

# Canal & River Trust (CRT) Types of boats used on our waterways

## Narrowboat dimensions

A narrowboat or 'narrow boat' is a boat of a distinctive design, made to fit the narrow canals of the UK.

The key distinguishing feature of a narrowboat is its width which must be less than 2.13 m wide to navigate British narrow canals. Modern boats are usually produced to a maximum of 6 feet 10 inches (2.08 m) wide to guarantee easy passage throughout the complete system.

The maximum length is about 21.95 m which matches the length of the shortest locks on the system.



The hulls of narrow boats are generally made of steel, with the cabins constructed usually of steel, but also of wood or fibreglass. Most narrow boats built in the last 20 years will be of all steel construction. The most common construction size of steel is called 10-6-4. This refers to 10mm Bottom, 6mm to gunwale level and 4mm for the rest.

The number of licensed boats on canals and rivers managed by Canal & River Trust (CRT), is over 30,000.

Modern narrowboats are used for holidays, weekend breaks, touring, or as permanent or part-time residences. Usually, they have steel hulls and a steel superstructure, but when they were first being developed for leisure use in the 1970s glass reinforced plastic (fibre-glass) or timber was often used above gunwale height. Newer narrowboats, say post 1990, are usually powered by modern diesel engines. There will be at least 1.8 m internal headroom

Some narrow boats may have a more traditional style (called trads) than others. They allow more space in the rear for living accommodation or storage.

## Engine specifications

### Modern Diesel

The most popular choice is the modern Diesel engine. These are "High Speed" engines, running at around two to four thousand RPM. These engines can be bought specifically for Marine use, or a standard engine can be obtained and converted. Modern diesel engines will fit easily under the deck of cruiser and semi-traditional boats, and in a box in the rear cabin in traditional barges.

## ENGINE TYPES ON CANAL BOATS & NARROWBOATS (GENERAL)

Extract taken from [www.thefitoutpontoon.co.uk](http://www.thefitoutpontoon.co.uk)

There are many different engines fitted to canal boats but primarily they are all diesel powered. Even most electric boats will utilise a diesel generator to charge battery banks.

Very simply the commonest type of engine fitted to a canal boat is the diesel fuelled engine. Diesels are used regardless of whether the engine is used directly via a gearbox to drive a propeller or indirectly to provide charge to a large battery bank for electric propulsion.

## **Diesel vs Electric**

There are licensing concessions available to those who choose electric propulsion but in reality the battery bank required for power still needs to be recharged. There is not the infrastructure on the main waterways in place yet to provide regular and cost effective recharging points so the trusty diesel still has a very important place in our market.

## **Why Diesel?**

Diesels are simple, easy to maintain and safe. Fuel is readily available and at the time of writing relatively inexpensive. Carbon monoxide content of the exhaust is minimal so they are safer in this respect than petrol engines. They do not rely on highly energised, high voltage ignition circuits so are far more adaptable to an environment that is cold and damp.

Diesel fuel will burn in air but it will not explode, far safer in an enclosed marine environment where accumulations of vapours can form in poorly ventilated engine bays.

The nature of how the engines are built to allow diesel to be used mean they are much more heavily built than petrol engines. As a result of this heavier construction and the fact that diesel is a better lubricant than petrol means diesel engines have a greater lifespan than petrol engines.

## **Engine Marques**

Early diesel engines fitted to working canal boats around the turn of the 20th century were made by companies such as Bolinder and National. Vintage engines fitted to canal boat include marques such as Gardner, Lister and Russell Newbury. Classic engines were supplied by manufacturers such as BMC, Perkins, VW and Lombardini and marinised by companies such as Tempest and Thornycroft.

Modern engine manufacturers and suppliers/marinisers include Vetus, Beta Marine, Isuzu, Barrus Yanmar/Shire, Nanni, Kubota and Engines Plus/Canaline.

## **MOST COMMON TYPES OF ENGINES ON NARROWBOATS**

### **Extract from Practical Narrowboat magazine**

*“Diesel engines - Most marine diesels will be old. Very old. If your engine isn't, then its probably a Kubota - (re badged as Nanni marine or Beta or some such) for a kubota - read 'BMC'”*

### **Lister (common /older type) engines**

<http://www.lister-petter.co.uk/p/green-technologies>

Canal Star Engines

18, 27, 36, 45

Variable speed; maximum power at flywheel at 3000 r/min:

14.9—41.0 kW; 20—55 bhp

TECHNICAL DATA					
Canal Star model		18	27	36	45
Cylinders		2	3	4	4
Bore	mm	86	86	86	86
Stroke	mm	80	80	80	80
Total cylinder capacity	cm <sup>3</sup>	930	1395	1860	1860
Off load idle speed	r/min	800	800	800	800
Fuel consumption (approx.) at 1500 r/min	l/hr	1.2	1.8	2.4	2.7
Oil sump capacity	litres	3.3	4.5	5.6	5.6
Propeller rotation viewed from stern in forward gear		Clockwise			

Note: 1. The dimensions (mm) given are for guidance only and must not be used for installation purposes.

