Test of the Best

TOP HILL KIT GOES HEAD TO HEAD

WATER PURIFIERS

FILTER TYPES & JARGON

Filters come in many different forms – all have drawbacks and benefits versus each other. So, this test features the best of a range of water filter types. From this, the best all-round option for British hillwalkers has been selected based on our testing team's opinion.

JARGON BUSTER

A guide to the more (un)common terms you might find in purification literature...

Micron the unit in which pore size of a filter element is expressed, and therefore the minimum size of micro-organism or particle a filter can remove. Most are 0.2 microns; some are 0.1; the finest are 0.01.

Carbon filter a charcoal filter that reduces chemical content such as chlorine and helps improve taste. Carbon filters need to be replaced more regularly than other parts of the filter but are non-essential for safety.

Pre-filter this part of the filter goes into the water first, and gets rid of dirt, silt and other large particles before the finer filtration starts. This increases the life of the filter inside as it stops it getting clogged up with sediment which reduces flow.

Particulates suspended sediment in water such as mud or silt or other compound elements. Collectively this is known as turbidity and it makes water visually mucky.

Gravity filtration a filter that works by suspending a reservoir of unfiltered water above it to create a flow through the element under the weight. Commonly found in larger filters such as basecamp systems.

Backwashing flushing water through a filter backwards using a syringe or high-flow tap. The most common way to clean a filter.

PURIFIER CHOOSER 1: MEANS OF DRINKING

If you want to drink straight from source without a bottle, a straw filter will do the job – just be wary of areas where water may not be readily accessible. If you use a hydration pouch, ensure your filter is practically or physically compatible – many feature clip-hoses to allow direct delivery without opening the reservoir up, or can be used in-line between the reservoir of wild water and your mouthpiece. If you're a bottle user, you may find a filter you can screw directly onto your bottle – but this is more a convenience than a necessity in most cases.

KNOW YOUR ENEMY

Wild water in Britain could be contaminated with chemicals, polluting particulates, bacteria like E.Coli and salmonella, or protozoan cysts like giardia, or in some cases viruses like Hepatitis A. Basically, you just don't know what's in there: and while the main risk is a dicky tummy, this could mean a ruined day at best, dangerous dehydration at worse. A filter should be essential kit.

PURIFIER CHOOSER 2: SOURCE OF WATER

Your choice of filter will depend on where you intend to use it. If your primary source will be high mountain streams that flow quickly, a UV filter like a Steripen may be sufficient. If lowland streams close to populations or farms are more likely, pick a filter of 0.2 microns or finer, and consider a secondary means of purification.

WATER PURIFIERS

TRAIL MAGAZINE BEST VALUE

Sawyer Mini

£30 ■ **Type** 0.1 micron hollow fibre in-line, screw-on or standalone ■ **Filters** bacteria, protozoa, particulates ■ **Weight** 56g ■ **Flow rate** 0.6 litres/min ■ **Filter life** >460,000 litres

IT'S GOOD Pioneered for use by the military, these very versatile filters can be used as straws direct to source, can be screwed to the top of many common bottles, pressure - or gravity - fed from the supplied reservoir, or can sit on your shoulder as a link between your hydration bladder and your mouthpiece. These filters have an astonishingly long lifespan – almost half a million litres, guaranteed – and the fact that cleaning it by forcibly 'backwashing' this tiny filter with a syringe (supplied) restores 98% of its flow rate means that you'll probably die of old age before it does. So this is effectively a one-off buy, which makes it unbeatable value. In terms of function, this is no slouch either: a 0.1 micron filter that gets shot of all the usual suspects plus some even smaller bacterial critters and a few large viruses, putting it above average in terms of effectiveness. It's also very light (57g) and even comes in a choice of colours. And look at that price! Remarkable.

HOWEVER Little not to like here. It lacks a pump for pre-treating water, but this can be got round by using the supplied reservoir which can either be hung up to allow gravity to do its work, or squeezed. The flow rate is fine – about half a litre a minute if you use the squeeze bag – though you'll need to backwash it to keep it so. Like most here it can't deal with everything but its high level of filtration is good. It lacks a carbon filter, so chemically water still tastes a bit chemically.

VERDICT

Superb in every respect – except perhaps taste. Even then, this is a no-brainer of a bargain buy at this price.

