



STOVES ON BOATS

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HISTORY OF BOAT STOVE DEVELOPMENT

From the time of Henry the Eighth and before, special stoves have been used on boats.

At the Portsmouth Historic Dockyard there are examples of stoves used on both the Mary Rose and HMS Victory.

The renowned 19th century stove manufacturers **Smith and Wellstood** of Bonneybridge, Falkirk, designed and manufactured stoves and cooking ranges and later on created a stove museum which has examples of specialist cookers used on the great trans-Atlantic Ocean liners with many very advanced design features.

Eventually the company went into receivership and in 1984 the Ouzledale Foundry Co. Ltd., bought it and established the new company of **Smith and Wellstood (1984) Ltd.**, subsequently moving the old museum to Barnoldswick in Lancashire.

For those who visit the beautiful Isle of White there is a superb example of a high quality, 1920's yacht stove in a sea front pub called The Spy Glass Inn at the Western end of the promenade in Ventnor.

2022 ECO DESIGN

Currently we are receiving a few enquiries regarding the effect that the 2022 Eco Design will have on boat stoves.

Firstly these regulations call for the certifying of all wood burning stoves, cookers and boilers to ensure that they comply with the requirements of the directive which generally cover:-

1. The contents of the flue gasses, NO_x, SO_x, CO, CO₂ and particulates PM₁₀ and PM₂₀
2. The efficiency of the appliance (75% minimum.)

Manufacturers can choose from a variety of test criteria as to how they want their appliances to be tested.

To the best of our knowledge there is no CE test yet established for appliances which are specifically designed for marine use only.

(Generally means on a typical boat flue which is normally about 2 meters tall and typically 4 or 5ins diameter.)

Almost all stoves fitted on boats are not designed for installation on flue vacuums attainable on a 2 meter high flue and if there were to be an incident, manufacturers would refer any complainant to this fact.

The competent persons Schemes namely HETAS, OFTEC and CLEARSKIES have rules for the installation of domestic stoves and one of the rules requires that the flue diameter, connected to the appliance, should be at least equal to the appliance outlet adaptor.

Currently, there are hundreds of stoves with 5” flue outlet diameters that are fitted with 4 inch twin wall flue systems on boats, all with the apparent blessing of the Boat Safety Scheme and all in contravention of the competent person’s schemes rules.

WHAT ARE THE DIFFERENCES?

There are quite a few differences between stoves designed for houses and stoves designed for boats, this is how we differentiate:-

STOVES DESIGNED FOR USE IN BOATS which can move. (TYPICAL CHIMNEY HEIGHT 2 METRES)

STOVES DESIGNED FOR USE IN HOUSES which don’t move. (TYP CHIMNEY HEIGHT 4.5 METRES MIN)

OUR CRITERIA.

1. To operate on a typical boat flue of min 2 meters in height.
2. Not to allow smoke to spill out through the open re-fueling door whilst the appliance is in use and being re-fueled.

To test that the flue is working correctly there must not be any flue gas products spilling out from the appliance door whilst the appliance is being re-fueled, if the stove does allow spillage, this is then classed as an unsafe situation.

3. So designed as to stop ash and hot coals falling out when refueling or opening the fuel loading door. (Critical front fret design.)
4. Capable of all night burning, minimum of 10 hours. (Solid smokeless fuel.)

5. Provided with a means of securely fastening the appliance down.
6. Internal baffle plates securely fastened so as to prevent movement when impacting lock gates etc.
7. Integral rear heat shield or shields made from heat resisting stainless steel.
8. Door lock capable of withstanding engine vibrations.
9. Substantial ash pan capacity to hold at least 24 hrs of continuous burning.
10. Integral fiddle rail option where stove top cooking is potentially possible.
11. Provided with an appliance specific, full marine fitting instructions written by the manufacturer.
12. Have a full and safe twin wall chimney system available with marine fitting instructions provided and following normal protocol where flue minimum diameter is equal to appliance manufacturers stated flue outlet diameter, i.e. 5" flue outlet = 5" flue system.
14. Be provided with an optional and safe means of twin wall chimney transition through a typical boat roof construction with a means of maintaining safe distance from combustibles where flue passes through combustible boat roof lining.
15. Appliance manufacturer must be able to supply purpose made chimney terminal to minimize the effect of cross winds on typical short flue.