## RATING DEFINITIONS, TO ISO 3046

ISO Standard Conditions

Barometric pressure 100 kPa

Relative humidity 30%

Ambient temperature at air inlet manifold 25°C

### 1. Fixed speed power: continuous power (ICN)

The power in kW which the engine is capable of delivering continuously at the stated crankshaft speed, under ISO standard conditions, measured at the flywheel without power-absorbing accessories, provided that the engine is overhauled and maintained in good operating condition and that fuel to BS EN 590 Class A1 or A2, and lubricating oils to the correct performance specification and viscosity classification as recommended by Lister Petter Limited, are used.

### 2. Fixed speed power: overload power (ICXN)

The maximum power in kW which the engine is capable of delivering intermittently at the stated crankshaft speed for a period not exceeding one hour in any period of twelve hours' continuous running, immediately after working at the continuous power, under ISO standard conditions and with the provisions specified in (1) above.

### 3. Variable speed: fuel-stop power, continuous power (IFN)

The maximum power in kW which an engine is capable of delivering continuously at stated crankshaft speed, under ISO standard conditions and with the provisions specified in (1) above, with the fuel limited so that the fuel stop power cannot be exceeded.

### 4. Variable speed: fuel-stop power, intermittent power (IOFN)

The maximum power in kW which an engine is capable of delivering intermittently at the stated crankshaft speed, for a period not exceeding one hour in any period of twelve hours' continuous running, with the fuel limited so that the fuel stop power cannot be exceeded, immediately after running at the rating in (3) above, under ISO standard conditions and with the provisions specified in (1) above.

### 5. De-rating

For non-standard site conditions, reference should be made to relevant BS, ISO and DIN standards. The overload capability applies to a fully run-in engine. This is normally attained after a running period of about 50 hours.

(see attached fact sheet)

## Beta Marine (new) engines

<http://betamarine.co.uk/uk-inland-section/>

Engine Selection for Canal Boats This table is to be used as a guide only!

- This guide is based upon cruising in still water canals at a relaxed engine speed. If you are using flowing rivers and/or tidal estuaries then a slightly larger engine size may be more suitable.
- Most of our canals and rivers in the UK are limited to 4 mph (3.5 knots) and do not need much power to achieve this; however you should consider safety and manoeuvrability where it is preferable to be able to stop your 10 tons to 30 tons of canal boat in its length.

APPROXIMATE DIMENSIONS AND WEIGHT <sup>1</sup>					
Canal Star model		18	27	36	45
Overall	mm	797	897	997	997
Length A	in.	31.4	35.1	39.3	39.3
	mm	439	539	639	639
Length B	in.	17.3	21.2	25.2	25.2
	mm	179	179	179	179
Length C	in.	7.0	7.0	7.0	7.0
	mm	647	647	647	647
Width D	in.	25.5	25.5	25.5	25.5
	mm	653	653	653	653
Height E	in.	25.7	25.7	25.7	25.7
	kg	150	180	210	210
Dry weight	lb	331	397	463	463

POWER OUTPUTS					
	Model	r/min	2600	3000	
Maximum power at flywheel	18	kW	13.4		
		bhp	18.0		
	27	kW	20.1		
		bhp	27.0		
	36	kW	26.8		
		bhp	36.0		
	45	kW			33.6
		bhp			45.0

TORQUE				
	Model	r/min	1800	2800
Maximum torque at flywheel	18	Nm	53	
	27	Nm	80	
	36	Nm	106	
	45	Nm		

