within the following table are indicative only.

Zoom.

Each electronic chart is intended to be displayed at a scale close to that of its paper chart equivalent. Use of the zoom function to enlarge the displayed area should therefore be limited. Significantly zooming the displayed image (similar to looking at a paper chart through a magnifying glass) doesn't provide any higher precision or any more detailed information. Over zooming the image can present an unacceptable risk because it can give a false impression of positional accuracy of the charted data and a false sense of distances between objects.

You **should ensure** that the electronic chart displayed on your screen is of an appropriate scale for your intended voyage. See table below (for ENC's, see also section "Scales and levels of detail" below).

Use of paper charts and ENC's, classification and comparison

Paper charts/ and RNCs		ENCs		
Names and uses	Indicative scale bands	Categories	Types of navigation	Indicative scale bands
Planispheres	1 : 5 000 000 to 1 : 15 000 000	1	Overview	< 1 : 1 500 000
Ocean charts	1 : 1 500 000 to 1 : 4 000 000			
Passage charts*	1 : 800 000 to 1 : 1 150 000	2	Général	1 : 350 000 to 1 : 1 500 000
Landfall charts**	1 : 300 000 to 1 : 600 000			
Coastal***	1 : 100 000 to 1 : 250 000	3	Coastal	1 : 90 000 to 1 : 350 000
Deep sea pilotage charts (local navigation, approaches to ports, complex passages)	1 : 30 000 to 1 : 90 000	4	Approach	1 : 22 000 to 1 : 90 000
Pilotage charts (ports, anchorages)	1 : 5 000 to 1 : 25 000	5	Port	1 : 4 000 to 1 : 22 000
		6	Berthing	> 1 : 4 000

NB: the first number in the ENC name shows the usage band that it has been assigned to

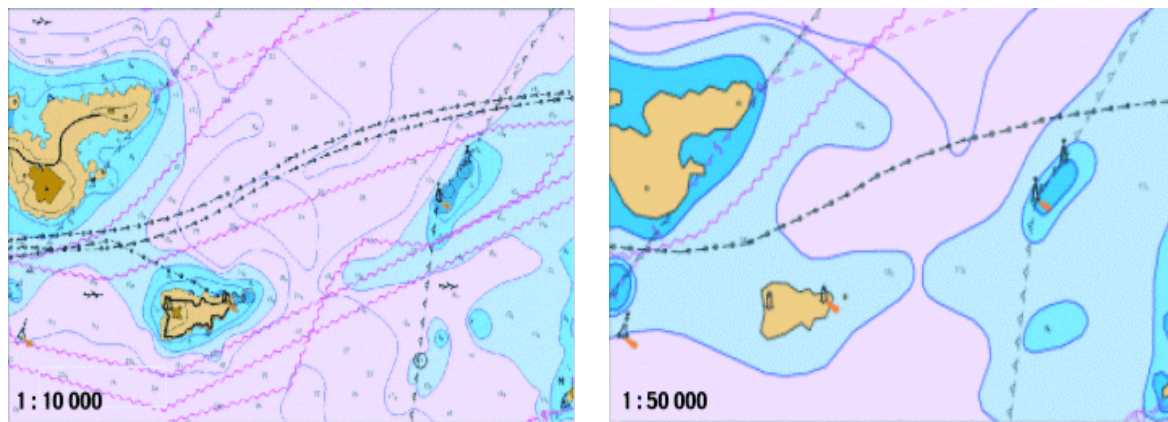
* Passage charts : navigation during which the ship remains most often between 50 and 200 miles from land

** Landfall charts : navigation which follows routes parallel to the coast at a distance between 20 and 50 miles and subsequent landfall.

*** Coastal charts : navigation parallel to the coast at a distance between 10 and 20 miles and normally greater than 3 miles from dangers.

Scales and levels of detail

For the same area the level of detail is notably different at each scale. As in the illustrated example of extracts from ENC FR603350 (1 : 10 000) et FR403330 (1 : 50 000) enlarged five times to show exactly the same area; larger scale ENCs contain numerous details / objects that are not shown on smaller scale ENCs of the same area.



It is necessary to ensure that the ENC to be displayed is of an appropriate scale for the intended navigational task (see table above).

Can leisure sailors navigate using ENCs?

The ENCs produced by hydrographic offices are a fundamental part of their whole thing. They can also be used by all compatible equipment and are not limited to professional navigators, to the contrary.

What ENC compatible equipment is available?

ECDIS (Electronic Chart Display and Information System) is designed for use by professional merchant mariners; to comply with international standards it has to include costly functionality. These systems have very advanced functionality (alarms etc) but are unsuitable for leisure users due to their high cost and size.

Simple electronic charting software packages that can display ENCs on a PC and are suited to the leisure user are available at an affordable price (a few hundred Euros). Very often they use the same colours and symbols as used in ECDIS by professional navigators; all have useful functions such as displaying GPS positions, planning and monitoring routes etc.

Not all such equipment is able to display encrypted ENCs. Systems that are compatible will be supplied with a unique ENC User Permit Number and a hardware key (dongle). When purchasing ENCs (the ENC user permit number is needed) access codes (cell permits) are provided; these allow the display of the ENCs.

Contact details for the manufacturers of electronic charting systems designed for the leisure user can be found on the following websites :

- http://catalogue.ukho.gov.uk/general_oems.asp
- <http://nauticalcharts.noaa.gov/mcd/enc/resource.htm>

Examples of French manufacturers of electronic charting systems designed for the leisure and fishing user, and able to display encrypted ENCs.

- Navicarte (Seapro software) : www.navicarte.fr
- Sodena (“mini-ECDIS” for fishing boats, YachtLiner for leisure boats) : www.sodena.net
- ScanNav (ScanNav version 55) : www.scannav.com

All these software packages which supply encrypted ENCs are also able to display RNCs like ARCS.

It is important to note that Sodena and ScanNav are distributors of Primar Stavanger and that Euronav (Navicarte's parent company based in UK) is a distributor of UKHO (IC-ENC).

Software prices are liable to change however as a guide ScanNav 55 is available from 120 euros (£80) and Navicarte and Sodena softwares from 500 euros (£350).

NB : the softwares of Maxsea that can supply ENCs (and RNCs) only supply unencrypted ENCs.