

THE 30-MINUTE FRENCH POLYNESIA COOKING GAS FILL

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The most recent version of this document can always be found at svMigration.com
in the *For Sailors* section where you'll find other helpful documents.

*This document was **NOT** written by a trained technician with professional experience handling flammable gases. Assess the risks and use your common sense to keep you, your crew, and your boat safe.*

Thanks much to Chuck & Linda of s/v Jacaranda. Though this is a slightly different method than that recommended by Jacaranda, their [LPG guide](#) is well worth reading as it has a lot of great information.

After experimenting with various methods aboard Migration, we determined that the following is the quickest and easiest way to fill an LPG tank in French Polynesia. A standard US 10 lb. tank can be filled in about 30 minutes. The key is *temperature differential*; you want the full tank very warm, and the empty tank very cold.

INGREDIENTS:

1. Your empty tank(s) (referred to as **your tank**)
2. Full tank purchased from local *magasin* (referred to as **FP tank**)
3. Connector hose
4. A container with just a bit bigger diameter than your tank
5. A fish or luggage scale
6. Cold water
7. Ice, if available. (Many villages have an ice machine at the quay that is used by the fishermen. You can usually buy a small amount for very little cost.)

MANY DAYS BEFORE

- **Create a connector hose:** one end with a French Polynesia style connector, the other end to connect to your tank. Consider using a clear piece of reinforced vinyl tube for part of the hose as this allows one to see if the gas is flowing. *Important: Make sure the connector you use for your tank does not have a one-way valve that will block the gas from flowing into the tank.*
- **Purchase a scale** so you can weigh your tank. A small digital scale used for weighing luggage will work (and you'll use it when filling bags to the maximum when bringing parts back to the boat!).
- **Find a container** or bucket big enough to hold your LPG tank, but not too big.



THE DAY BEFORE

- If your empty tank had propane in it (because it was filled in the USA or Mexico or another country that uses propane, make sure it is **completely empty**. The butane used for cooking gas in French Polynesia rests at a lower pressure than propane so any residual propane will hinder the flow. Open the bleed valve and let all the gas out. Do this someplace safe like on the beach or the back of the boat in the wind. *This is only necessary if you have propane from outside of French Polynesia in your tank. If your tank is partially full of gas from French Polynesia, you do not need to empty it... you can top it off with no problem.*
- If you can **make ice**, make it.
- **Cool as much water** as is practical in your fridge (several gallons if possible).
- **Put your empty tank in the fridge** if you have room. This helps a lot.



THE DAY OF

- **Have old towels handy** as you don't want to put the FP tank directly on your deck. The tank bottoms are usually covered with chipping rust. Maybe spread a drop cloth to catch the rust bits if the FP tank is in particularly bad condition.
- **Purchase your FP tank** at the local *magasin*. If you tell them you will bring it back the same day, they often will not charge you the deposit.
- On your way back to the boat, **keep the FP tank in the sun**.
- **Find a location on your boat** where the FP tank can be several feet higher than your tank. The FP tank must be on its side at the beginning of the process. Later, as it empties, you will need to tilt it valve down and then invert it by hanging it upside down. However, you don't have to hang it upside down at the start of the process as it is very heavy (but you can if you want).
- **Keep the FP tank in the sun** during the entire process. It should be warm to the touch. Remember, the key is creating a difference in temperature between the FP tank and your tank.
- **Weigh your tank**. If it is empty, it should weigh the same as the *tare weight* (TW) stamped on the shoulder or handle of the tank. If you are topping off a tank that already has gas from French Polynesia, weighing it will give you an idea of how empty it is and how much time it will take to fill.



- Place your bucket or container a foot or two *below* the FP tank. Fill with ice (if you have it) and cold water. Place your tank in the bucket. Rig a shade cloth over your tank to keep it cool.
- If you have multiple tanks to fill and have space in the fridge, **put the 2nd empty tank in the fridge** (or start to cool it down with extra ice if you have it).

Now you're ready.