Engine Power	Narrowboat	Wide Beam & Dutch Barge	Propeller	Bow Thruster
<u>Beta 14</u> 13.5 bhp at 3,600 rpm	20' - 25' 6 tons	-	12" x 8"	6 hp
<u>Beta 16</u> 16 bhp at 3,600 rpm	20' - 30' 7 tons	-	12" x 8"	6 hp
<u>Beta 20</u> 20 bhp at 3,600 rpm	20' - 35' 8 tons	-	13" x 8"	6 hp
<u>Beta 25</u> 25 bhp at 3,600 rpm	25' - 40' 10 tons	-	14" x 8"	6 hp
<u>Beta 30</u> 30 bhp at 3,600 rpm	30' - 40' 12 tons	-	15" x 9"	6 hp
<u>Beta 38</u> 35 bhp at 2,800 rpm	40' - 50' 14 tons	-	16" x 10"	6 hp
<u>Beta 43</u> 43 bhp at 2,800 rpm	50' - 70' 18 tons	-	18" x 12"	6 hp
<u>Beta 50</u> 50 bhp at 2,800 rpm	60' - 70' 18 tons	45' - 50' 22 tons	19" x 12"	6 hp

(Most engines used by CRT's work fleet would be in the mid-range here, for example, the Beta 38 Greenline)

### Beta 38 'Greenline'

4 cylinder, naturally aspirated, diesel propulsion engine developing 35 bhp at 2,800 rpm with a swept volume of 1498 cc.

(Full technical specifications provided separately as a pdf)



## Other types of boats on Britain's Canals and Rivers

### Cruisers / Narrowboat cruisers

Allow more read deck space. This is useful if several people want to join the helmsman whilst they are steering. Cruisers come in a variety of lengths and widths and are mainly of GRP (fibreglass) construction.



## Working boats

There are also working boats that carry goods under canvas with a rear cabin. Some of these have also been adapted for pleasure use.



Most boats are built to their individual users' specifications, so you will see a wide-ranging combination of styles, for example longer front decks or portholes instead of windows.

## Wide beam Narrow Boat Style

These craft look like narrow boats but are built up to 13' wide and offer much internal space. Practically a beam of 10' to 12' is a good maximum to consider. Because they cannot go through narrow locks their cruising area is limited.

## Converted Barges

There are all sorts of barges, both English and Dutch. Lengths can vary from 40' to 120' plus, with beams from 10' to over 16'. All but the smallest require a reasonable degree of competence to handle them. The larger barges are only suitable for use on major rivers because of their size.

**Also common are converted lighters or dumb barges, with no motive power.**

Dutch barges are mostly powered, and some are rigged for sail. It is possible to buy unconverted barges either in Holland or in the UK, but the job of conversion is huge, easily under estimated, and is most certainly not for the faint hearted.



## ECMT Classification

At the moment it is not possible to use the ECMT classification for the UK. The classification as it currently stands is not totally appropriate to much of the UK waterway system. Much of the network is navigable by “narrow boats”, which have dimensions of 22m length by 2.2m beam. The length would place these craft above the recreational waterway classification, but the beam would put them into the RA category. Overall such waterways would most appropriately be classified as RB – for cabin cruisers.

Classification	Tonnage (t)	Length (m)	Breadth (m)	Draught (m)	Air Draft (m)	Notes
RA		5.5	2.00	0.50	2.00	"Open boat"
<b>RB</b>		<b>9.5</b>	<b>3.00</b>	<b>1.00</b>	<b>3.25</b>	<b>Cabin cruiser</b>
RC		15.0	4.00	1.50	4.00	"Motor yacht"
RD		15.0	4.00	2.10	30.00	"Sailing boat"
I	250–400	38.5	5.05	1.80–2.20	3.70	"Péniche"
II	400–650	50.0–55.0	6.60	2.50	3.70–4.70	Euro-barge
III	650–1,000	67.0–80.0	8.20	2.50	4.70	"Gustav Koenigs"
IV	1,000–1,500	80.0–85.0	9.50	2.50	4.50; 6.70	"Johann Welker"
Va	1,500–3,000	95.0–110.0	11.40	2.50–4.50	4.95; 6.70; 8.80	"Large Rhine"
Vb	3,200–6,000	172.0–185.0	11.40	2.50–4.50	4.95; 6.70; 8.80	1x2 convoy
Vla	3,200–6,000	95.0–110.0	22.80	2.50–4.50	6.70; 8.80	2x1 convoy
Vlb	6,400–12,000	185.0–195.0	22.80	2.50–4.50	6.70; 8.80	2x2 convoy
Vlc	9,600–18,000	270–280	22.80	2.50–4.50	8.80	2x3 convoy
	9,600–18,000	195–200	33.00–34.20	2.50–4.50	8.80	3x2 convoy
VII	14,500–27,000	285	33.00–34.20	2.50–4.50	8.80	3x3 convoy