



## **Before you charge ahead - Properly size your boat!**

Properly sizing your boat is a critical part of planning a successful air conditioning system that you will enjoy for many years.

The thermal gain of your boat varies greatly during every 24 hour period, and peaks when the sun is at its maximum strength. You must at least equal this maximum BTU gain, otherwise the temperature inside your boat will go up rather than down when you close it up and turn on the a/c at noon.

If you undersize your load you will be very uncomfortable and unhappy with your system when you need it the most!

Significantly oversizing the system will result in system "short cycling" - not giving the system adequate run time to satisfactorily dehumidify the vessel.

The general rule of thumb for sizing a pleasure boat is using the formula of 14BTU's/cubic foot (480 BTUs/ cubic meter) of air conditioned space.

This factor is for typically constructed pleasure boats and should be adjusted if nonstandard construction techniques have been employed.

It is prudent to use a factor of 16 to 19 BTU's/cubic foot (550-650 BTUs/ cubic meter) for areas that are used during the heat of the day that have a lot of sunlight coming in - for example a pilothouse, especially if the roof is not shaded or well insulated.

For areas below deck that are primarily used after sunset such as a stateroom, you can usually drop this factor to 10 - 12 BTU's/cubic foot (380-410 BTUs/ cubic meter).

If you plan to air condition the vessel only in the evening hours, or if your boat is under a canopy and out of the sun, you can typically use a factor of 10-12 BTUs for the entire vessel.

In many installations we have designed systems that will cool the main salon during the day and the entire boat, including the staterooms, in the evening by using multiple ducting with closeable grills combined with a more powerful blower motor. This frequently results in a single system accomplishing what you would typically need two systems for, saving you a lot of money and frequently eliminating the need for an additional shore power service. (You need about 10 BTUs/cubic foot after sunset, therefore if you concentrate the entire capacity of a single unit to the main salon only, during the day, you will end up with, for example, 18 BTUs/cubic foot in this smaller area during daylight hours, and 10 BTUs/cubic foot during the evening when you open up all of the ducts and cool the entire boat).



Exceptions: Catamarans and boats with large "greenhouse" like glass that allows lots of direct sunlight into the boat: Unless you can shade these areas so they are not in the direct sunlight, add about 600 BTUs of a/c capacity for every square foot of this glass (not the vertical panes as well). Tinting the glass helps a lot, however a simple tarp a few feet above the glass is the best solution while not eliminating your view. The darker the fabric the better for dark colors also block most of the UV radiation unlike a white fabric. Keep in mind that tinted glass is not permitted in the navigation station because it almost eliminates your nighttime visibility.

In applications where there is an unusually high heat load from many passengers such as a party boat, you should also increase your factor accordingly. The general rule of thumb is 250 BTU's for inactive occupants and 500 BTU's for active occupants such as working or dancing.

Please note that these formulas are for maintaining the desired temperatures of a typical vessel. Don't arrive at your boat at noon after it's been baking in the hot sun for hours with an inside temperature of 120°F, and expect it to be at 72°F in a half hour! You usually have thousands of pounds of furniture, fiberglass and steel that needs to be dropped 50° before the a/c has to only maintain this temperature. Just as in a house that has been closed for vacation, it may take several hours for the a/c system to catch up. This "Thermal Load" or "Thermal Mass" is most easily overcome during the evening hours when the thermal gain from the sun is nonexistent. We suggest you program the system to go on a 3AM, for example, in these situations - especially with commercial boats, unless you want to grossly oversize the system to accomplish your needs.

Using these factors combined with some common sense will almost always produce a satisfactory system, however you can always hire a professional to prepare a thermodynamic heat load analysis for your particular vessel.

We have a lot of experience sizing different vessels and will work with you in making this determination.

Equally important to properly sizing the vessel is determining how much individual temperature control is desired. For example, in individual staterooms you may wish to have small separate systems that are independently controlled and one large system for the main salon and galley areas.

We will take into consideration many factors when recommending a system for your vessel.

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