

A night beneath the stars

The start-up Polarmond has developed an innovative sleeping system in collaboration with Empa researchers. The bivouac is expected to revolutionize comfort while sleeping outdoors in temperatures as low as minus 30 degrees Celsius. EmpaQuarterly reporter Lorenz Huber decided to find out whether the product delivers what it promises. So he packed his rucksack – and spent a night on the Furka Pass.

TEXT: Lorenz Huber / PICTURES: Lorenz Huber, Empa



The first snowfields loom in front of me on the north face of the Furka Pass at an altitude of around 2,000 meters. This November, the snow has only stuck wherever the sun doesn't show its face all day long. On top of the pass, there's a plateau so I stop my rental Toyota to take in the view. As soon as I open the car door, however, a surprisingly strong gust of wind slams it shut again. I brace myself for the second attempt. On the short walk to the edge of the plain, I have to hunch up my shoulders and hold my hand in front of my face. The wind peppers my skin with small hailstones, which sting like whiplashes. The temperature is just below zero – conditions that shouldn't be a problem for the bivouac I plan to sleep in. The start-up Polarmond teamed up with researchers from Empa to develop this all-in-one sleeping system for temperatures as low as 30 degrees Celsius. It shouldn't get below 25 degrees beneath the liner in the spacious interior. The product passed the lab test in Empa's climate chamber; now it has to prove itself in practice.

From the top of the pass, the view stretches across to the Uri face of the Urserental. In the other direction, you gaze down on the Valais municipality of Obergoms. A few lone, determined sunrays pierce the dark clouds in the sky and illuminate the snow-covered mountaintops. The pass road, which snakes its way up both sides of the slope, isn't exactly busy. I drive on for another few meters, come to a fork in the road, veer to the right up the slope and park outside a small wooden hut.

With the bivouac tightly packed and lashed to the rucksack, I begin the climb. A trail leads past the hut, which I follow for a while, keeping my eyes peeled for a spot to set up camp for the night. The wind makes a constant, temperamental companion, intermittently blasting its tempestuous gusts, which tear up anything that isn't firmly rooted to the ground. On two occasions, I only just manage to hold onto my woolly hat. I eventually find a suitable spot; a flat area, roughly five by ten meters in size. A boulder offers a little shelter from the wind. As it's already getting dark, I immediately start pitching the tent. Due to the treacherous weather, my efforts to lay out the bivouac parts aren't particularly successful. The sleeping system comprises the following components: a blue sleeping shell with a high-performance insulating layer; two frames, which provide shape and stability; a sleeping mat, which can be incorporated into the sleeping shell; an orange weather guard, which can be attached to the sleeping shell thanks to a clever zip system; and a liner, which conducts away the moisture from the sleeper's body.

The bivouac is fairly foolproof. The sleeping shell has an opening at the top, where you push – or rather squeeze in – the sleeping mat, but this is the only somewhat more arduous task. The frame, on the other hand, is a piece of cake to assemble: at the top and bottom of the sleeping shell, there is a loop on both sides, through which you thread the ends of the tent poles and attach them at the bottom. Black hooks fastened to the outside of the sleeping shell conveniently click into the frame. In order to protect your face from the elements, you now affix the weather guard, which is also quite easy. Two zips and a Velcro fastener provide a water-proof seal. Finally, you secure the bivouac to the ground with a total of five lines.

The job described here, which would be a pushover in normal weather conditions, is at least twice as difficult in heavy, irregular gusts of wind. Any pieces that you aren't holding need to be weighed down with stones. Once I finally get the sleeping mat in the shell and start sticking the individual parts of the frame into each other, the wind hits me at full force again and sends everything flying. The two stone weights are powerless against such a strong gust and the sleeping shell takes off along with the sleeping mat. It's literally catapulted about 15 meters up into the air and shoots off towards the valley, upon which I let out a loud curse and sprint frantically after it. Fortunately, I reach the tent before the next gust of wind. The subsoil poses the next challenge. A few centimeters beneath the greenery, I hit rock, which makes it difficult to plunge in the tent pegs attached. After bellowing another string of expletives and enlisting the aid of some rocks and the heel of a shoe, I eventually manage to secure the bivouac.