Effectiveness	★★★★☆
Design	★★★★★
Portability	★★★★★
Ease of use	★★★★★
Value for money	★★★★★
OVERALL SCORE	**96%**

MSR TrailShot

£40 ■ **Type** 0.2 micron hollow fibre ■ **Filters** bacteria, protozoa, particulates ■ **Weight** 145g ■ **Flow rate** 1 litre/min ■ **Filter life** <2000 litres

IT'S GOOD Launched earlier this year, the means of filtration of the TrailShot makes it both simple and highly practical. You squeeze the main unit which creates a pump, drawing the water up the tube and through the filter, then spurting it out the spout at a brisk rate of a litre a minute. You can refill your bottle or drink straight from the spout. There are two great things about this filter: you can use one hand to operate it, which has obvious practical benefits when filling a hydration reservoir over a fast-running stream, say. Secondly, it's light and tough and highly nifty. The filter can be replaced after its 2000 litre life, and with a hollow-fibre cartridge that strains down to 0.2 microns, you can count on it to wring many nasties - including cryprosporidium and giardia – out of your water. Great price, too.

HOWEVER If we were being picky, the hose could be longer, which would make filling from awkward sources easier. The filter could be finer, too – like most filters it won't get rid of viruses, and at this size (just) produces sterile-standard water so this is unlikely to be a deal-breaker unless you're trudging through dodgy overseas climes with questionable water sources. Still, I would have liked to see a 0.1 micron filter to push its spec even higher. If used hard in murky sources the flow rate does slow – and will probably slow as the filter gets used anyway – but giving it a shake (read: shake it like it's electrocuting you) cleans the filter and sorts this. At this price, this is still pretty good.

VERDICT

Mixes simplicity, portability and value so well. As a sensible level of caution for the UK hills, this is ideal.

Effectiveness	★★★★☆
Design	★★★★☆
Portability	★★★★★
Ease of use	★★★★★
Value for money	★★★★★
OVERALL SCORE	**92%**

LifeStraw Steel

£50 ■ **Type** 0.2 micron hollow fibre straw with replaceable carbon filter ■ **Filters** bacteria, protozoa, particulates, chemicals ■ **Flow rate** n/a ■ **Filter life** <1000 litres

IT'S GOOD Suck from a puddle! For convenience, the Lifestraw is a tough act to follow. With philanthropy at its spiritual core – for every Lifestraw bought, a child in a developing country is funded for clean drinking water for a year – the physical core of the Lifestraw is a 0.2 micron hollow fibre filter rated for 1000 litres, and a carbon filter rated for 100 litres to reduce chlorine, pesticides and fertilizers. In use, once the water is flowing it's a simple matter of drinking; cleaning involves blowing into the filter. While, like most, it is not effective against most viruses, the Lifestraw gets rid of E.Coli, giardia and cryptosporidium – making it highly useful for use in the UK. This is aided by its compact design and weight: it's great for stuffing in a rucksack side pocket.

HOWEVER You need to suck; you can't fill a bottle with clean water. Some will love the liberation of not carrying a bottle but for many this could mean the Lifestraw concept may be restrictive – particularly if you're heading where water is scarce. It's slightly undignified lying down to drink – and it is biased towards standing water, which is more likely to be contaminated – but you can suck from a cup of course. The filter can't be replaced, and while the Steel is more lovely, it is very close in function to the original plastic Lifestraw, which comes in considerably lighter (57g), cheaper (£22) and has tethers to stop you losing those filter caps. It lacks the carbon filter though.

VERDICT

Opportunists who like to move unencumbered will love this simple filter, that sorts most watery issues.

Effectiveness	★★★★☆
Design	★★★☆☆
Portability	★★★★★
Ease of use	★★★☆☆
Value for money	★★★★☆
OVERALL SCORE	**76%**

WATER PURIFIERS

Survivor Filter PRO-LE

£60 ■ **Type** 0.01 micron hollow fibre plus carbon ■ **Filters** bacteria, protozoa, particulates, viruses, chemicals ■ **Weight** 340g ■ **Flow rate** 0.6l/min ■ **Filter life** <100,000 litres

IT'S GOOD Canadian-designed and available through Amazon UK, the Survivor Filter stamps the results of its independent lab tests over its website – and those results are very impressive. Using a three-stage filter – one an external ultra pre-filter which strains debris, a carbon filter which improves taste and reduces contaminants, then a third ultrafilter within the housing. The remarkable thing about this is that it filters the water down to 0.01 microns – that's ten times smaller than the next finest specified filter in this test. This means that it filters 99.99% of everything – including viruses – and reduces heavy metals to negligible levels. In our test, stagnant water came out crystal clear and tasting great. This kind of technology usually comes in a heavy package with a big price; £60 will get you this whole kit, and will last 100,000 litres before the ultrafilters need replacing. And when they do, it's £15. If there's a catch, we can't find it – and if you can, it has a lifetime defect warranty. Impressive stuff.

HOWEVER It looks and feels cheap and militaristic – this is functional, not pretty. Durability is tough to test but we'll see. The weight, at 340g, makes it a consideration, but can be reduced to 284g if you ditch the cup/case. Performance-wise, we couldn't find anything wrong with the PRO-LE.