ABOUT CE EN13240 MARKING.

Do not be under the impression that CE marking is the ultimate **GOLD SAFETY STANDARD**

It does not make any checks to see if a stove is either safe or suitable to be used on a typical low flue application as is generally the case with boat installation.

It tests emissions, efficiency, output and a sundry other items but it does not test **material thicknesses.**

This is left to a declaration of material and process conformity (form no DE1) signed by the manufacturer.

(We know of at least one case where an appliance was CE marked BY AN APPROVED TEST HOUSE when it did not comply.

WHERE DOES THIS LEAVE US?

If you fit a Domestic stove into a boat, the stated chimney heights in the manufacturers installation instructions (Contents of which are vetted in the CE testing /marking process) would not comply with the manufacturers approved fitting instruction and this would then nullify the manufacturer's warranty.

When fitted with a low flue, the stove could spill smoke into the boat when the front door of the stove was opened during the refueling operation.

The stove might not stay in for longer unattended periods because the short chimney could not provide enough constant steady vacuum to draw adequate combustion air through the appliance leading to a situation where incomplete combustion could occur, note that the higher the tested efficiency of the stove, the worse the problem.

Some of the very high efficiency stoves struggle to work on 4.5 Meter chimneys let alone 2 meter high.

This would then allow the possibility of **Carbon Monoxide production** which could then effect other boat users in the immediate vicinity, creating the requirement for additional monoxide alarms to be fitted in all sleeping areas which we believe has just been implemented by BSS.

If the CE tested stove were to be fitted on a typical 2 metre high boat flue, it could not be classed as being CE marked on the basis that it would not pass the combustion or performance criteria required for application of the CE EN13240 or 2022 Eco Design.

EUROPEAN 2022 ECO DESIGN DOMESTIC STOVE REQUIREMENTS.

In an attempt to reduce air pollution the new European regulations effecting stoves without boilers, will come into force Jan 1 2022.

Other rules regarding wood burning boilers came into force on Jan 1 2020.

This will mean that stove manufacturers will have to make sure that their products can comply with the new reduced levels of particulate emissions and improved efficiency levels and this in itself creates further problems for the boat owner.

Particulate Emissions.

The key to reducing particulate emissions is to burn them off during the course of higher temperature combustion.

To achieve this manufacturers are employing a number of techniques one of which is lining combustion chambers with a material known as vermiculite boarding which acts as a substantial insulator so keeping the heat in the combustion chamber and thus promoting the higher temperature combustion required to burn off more of the particulates.

Unfortunately, as with all well intended legislation there are problems.

High temperature combustion requires constant attention and if the combustion chamber temperature falls below the desired temperature, when the stove is refilled with a fresh charge of fuel, particulate emissions will return in the form of smoke.

So the cycle starts again, the stove has to come up to high temperature and then the emissions fall and when the stove is ready for its next re fueling the same thing happens on an inevitable repetitive cycle.

The correct way to run the stove is to make sure that the refueling does not kill the high combustion chamber temperature which means a little and often, probably every half hour or so which is achievable in the laboratory conditions of a test house, but almost never repeatable in the real world, this then possess the following issues :-

Q. If I want to leave my new 2022 stove and go out for a few hours, how can I ensure that it is still in when I return?

A. Well you could turn it down but then it would just smolder for 4 hours, annoying your neighbors and still emit loads and loads of particulates.

Everything is hunky-dory, I have the stove up to high temperature combustion but the boat is way too hot and it's going to cost me a fortune in wood and by the way, after 2022 you will only be allowed to burn wood supplied by an approved supplier, to the correct moisture content 15% which will be lower than the current recommendation of 20%.

