

# WAGGONER CRUISING GUIDE

## SELECTING A DIESEL HEATING SYSTEM: PART 1

The Pacific Northwest is one of the premier cruising destinations in the world, and for good reason. There are so many anchorages and small coves to explore that it would take more than a lifetime to explore them all. So to see as many of them as possible in your lifetime, you have to extend your cruising season into the cooler months. To accomplish that, it makes sense to have an adequate heating system aboard. When it comes to keeping your boat cozy, you can't beat a diesel heater. With so many types, it pays to consider the variables and pick the correct solution for your boat and cruising needs.

Before addressing the different types of diesel heaters available, it will serve us well to discuss a few things that will help in the selection process:

- Why diesel?
- Safety
- What's a BTU?
- How much heat do I need?

Determining which system is right for you depends largely on what kind of boat you have, how well insulated it is and where and when you plan to use it. Onboard diesel heating systems are available for boats from 20 feet to superyachts.

### WHY DIESEL HEAT?

Diesel certainly isn't the only way to heat a cruising vessel. Reverse-cycle heat and air conditioning systems are vogue aboard nearly all new and many older vessels. These systems, akin to shore-based heat pumps, work well in many scenarios and are capable of taking the chill off those fall days. However, they suffer from two shortcomings. One, many users complain that blown air, particularly when it's less than hot, often produces a certain chilling effect. Two, heat pumps are efficient only when the temperature of the water surrounding the vessel is above 45-degrees Fahrenheit – an issue when cruising Pacific Northwest waters. Below 45 degrees the heat exchanging capability of the heat pump system is no longer effective, and the system rapidly loses efficiency and its ability to produce heat.

If a vessel is already equipped with propane for the galley stove, you may wonder, why not use propane as a heat source? Propane is unrivaled where cooking is concerned but it's simply not as Btu abundant as diesel fuel. While propane is an ideal fuel to cook with, it also has its drawbacks. Additionally, the crew on an extended cruise (like up the inside passage), must concern themselves with obtaining two types of fuel—a task that can be difficult in remote regions. When used for cooking only, propane lasts an especially long time.

Not the least of these is its inefficiency when compared to diesel fuel; pound for pound, diesel fuel is difficult to beat as a heat source. Diesel fuel offers nearly 140,000 Btu per gallon, compared to 91,000 Btu for propane. Diesel is especially attractive if your boat is powered by diesel. Diesel heaters do a great job of keeping your boat warm, dry and comfortable using less than two gallons a day.

Finally, diesel fuel with its flash point of 140-degrees Fahrenheit is especially safe. Conversely, propane, on the other hand, has a flash point of negative 156-degrees Fahrenheit, which means it's always flammable.

## **SAFETY FIRST**

Before continuing our discussion of diesel heat a subject worthy of mentioning is Carbon Monoxide, or CO, gas. It's a colorless, odorless gas that is nearly the same density as the air we breathe and is created whenever carbon-based fuels are burned. CO interferes with red blood cells' ability to provide oxygen throughout the body. In high concentrations, death can occur in just a few minutes.

Therefore, every boat, whatever fuel is used for propulsion or heat, should be equipped with at least one American Boat and Yacht Council (ABYC) compliant CO detector. A detector should be installed in each stateroom and the saloon. It is also vital that these detectors are installed in such a way that they can't be inadvertently or intentionally turned off. This is accomplished by wiring them directly to the load or output side of the house battery bank switch using an appropriately sized fuse. Wired in this manner, the CO detector will be active whenever the vessel's house battery switch is in the "On" position.

## **WHAT'S A BTU?**

British Thermal Unit (BTU) is a term frequently used in heating system literature and is used to compare heating capabilities. In scientific term, a BTU is the amount of thermal energy required to raise the temperature of one pound of water 1-degree Fahrenheit from the temperature at which water has its greatest density, 39-degrees Fahrenheit. In simple terms it's a way to compare apples to apples.

## **HOW MUCH HEAT DO I NEED?**

Properly sizing your heating system will ensure that the system keeps the boat warm. For self-regulating systems such as forced-air and hydronic, proper sizing will ensure that the cycling times, 50 percent is desirable, are appropriate. Bulkhead and freestanding heaters are designed to run continuously, and they operate more efficiently at higher settings. If a forced-air or hydronic system runs too infrequently, it may increase carbon accumulation and require more frequent maintenance. If it's too small, a system will run continuously, which will also increase maintenance requirements and increase power and fuel consumption/operating costs. While manufacturers typically provide guidelines for sizing their respective systems, a general rule of thumb does exist.

Calculate the interior volume of your boat in cubic feet and multiply by 12 for sailboats and 15 for powerboats. If you plan to do winter cruising, the multipliers are increased to 15 and

18. This will provide a good idea of the British Thermal Units (BTUs) required. When determining the size of the heater it's better to get the next size larger, rather than a size smaller, and have it run less time. These figure will vary based on the design and insulating properties of a boat. For instance, cored hulls have inherent installation were aluminum hulls have nearly zero. Also the number of windows, ports, hatches, all of which radiate heat more quickly than the hull or cabin structure.

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