

# MSR

## Windburner Duo

WRITTEN BY ~ GREG DULEY

Insulating the canister from the cold ground aids performance hugely

MSR are part of the Cascade Designs group, an American company that specialises in state of the art products for serious outdoors people

We use their tents, Thermarest mattresses and cookers in the TV Show. Their unique enclosed burner stove has been around in a number of manifestations since the original Reactor we tested back in our "FastBoil Cooker Head to Head" back in issue 28. They released a personal cooking system version with a 1 litre pot in 2014 called the WindBurner, which we reviewed in issue 44.

This is a unique stove that uses radiant as well as the usual convective heat transfer. Think of it like the heat you feel from the sun, as opposed to the warm air you feel from a fan heater. The enclosed head burner also entrains 100% of the air needed for combustion before the burner head surface, whereas most stoves only entrain about 60% of the air at the mixer tube, then rely on another 40% from the surrounding air at the burner surface. This allows MSR to have a totally enclosed burner head which is so much less affected by wind and adverse environmental

conditions. It is also internally pressure regulated, to maintain more consistent burn times from start to finish of the fuel canister. There is no piezo ignition though, the burner must be lit with a lighter or match - always on top before you put the pot on.

**The latest in the WindBurner family is the Duo Stove system.** This is a modular system with a remote burner head with its own support and a braided stainless steel hose that connects to the gas bottle. You can use any of the WindBurner family of pots on it, but a new 1.8 litre pot has been designed specifically for it



## Windburner Duo Features

- » Ultra-Efficient: Windproof radiant burner and pressure regulator maintain stove performance in windy and cold conditions; faster boil times & more fuel efficiency than conventional stoves.
- » Compact Nesting: System perfectly nests all components including an 8-oz/230gm MSR® IsoPro™ fuel canister.
- » Modular: Stove is optimized for all WindBurner cookware and a range of cooking styles.
- » Stable: Anti-topple stove features a remote canister design and self-centering pot.
- » Radiant burner with boil-to-simmer control
- » Pressure regulator for consistent performance
- » 1.8 L hard-anodized aluminum pot with integrated heat exchanger & insulated cozy with handle
- » BPA-free drinking/straining lid
- » 0.85 L integrated bowl, 610gms inc bowl



# Testing

The Duo boiled 1 litre of water in 3 minutes 50 seconds, and 1.8 litres in 7 minutes 15 seconds in our standard test conditions of 17°C water and 18°C ambient temperatures. And it wasn't affected by the 5 km/h wind at all. We followed this up with a 15 km/h test that stops most stoves dead and this only slowed it down 5%. No other stove can match this burner in the wind. It used 11.5 gms of gas per litre water boiled. The 5°C test didn't slow the boil time down at all, but as you get below 0°C it will slow down, and unless you use a few tricks, you won't be able to keep the WindBurner going below -5°C. There simply won't be enough gas vapourisation to create enough gas pressure to keep the burner alight. Other open head burners will actually stay alight at temperatures below -5°C, but not with sufficient heat to actually boil water, so they don't offer any practical advantage. Why is this happening you say? Let's have a bit of a discussion about cold weather gas stove performance.

## The Cold

**Firstly, gas stoves run on just that – gas!** The fuel canisters contain liquid fuel, mainly butane, that turns to gas when you open the valve releasing the pressure allowing it “room” to vapourise. The pressure in the canister keeps it liquid. The cheapest butane, n-butane, vapourises down to just below 0°C, but it needs to be about 10°C above that minimum vapourisation temperature to create enough gas pressure for a burner to operate properly – not much use in the mountains. A more expensive form called isobutane vapourises down to -12°C, so will still operate a burner at -2°C – much more useful. Propane vapourises down to -42°C therefore

works fine down to -32°C, but also therefore creates a much higher gas pressure for any given “normal” temperature – too much for a little thin walled gas canister to contain when it's hot. (Look how thick the steel is in the 9kg propane bottle you run the gas barbecue on!) The higher the temperature is above its vapourisation temperature, the higher the gas pressure, and the stronger your canister needs to be. You could get away with pure propane in a thin walled canister up to maybe 10°C, **but you could end up with a bomb if the day gets too warm**, let alone if you left a canister sitting in the sun.

