



Galley Guide: Refrigeration, How to Keep Your Cool

When we started out on our sailing adventure I was willing to compromise on a lot of things. I would survive without long showers and a hairdryer. I could make do with limited storage space. However, reliable refrigeration was on the must have list

The only refrigeration onboard Kate when we purchased her in 2008 was a small standalone cooler-type fridge. During the first weeks onboard, as I was trying to cram all our fruit and veggies into the small box, I would often find myself standing over the fridge, lid ajar, wondering “How am I going to keep enough fresh food for long passages, let alone cold beer?” There was no doubt we needed more cold storage.

Steve and I considered installing a new compressor in the old icebox. Like most boats the compartment wall laid against the hull. To ensure all our hard-earned cold from the new compressor stayed inside the fridge we would have to beef up the insulation inside the hold as well. To make the massive space usable we would then need to install shelves and dividers. Finally, the drain would need to be rerouted so that it no longer emptied into the bilge. We decided that our

time, money and space could be used more efficiently.

The old icebox was turned into a dry stores area. We now had easy access to everything we needed while cooking and a huge storage compartment for long term provisioning. To solve our refrigeration woes, we installed an additional standalone unit and more than doubled our cold storage capacity. The option of running one as a freezer meant we could stock up on meat in major ports. We looked forward to sailing to more out-of-way destinations with enough fresh and frozen provisions to last for several weeks.

For years this fridge/freezer system worked perfectly, then last summer our big refrigerator just stopped

working. It was clearly an electronics problem but we were in the Solomon Islands and shipping parts into the country was difficult. So, we downsized and made due. For 8 months we lived with only 40 quarts of refrigeration.

Surprisingly our routine changed very little. We still enjoyed cold beer, fresh veggies and meat when we wanted it. When we departed on what turned out to be a 21-day passage I precooked and vacuum packed several meals for the trip and still had space for fresh goods.

REEFER MADNESS

Refrigeration and boats have been an unlikely couple since the concept of refrigeration was invented. When Frederick Tudor started cutting blocks of ice out of Walden Pond in the winter of 1846 his first thought, oddly, was to ship it to a really hot place. Nestled in bales of hay and loaded onto cargo ships his ice would make it to New Orleans, Martinique, Cuba and even as far as India. Although the ice was shipped to the rich, no doubt those sailors took advantage of their cold cargo along the way.

Refrigeration is actually all about removing heat, not adding cold. All modern refrigeration systems function the same way, and are made up of four main parts; a compressor, a condenser (located outside the fridge), the expansion valve or capillary tube and an evaporation plate (inside the insulated box). Several people have published



DIY fridge repair in the Philippines, not usually an option for modern refrigeration

articles and books explaining in depth the technical aspects of marine refrigeration. Without getting bogged down in thermodynamics and Boyle's Law of Partial Pressures here's the simple version of how a fridge works.

The closed-loop cooling system is charged with a specialized refrigerant gas, which is very temperature sensitive. The compressor pressurizes the gas, causing it to heat up, think of when you pump up a tire or how your dive tank feels hot after it is filled. The hot, pressurized gas moves to the condenser where the heat is released into the surrounding environment. Still compressed it is then passed through the expansion valve or capillary tube which rapidly lowers the pressure. This dramatic pressure shift also causes a temperature drop resulting in the gas turning into a liquid. The liquid is then circulated through the evaporation plate where it absorbs heat from inside the fridge. Then it is back out into the compressor and the cycle begins again.

The shift from gas to liquid and back is necessary to take full advantage of the heating and cooling properties of the refrigerant. Liquid absorbs heat better than a gas but gas releases heat better than a liquid. On a marine refrigeration system the condenser can be either air cooled or water cooled. In an air cooled system the condenser is a series of metal fins mounted in front of a fan, similar to the radiator in a car. In water cooled system the condenser is submerged in sea water; either in a sealed vessel like the heat exchanger on your diesel engine or by attaching it to the outside hull, which is called a keel cooler.

COOL AS A CUCUMBER

Space in the galley is tight on most boats, which is perhaps why boat builders and designers are constantly putting the standard built-in fridge next to the stove. Not only are these units huge – I have watched as users



fold down a step to stand on so they can reach contents in the bottom of the fridge – but placing a space you are trying to cool next to a heat source seems counter-productive. However, there are things you can do to maximize your refrigeration and make it run more efficiently.