VERDICT

Amazing for £60. The spec beats everything in test and gives the £310 MSR Guardian a run for its cash.

Effectiveness	★★★★★
Design	★★★★★
Portability	★★★★☆
Ease of use	★★★★★
Value for money	★★★★★
OVERALL SCORE	**96%**

DrinkPure Water Filter

£60 ■ **Type** polymer membrane plus carbon ■ **Filters** bacteria, protozoa, particulates, viruses ■ **Weight** 145g ■ **Flow rate** 1 litre/minute ■ **Filter life** <1000 litres

IT'S GOOD A new, unique design that reached the market via a crowd-funding campaign, this robust unit uses a simple-but-clever gravity feed to fill a bottle, or filters direct to mouth. Shaped like a flying saucer, it uses a Swiss-made membrane with 6.3 billion pores, with a carbon filter and a self-cleaning layer that prevents mould when not in use. The tech is cutting-edge, and lab tests impressively claim the filter removes 99% of viruses, chlorine and dissolved contaminants such as plasticisers and metals, plus the usual foes of protozoa and bacteria, making this close to a one-stop purifier. A weight of 120g (dry) means this is also light and easy to pack. Its 'dirty' port is compatible with most PET bottles and Platypus bladders, making it very adaptable and the flow rate is pretty good, too. You get a backwash cleaning syringe, a compatible 'dirty' bladder and stuffsack included. The picture shows it dripping into a water bottle using the supplied bladder.

HOWEVER As this relies on balance (or someone holding it) it's not that easy to fill a bladder using it. The relatively short life of 'up to 1000 litres' will presumably be less if you're filtering stodgy water, so you'll need to use the best possible water source to keep your £60 investment working as long as possible (you do get a cleaning syringe to help with this). One thing it doesn't come with is a cap for the filter, which we found a bit odd.

VERDICT

Suited to backpacking anywhere on earth - bar the odd practical drawback.

Effectiveness	★★★★★
Design	★★★☆☆
Portability	★★★★★
Ease of use	★★★★☆
Value for money	★★★★☆
OVERALL SCORE	**84%**

Katadyn Hiker Pro

£80 ■ **Type** 0.2 micron pleated carbon fibre plus carbon ■ **Filters** bacteria, protozoa, particulates ■ **Weight** 310g ■ **Flow rate** 1 litre/minute ■ **Filter life** <1150 litres

IT'S GOOD For those who prefer a more traditional pump design, this is well-proven. Like its smaller ceramic filter stablemate the Mini, the primary advantage is you get total control over where your water comes from and where it goes, plus the added power of a manual pump gives a decent flow rate. As regards practical usage, it's a joy – it feels like a quality product, the pump is smooth and sure, and the good flow rate means you'll be filling up whatever you need to fill before you know it. The filter comes with a long hose to allow you to access hard-to-reach sources, and there's a float on the end to keep it under control as well as very handy quick-release connectors to allow swift connection to hydration systems to filter directly into the reservoir. You also get a stuffsack and some lubricant for the pump.

HOWEVER The numbers aren't the best here: the filter is rated to 0.2 microns, which is fine if not outstanding, but the life of the filter isn't likely to last beyond 1150 litres before a pricy (£43) replacement, even with the supplied protector. It's also bulky, especially against the Sawyer which lasts longer, filters more finely and costs less. This feels fairly old-school, but many will prefer the operation and the quality is hard to knock. If you like the aesthetic but want a smaller unit, consider the Katadyn Mini. If you just want function and a higher filtration rate, buy the Survivor Filter.

VERDICT

Works great, but others are better in terms of weight, longevity and filtration.

Effectiveness	★★★★☆
Design	★★★★★
Portability	★★★☆☆
Ease of use	★★★★★
Value for money	★★★☆☆
OVERALL SCORE	**80%**

Steripen Ultra

£80 ■ **Type** ultraviolet lamp ■ **Filters** bacteria, protozoa, viruses ■ **Flow rate** n/a ■ **Weight** 140g ■ **Filter life** <8000 litres

IT'S GOOD The Steripen is one of those products that is almost too weird to be real. Using UV light (actually the purification method for many large-scale domestic applications) you light it up, whisk it around in a litre of wild water for a minute or so and it emerges leaving the pathogens within – including viruses – neutered and incapable of multiplying to make you ill. While the squeamish might not like the idea of drinking water with the nasties remaining (albeit rendered harmless) the method is highly effective at removing the threat of pathogens. What it can't do is filter it for chemicals, turbidity (muck) or other particulates, making the Steripen less useful when taking water from anything other than fast-flowing mountain streams. Some use a basic filter (nylon stockings are rather good) to help combat the worst of this. This is a fast unit (48 seconds for a litre) rechargeable via USB, has an LED indicator and a belt sheath that (caution!) makes it look like a dagger. Where this excels is as a secondary purifier with another filter.