So consequently, safe but usable cold weather fuel is a mix of mostly isobutane with some propane. The best canisters like the MSR ones run an 80% isobutane/20% propane mix, with no n-butane at all. The cheaper models, even if they say things like 70% butane/30% propane, will contain a large percentage of n-butane which is near to useless in the cold. So a new 80/20 MSR canister will work just fine down to -8°C, but the issue is the propane vapourises quicker in the cold, and very soon your 80/20 mix is more like 99/1 and your stove will slow right down – and worse still if that 99% left is n-butane, you won't be getting that hot cup of tea at all! The best way to ensure good cold weather performance below 0°C is to keep your canister warm, so the isobutane vapourises at a similar rate to the propane. Now compounding this is the fact your canister in use (evaporating liquid into gas) is effectively a refrigeration unit. A fridge

In the wind, there is no better cooker. Even in a 15 kmh wind that stops all other cookers dead, the WindBurner is only slowed down 5%



has an evaporator and a condenser though which the refrigeration liquid/gas is pumped. It takes heat to vapourise liquid, and that heat is sucked from the surroundings – which is how a fridge works – the evaporator inside the fridge sucks the heat out of it as the refrigeration liquid turns to gas, while the condenser outside the fridge releases heat as it turns back into a liquid again. Simply, inside cold, outside hot – perfect for a fridge, but not so good for a gas canister! So whatever temperature your canister starts off at, once the stove is running the fuel will get colder and colder, which is why you see frost/ice start to form on your canister in temperatures well above 0°C, and why a “canister cozy” doesn't help much.

**As we've already said, the best way to keep your stove working satisfactorily below zero is to keep the canister warm.** If it's going to be below zero in the morning, put your canister inside your sleeping bag during the night. Start with it warm and keep it warm while the stove is running. And this is where the new MSR Duo really comes into its own. Because it has a remote canister, you can put it up on something to insulate it from the cold ground or snow. You can easily put your hands around it to warm it up, or put the first bit of water heated in a bowl and sit the canister in



The remote burner of the Duo is extremely stable and easy to use



The burner with its legs in the folded position



that – just warm water, not boiling or you'll create a bomb! It is much easier to keep a canister warm in use when it's not stuck on the bottom of the stove!

There is another cunning plan for use at temps below satisfactory vapourisation, and that is to use an inverted canister stove with a generator that can run on liquid, but we'll leave that discussion for another time. With a remote canister stove like the Duo, using common sense we have had no issues maintaining satisfactory operation down to -10°C air temperatures.

The Duo is a welcome addition to the WindBurner family and we'll certainly be using it anytime there's more than two of us. At 1.8 litres it can boil enough water to do 3 x 2 man Backcountry Cuisine meals at once, and even 4 meals with 450mls each at a pinch – then you just need to top up each meal with a little more water from a second boil but at least everyone's meal is already rehydrating. No one wants to wait for the second boil and have to watch the others already eating at the end of a big day! In cold weather trips I'd also take it for a 2 man trip, as the better performance outweighs the extra 150gms over the 1 litre WindBurner. The remote canister system is so much easier and more stable to use, especially as the burner has its own built in, fold out leg supports – no little plastic fold-out tripod to lose or break! The centre of gravity of the pot full of water on the burner is so much lower and less likely to get knocked over than other personal cooking systems. MSR have done away with the bayonet fitting as the 1.8L pot is so stable on the stove, which makes it even more pleasant to use. On top of that, at 850mls the bottom cover is a really useful bowl so one of you doesn't need to carry a separate plate.

In perfect conditions there are other open burner stoves that are slightly quicker to boil and slightly more efficient, so if you're always going to use your stove in a hut they're the best choice. **But the minute you go outside, the WindBurner will soon overtake them in both stakes.**



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