Q. My 2022 compliant stove was only tested on a 15 foot tall flue and it doesn't seem to draw too well on my 6 foot boat chimney (which will have to be of twin wall construction) and undoubtedly smoke back when I open the re fueling door.

A. So to keep the stove in for a long period of time it looks like I will have to bow to the inevitable and burn an approved smokeless fuel.

Q. In which case what are the new regulations about?

A. Mainly those who want to burn wood of the correct moisture content and have the time and way with all to run the stove correctly on 4.5meter high, fully insulated, class 1 chimneys.

If you don't want to burn wood then it is unlikely that a 2022 stove would make any difference to emissions but it will increase the cost of a new stove and most boat owners allow their stoves to slumber on smokeless fuels.

BS8511:2010

Code of Practice for the installation of solid fuel heating and cooking appliances in small craft states that:-

“Any stove tested and approved to the current CE test no 13240:2001/AS: 2004 would be suitable for installation in a boat.”

This statement effectively means that you could safely install a 20 kW stove into your boat, on a 2 meter flue and bearing in mind that the manufacturer of such a stove would call for an 7ins dia flue which when twin walled would equal 9ins OUTSIDE diameter!

*Doesn't make much sense but it's in **BS8511:2010**.*

FURTHER COMPLICATIONS ON DOMESTIC INSTALLATIONS.

2022 Eco Design leaves manufacturers chasing academic efficiencies.

In the scramble for Top Position in the Premiership efficiency league table, manufacturers are loading up a potential nightmare situation for stove shops and installers both of whom will have to deal with the expensive fall out.

To get higher efficiency the flue gasses leaving the appliance have to be much cooler. This leads to all old masonry chimneys needing to be backfilled with Vermiculite after lining and even with the backfill this lower chimney temperature results in wood tar build up rapidly rotting or blocking the liner in double quick time resulting in a multitude of end user complaints.

We have experienced this on some of our installations and when we ask the stove manufacturer for advice we are told to remove some of the baffles to try and increase chimney temperature subsequently rendering the appliance non 2022 Eco Design.

OUR APPROACH.

When we design our Bubble Stoves we design features into them which mitigate the many problems associated with fitting stoves into boats and we had our first version Corner Stove tested as:-

Fit For Purpose as this was the only test available.

In this test the manufacturer has to state under what conditions the stove will be used and the test house then test it against the manufacturers stated criteria.

In our case this was FOR USE ON BOATS WITH A MAXIMUM FLUE HEIGHT OF 2.1 METERS.

QUESTION FROM A CUSTOMER.

QUESTION AND ANSWER PAGE

This is the thread of an answer to a boater who was worried about the effect of the new 2022 Eco Design.

On 9 Feb 2019, at 12:15, contact <contact@bubbleproducts.co.uk> wrote:

Be careful on this one Charlotte,

The regs are aimed at domestic properties but it may be that some authorities issue control orders in certain areas namely areas in and around the larger cities.

Stoves designed for boats (to operate on chimneys typically less than two meters tall) are not the same as stoves designed for houses (to operate on chimneys typically 4-5 meters minimum height) and you will find that nearly all stoves fitted on boats are designed for houses.

We only know of perhaps two or three makers who are genuinely making stoves for boats.

You will also note that most of the house stoves fitted to boats do not have any instructions supplied to inform the user HOW TO FIT THE THEIR STOVE IN A BOAT.

Ask one or two stove manufacturers for their boat fitting instructions and see what response you get!

Within the last few years a third party organization called SOLIFTEC has been called upon by the BSS to provide general instructions on fitting generic house stoves into boats simply because house stove manufacturers don't have the knowledge required or can't be bothered or can't speak English in the case of the thousands of Chinese appliances recently allowed to flood into the country.

Thank you for a very thorough reply. Your stove is still at the top of our list!

Are CRT aware of all this?

Charlotte.

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