⇒ ***Remember to do this outside with good ventilation!*** ⇐

1. Connect connector hose to FP tank.
2. Open FP tank valve for just a moment to purge air from connector hose.
3. Connect connector hose to your tank.
4. Open valve on FP tank. If you have a clear section in your connector hose, you will see liquid fill the hose.
5. Open valve on your tank. The liquid will flow down the hose and disappear. You may see bubbles in the hose. You should hear a hissing noise as the fuel flows into your tank.
6. If there is no sound and no flow, open the bleed valve for a moment on your tank.
7. Watch and listen. Monitor the process. Periodically lift your tank to see how heavy it is.
8. When you think your tank is close to full, turn off the valve on the FP tank and weigh your tank.
9. Continue adding gas until your tank weight equals the tare weight (empty weight) plus the amount of gas the tank holds (usually 10 or 20 lbs., see the table at the end of the document if you don't know). Example: a standard 10 lb. aluminum propane cylinder from the USA has a tare weight of 10 lbs. Add that to 10 lbs. of propane and you get 20 lbs. when full. You can also tell if the tank is full if liquid gas sprays from the bleeder valve when it is slightly opened. Most US tanks have OPC valves which automatically close internally when the tank is full.





Note: Butane weighs 18% more than propane per liter (or gallon). That means, theoretically, your tank should be full when the weight of the tank is equal to: tare weight + (capacity in lbs of gas x 1.18). A standard 10 lb. aluminum tank from the USA should be full of butane when it weighs 21.8 lbs., not 20.0 lbs. The density of LPG is temperature dependent so these numbers are approximate. Use this information at your own risk.

10. Close the FP tank's valve. Wait a moment for the liquid to flow into your tank. Close your tank's valve.
11. Disconnect connector hose from your tank and repeat with additional tanks if required. A full FP tank holds 13 kg (28.6 lbs.) of gas so you should be able to fill one 20 lb. tank or two 10 lb. tanks plus top off another. The butane will flow much slower as the FP tank empties and cools down. If necessary, stop the process and let the FP tank warm in the sun while keeping your tank as cold as possible.
12. Voila! Now go cook a nice meal!

BUTANE vs. PROPANE

LPG stand for Liquified Petroleum Gas. Both butane and propane are types of LPG. What we call propane or butane can often be a mixture of the two gases.

The main difference between butane and propane is the boiling point: the temperature at which the liquid state turns to gas. For water, that's when it boils at 100°C (212°F). Propane has a boiling point of -42°C (-44°F), while butane has a much higher boiling point at -2°C (28°F).

This is why propane is the gas most used in countries like the United States where many areas are well below -2°C in the winter. Butane would never turn to a gas if it were used as a heating or cooking fuel in these places. In fact, LPG suppliers often adjust the propane/butane ratio during the winter and summer months.

This is something to remember if you fill your LPG tanks in French Polynesia and then sail to Alaska, or someplace else very cold. If you have big tanks that are still filled with butane, you will not be able to cook if you decide to winter over in colder climes.

When stored as a liquid in a tank, propane exerts a greater pressure than butane at the same temperature: about 160psi versus 40psi. That's why a propane tank is made of thick steel or aluminum while butane can be stored in a plastic cigarette lighter. That's also why the pressure gauge on your LPG regulator reads so low when you connect a tank filled with butane. There's nothing wrong with the gauge.

Butane and propane do not weigh the same. Butane weighs about .6 kg/liter (5 lbs/gallon) while propane weighs .49 kg/liter (4.1 lbs/gallon). By volume butane has about 9% more energy than propane, however propane has about 5% more energy by weight.

Lastly, because they have different physical properties, butane and propane burn differently in your stove and oven. The gas orifices on burners designed for propane are not optimized for the characteristics of butane leading to somewhat less efficient burning. You may see a higher flame or flames with yellow tips.

If you don't know how many pounds your tank holds, you can use this chart to determine the gas capacity based on the Water Capacity. Use the WC number stamped on the shoulder or handle of your tank. This chart refers to the weight of propane; butane is approximately 18% heavier.

CYLINDER FILLING CAPACITY CHART			
WC	LBS PROPANE		WC LBS PROPANE
2.39	1		35.8 15
4.78	2		38.2 16
7.17	3		40.6 17
9.56	4		43.0 18
11.9	5		45.4 19
14.3	6		47.8 20
16.7	7		59.7 25
19.1	8		71.7 30
21.5	9		78.8 33
23.9	10		83.6 35
26.2	11		95.6 40
28.6	12		105.1 44
31.0	13		119.5 50
33.4	14		239 100