

Watermaker

From Wikipedia, the free encyclopedia

A **watermaker** is a device used to obtain potable water by reverse osmosis of seawater. In boating and yachting circles, desalinators are often referred to as "watermakers".

Contents

- 1 Varieties
- 2 Water requirement
 - 2.1 Pros
 - 2.2 Cons
- 3 Technology
- 4 Atmospheric water generator
- 5 References

Varieties

Many different versions are frequently used by long-distance ocean cruisers. The devices can be expensive to buy and maintain, but are a huge advantage because of the reduced need to have large water tanks for a long passage.

Depending on the design, watermakers can be powered by electricity from the battery bank, an engine, an AC generator or hand operated. There is a portable, towed, water-powered watermaker available which also converts to hand operation in an emergency.

Water requirement

There is great variation in the amount of water consumed per day. At home in the United States, each person uses about 55 Gal. (208 liters) of water per day on average Virginia GPCD (<http://www.vdh.virginia.gov/DrinkingWater/documents/waterconservation/appendib.pdf>). Where supplies are limited, and in emergencies, much less may be used.

Typical cruising yachts use from 4 to 20 litres (1.05 to 5.28 gallons) per person per day, the average probably being about 6 litres (1.59 gallons). The minimum water intake required to maintain body hydration is 1.5 litres (0.4 gallons) per day. The maintenance of comfort under normal circumstances requires 3% of mass body weight or typically about 2.3 litres (.61 gallons) per person of drinking water per day.

The popular brands of yacht watermakers typically make from 2 to 150 litres per hour of operation (.53 to 41 gallons) depending on the model.

There are strong opinions among small boat cruisers about the usefulness of these devices. The arguments may be summarised as:

Pros

- The user is independent of shore-based water supplies, which is especially important in remote parts of the world.
- They provide safe water when shore-based water is of uncertain quality.
- Some designs are portable and can be converted to manual operation in an emergency.
- The hand-held unit offered by one manufacturer and the towed water-powered watermaker offered by another manufacturer can be transferred to a liferaft in an emergency.

Cons

- They are expensive: indicative costs are US\$2,000 for the manual type, US\$3,000 for the towed water-powered type, US\$4,000 or more for an engine-driven type, designed to be fitted to the inboard motor of the vessel, and about the same for an AC generator-driven type.
- Some types (but not all) are time-consuming and expensive to maintain.
- They are very power hungry, except the hand-held emergency watermaker and the towed water powered type. Accordingly, these devices overcome the problem of large electric current demand.

The drawbacks for these non-electric designs are that manual operation is tiring for the operator and the towed watermaker only works while the vessel is moving through the water.

Some manufacturers of electrically powered watermakers have energy recovery systems incorporated in their designs which reduce the power consumption; however, these are typically some 50% more expensive for any similar size due to their additional complexity. As a guideline, assuming a 12V DC system, the energy recovery incorporated in those watermakers have the effect of reducing the electric current used from perhaps typically 20A to about 8A.

- Like every additional piece of equipment, it is bound to fail at some time in the future and cause expense/anxiety.

Technology

All watermakers designed for small boats and yachts rely on essentially the same technology, exploiting the principle of "reverse osmosis"; a high pressure pump forcing seawater through a membrane which allows water but not salt to pass.

The common comparison is that of a filter; however, as the holes in the membrane are smaller than molecules of sodium chloride (salt) and indeed smaller than bacteria, and pressures in the nature of 68 bar are required, the process is much more complex than the common water filter or the oil filter found in our automobile engines.

Atmospheric water generator

The term watermaker may also refer to an atmospheric water generator, a machine that extracts potable water from the humidity in air using either refrigeration or a desiccant. Condensing moisture by refrigeration requires a minimum ambient temperature of about 50-60°F, while desiccant absorbers have no such restriction. Either method is suitable for a desert climate, where water production is dependent on ambient humidity. The Negev desert in Israel, for example, has a significant average relative humidity of 64%.^[1] And contrary to some

online sources,^[2] a 1922 article in *Popular Science Monthly* cites an average relative humidity of 30% for the Sahara Desert, about twice the humidity in an air conditioned home.^[3] Moreover, the effect of the dew point causes early mornings to have higher humidity, so that atmospheric water generation is possible even in the harshest climates.

References

- "Drinking Water from Air Humidity". *Science Daily*. Retrieved 4 January 2012.
- "Sahara". *The Free Dictionary*. Retrieved 4 January 2012.
- Driscoll, W. H. (1922). "How You Can Burn 30% Less Coal and Still Keep Warm This Winter". *Popular Science Monthly*. **101**: 32. Retrieved 4 January 2012.

Retrieved from "https://en.wikipedia.org/w/index.php?title=Watermaker&oldid=747770528"

Categories: Drinking water | Water treatment | Water supply | Membrane technology

-
- This page was last modified on 4 November 2016, at 08:06.
 - Text is available under the Creative Commons Attribution-ShareAlike License; additional terms may apply. By using this site, you agree to the Terms of Use and Privacy Policy. Wikipedia® is a registered trademark of the Wikimedia Foundation, Inc., a non-profit organization.