HOWEVER Aside from the lack of a particulate filter the other main drawback of the Steripen is the need to use a wide-mouth water bottle, bladder or container to operate it; it can also only purify a maximum of 1 litre at a time, so it's no good sticking it in that 3L reservoir and expecting this to sort you out.

VERDICT

If you only purify a litre at a time, will be using cleaner sources, or worry about viruses, this could be ideal.

Effectiveness	★★★★☆
Design	★★★☆☆
Portability	★★★★☆
Ease of use	★★★★☆
Value for money	★★★★☆
OVERALL SCORE	**76%**

Platypus GravityWorks 2.0

£90 ■ **Type** 0.2 micron in-line hollow fibre ■ **Filters** bacteria, protozoa, particulates ■ **Weight** 198g (min) 269g (max) ■ **Flow rate** 1.5 litres/min ■ **Filter life** <1500 litres

IT'S GOOD This filter makes use of a chunky in-line cartridge and a hanging reservoir to provide a substantial water supply suitable for a basecamp, using gravity to make the filter flow. It also comes with an array of fittings and adapters that are capable of making the filter a versatile addition to any walker's arsenal. This includes two 2.0L Platypus reservoirs, one labelled 'dirty'. The pack lists three options for use – the lightest of which comes in at 198g but the 2+2-litre 'basecamp' option only weighs 269g. The 0.2 micron filter itself is larger than the Sawyer Mini, and rather more delicate, featuring rubber floats/buffers (which can be removed) to avoid damage if dropped. At 0.2 microns it's not as fine as the Sawyer either but will get rid of muck, bacteria and protozoa. The adaptors – while bewildering – allow it to be fitted to most bottles and most useful are the straight-to-bottle/reservoir options. The gravity mode worked well; we would have expected a decrease in flow as the bladder emptied, but didn't see one.

HOWEVER Not everyone will want a gravity flow system, which needs to be hung high to work, so you may want to go for the stripped-down bottle kit. The filter lasts up to 1500 litres, but at £44 a pop they aren't cheap. We also found the flow rate to be slower than the stated 1.5 litres a minute with the gravity flow; it took more like three minutes.

VERDICT

Great if you're likely to be base camping as you walk, this is an a versatile large volume system.

Effectiveness	★★★★☆
Design	★★★★★
Portability	★★★★☆
Ease of use	★★★★☆
Value for money	★★★☆☆
OVERALL SCORE	**80%**

H²O PURIFICATION Q&A

Why should I buy a filter?

If you're frequently camping or walking in wild country, a water filter is more or less essential. You can choose a filter to suit the likelihood of you using it, too – from a simple straw filter for backup to a heavy-use gravity filter for constant use in a basecamp.

Do I need one for the UK?

Yes. Untreated mountain water – while mostly safe, or safe enough not to make you ill – is a gamble as you never know what's flowing into it. From the guts of a dead sheep to cryptosporidium-infected poo to pesticide runoff, at any level there is the chance the water you're drinking could make you ill. Hepatitis A, giardia and a host of bacterium can all be found in UK streams – so filter, purify, or boil. Even if it's just a bit.

Do filters guarantee safe water?

No. What they do is shift the odds in your favour to a reasonable standardised benchmark, usually NFS or EPA accredited. This is why most filters leave a tiny element of doubt (usually 99.99%). Most reduce muck (>5 microns in size) protozoan cysts like giardia and cryptosporidium (1-20 microns) and bacteria like E.Coli and Salmonella (0.1 – 10 microns). When it comes to viruses such as Hepatitis A, rotovirus or Ebola things are a little less clear cut – some viruses are extremely small (0.014 – 0.1 microns). Most filters play the odds and filter to the standard for sterile filtered water (0.2 microns). The finest filter here filters to 0.01 microns, which will catch most viruses, too.

What about chemicals?

Iodine was recently banned for free sale in the EU due to concerns over its safe use. Chlorine dioxide is the most commonly used chemical treatment these days. But chemical treatments don't kill everything: chlorine dioxide can take up to four hours to kill cryptosporidium, for instance. And dirty water stays dirty. So they are a good backup, but filtration is a better bet as a first call.

So what do I do?

If you're going abroad, buy the best filter you can. If you have a >0.1 micron filter in unsanitary conditions where viruses are a particular concern a secondary means of killing viruses – such as a UV purifier or a boil – is recommended. If you're staying domestic, buy a filter that is of a size, weight and spec proportionate to the frequency and location of your likely use. Take water from high, fast streams wherever possible. And if you have any concern about viruses after filtering, employ a cost-effective two-stage system – one to filter, another to kill anything that's left. For instance, a MSR Trailshot and a Steripen used together. Or, boil the water afterward. Boiling kills everything.