Having a well-insulated box, free of air leaks, is perhaps the most important part of a good fridge. Finding leaks and diagnosing insulation issues is a great place to start when you want to improve your cold storage onboard. A major leak can be felt on your hand as a rush of cool air, and often occurs around the lid or door seal. Using a laser thermometer take temperature readings of various spots in your reefer unit to identify any hot spots that might need attention.

With older icebox-type holds it may be necessary to substantially increase the insulation so that the fridge functions efficiently. Adding 4-6" of foam on all surfaces and properly fiber glassing and sealing the hold so it is watertight is a big job but you should see immediate results when you turn on the compressor. For a more DIY approach try filling large Ziploc bags with foam packing chips or for a custom fit use spray foam insulation found at the hardware store. This type of expanding foam conforms to odd-shaped spaces, allowing you to build Ziploc blocks to fit your needs.

Even using something as simple as a car windshield reflector cut to fit on the top of your fridge will prevent a blast of cold air escaping every time someone opens the lid.

On long passages or between major ports it can be difficult to keep your fridge full but it is important to avoid having a lot 'dead air' in your reefer compartment as takes more energy to keep air cool. As food items in your fridge get used fill the empty spaces with bottles of water. Not only can you enjoy a refreshing drink but the water will retain the cold longer, acting as temporary insulation. At the same time, it is important not to overwhelm your fridge by packing it full of warm items. If provisioning in the tropics try unpacking your fruit and veggies in the cabin for a few hours, letting some of the heat dissipate before stowing them away. Same goes for cans or bottles of drinks purchased or stored in from hot store. You can also stock up over a few days so that you're adding warm items in small batches rather than all at once.

There are many things you can do to give your refrigerator a break during the average day. Keep your fridge organized by using large plastic bins or baskets. This way you can easily find what you're looking for and separating meat and produce makes it easy to contain and clean up drips or spills. If you have a big, deep fridge and often

find decaying produce forgotten at the bottom it might be helpful to itemize the contents as you provision. Use a white board to keep a running list of what you put in your fridge and check items off as you use them. This strategy will prevent food waste and help with meal planning. It will also eliminate you standing in front of the fridge with the door open, letting all the cool air escape, as you try to decide what you're in the mood for, just like you did when you were a kid.

Take into consideration what type of containers you use and buy. For instance, beer cans will cool quicker than beer bottles, and beverages like wine, milk and juice are now available in easy to store and chill tetra-packs. If you rely on solar to power your onboard refrigeration then avoid adding non-chilled items late in the day when your power production is low. When there are leftovers after meals pack them into storage containers, but leave them on the galley counter

with the lid ajar until they are cool to the touch before throwing them in the fridge. If it is necessary to turn off your compressor for several hours simply reducing the amount of times you open the door will reduce the amount of cold lost while the fridge is off.

Ice on a boat is often still considered a luxury, but rare is the sailor who is willing to voyage without refrigeration in the 21st century. Options for improving or replacing your existing system are now cost effective and power efficient, so everyone can just stay cool and keep sailing. **BWS**

Heather Francis is originally from Nova Scotia, Canada but has lived and worked on the ocean for over a decade. She has cooked professionally on land and on yachts. These days you'll find her in the galley of Kate, the Newport 41' sloop she and her Aussie partner, Steve, have been sailing since 2008. For more stories, photos and recipes log onto www.yachtkate.com

Leftover Rice Salad – 4 Ways

Whenever I cook rice I always make a double batch so I have leftovers. Used hot or cold, cooked rice is a blank canvas waiting for you to add the flavor. This salad is quick to throw together and lets you feed a crowd, even if you only have few veggies left in the fridge.

Served as a casual lunch underway, taken to a beach potlatch or paired with meat or fish for dinner Leftover Rice Salad has endless flavor possibilities; simply vary the ingredients and change up the dressing. The best news is you'll only need to spend 15 minutes in the galley to turn out a delicious and nutritious meal that the whole family will love!

Galley Tips

The trick to the perfect Leftover Rice Salad is to finely dice all the veggies so that they don't overwhelm the rice. You can grate hard vegetables like carrots and radish but the texture won't be as nice. Rice is the base of the salad, however, you can substitute some or all for another grain. Bulgar or quinoa work well and they add a nice, nutty flavor to the dish.

Add beans, lentils or a boiled egg for a kick of protein.

Salad and dressing can be made ahead of time and stored in the fridge separately for up to 3 days.

Start with 2 cups cold, cooked rice in a large bowl. Add chopped vegetables and stir well, breaking up the rice, until mixture is uniform. In a separate bowl or jar make dressing, adding all ingredients and mixing well.

Dress salad 5 minutes before serving.

COOL IDEAS

NEVER use a sharp tool to remove ice from your evaporation plate!! Instead place a bowl of boiling water next to the icy build up and let science do the hard work. The steam will melt the ice and you won't have to worry about damaging your holding plate.

If you think you are having problems with your refrigeration system it is best to consult a licensed fridge technician. Refrigerant gas can be toxic and modern refrigeration units are not as user serviceable as they once were.

Most butchers will vacuum pack and freeze orders if you give them advanced notice. Plan ahead, your fridge will thank you.

Cleaning the interior of your fridge with white vinegar is a great way to get rid of bad smells without harming surfaces, it will also get rid of mildew on door seals. For stubborn odors like fish or spoiled dairy try wiping surfaces with vanilla essence.

When turning off the reefer for long term storage make sure to clean and dry the interior well and leave the lid slightly ajar to prevent mold growth.

Fitting the new larger standalone fridge



INDIAN

½ cup each, finely diced: carrots, radish, onion and red cabbage.
 ½ cup lentils, ½ raisins or dried cranberries

Dressing - ¼ cup olive oil, ¼ cup vinegar, 1 tbsp. of curry powder, 1 clove garlic, grated, salt & pepper to taste.

Garnish - lentil sprouts, black sesame seeds, cumin seeds

MEXICAN

½ cup each, finely diced: carrots, onion, bell peppers and tomatoes.
 ½ cup corn kernels, ½ cup black beans

Dressing - ¼ cup veg oil, ¼ cup lime juice, ½ tsp ground cumin, 1 tsp dried oregano, 1 clove garlic, grated, salt & pepper to taste.

Garnish - diced avocado, cumin seeds, shredded lettuce

MEDITERRANEAN

½ cup each, finely diced: carrots, radish, onion, green beans, tomatoes and red cabbage.

Dressing - ¼ cup olive oil, ¼ cup vinegar or citrus juice, ½ tsp dried basil and oregano, 1 clove garlic, grated, salt & pepper to taste.

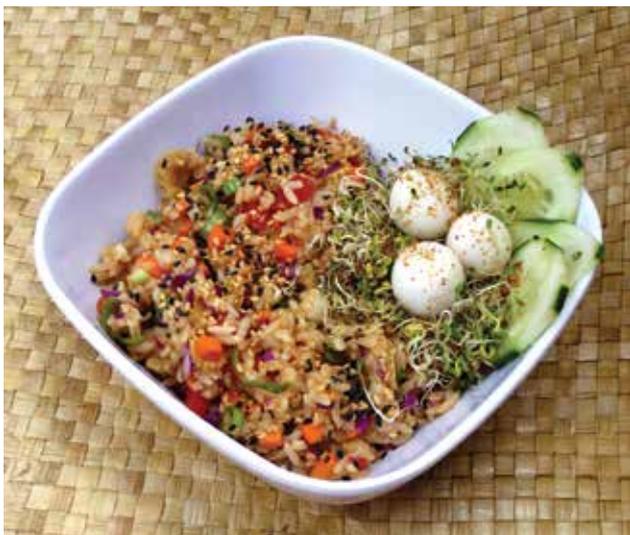
Garnish - alfalfa sprouts, crumbled feta, olives, dill seeds

ASIAN

½ cup each, finely diced: carrots, radish, onion, green beans and red cabbage. sliced baby corn.

Dressing - ¼ cup soya sauce, ¼ cup light veg oil, 1 tsp sesame oil, dash of wasabi, 1 tbsp rice vinegar, 1" ginger, grated, 1 clove garlic, grated.

Garnish - cucumber slices, broccoli sprouts, toasted sesame seeds, crumbled nori



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