Dusk has already fallen and there's barely a car on the road. Right next to the rock, someone has piled up stones into a low wall to make what looks like a makeshift pen that measures around three square meters in size. Against all the odds, I manage to get a fire going inside this corral. Although my elation is short-lived – the little wood I found by the roadside on the way up is rotten and burns reluctantly and briefly – it still gives off a little heat. As the last beams of sunlight sink behind the mountains across the valley, I settle down next to the fire and brew up a mate tea. This traditional Argentinian drink, which you sip from a hollowed- and dried-out pumpkin through a metal straw with a filter, always makes a sterling traveling companion. As the wood hasn't exactly left any burning embers behind, I have to resort to a camping stove to prepare my supper: tinned lentils with bacon.

When darkness finally falls, I sit down so that I can see the bivouac in the beam from my headlamp. At first, I'm dubious about the reliability of the tent pegs. But regular checks to the lines set my mind at ease. Although the bivouac takes quite a pounding from the wind, it stands firm. I can see the odd star between the clouds. The temperature has dropped way below freezing and all that remains of the campfire is a dull glow. It seems like midnight. In reality, however, it's just after six. The lentils go down a treat.

When my feet start to feel like blocks of ice, I decide to turn in for the night. Eager to find out whether the product actually lives up to its promise, I crawl into the bivouac. Getting in is easier said than done – although, to be fair, I do make a meal of it. It takes me a while to position myself correctly in the liner and wriggle my feet into the foot section. I wait impatiently for the insulation to work its

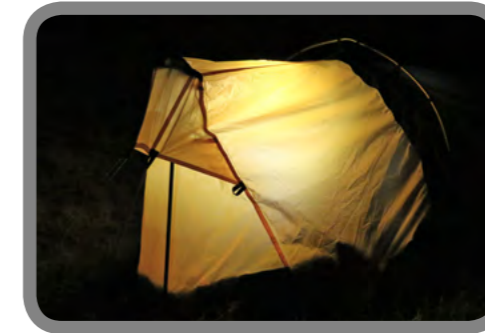
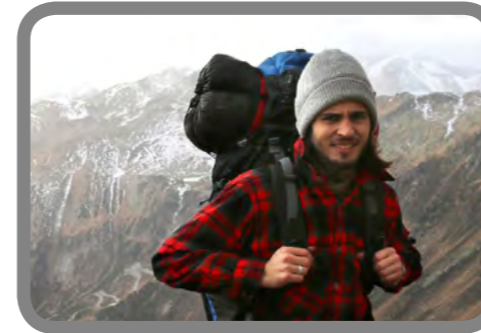
magic. And sure enough, after a few minutes the interior starts to warm up. Still in my winter coat at first, I gradually peel off my clothes until I'm lying there in just my underwear. There's plenty of room in the bivouac. Spread out next to me in the shell are: a camera, complete with its case; my winter jacket, trousers, shirt and hiking boots. Even though it's almost as comfy as lying in a bed, I have trouble getting off to sleep. The mountain wind is still thrashing the bivouac mercilessly, which makes an infernal din inside. I'm a bit worried about my rucksack, which had to stay outside. Although I can feel the gusts of wind a little inside, before long it's so warm that I have to unzip the temperature control.

The next thing I know, it's half past midnight. There's no sign of the wind anymore and the night is deathly still. The temperature in the sleeping shell is still pleasant. I decide to go outside to check the stability of the tent and the whereabouts of my rucksack. When I glance up, the beauty of the view almost takes my breath away. There isn't a cloud in the sky and I have an obstructed view of the starry night – a sea of sparkling little particles, framed by the dark, jagged silhouettes of the mountains.

The rucksack is fine and the bivouac is still firmly anchored to the spot. When I lie back down, I leave the weather guard open so I can up gaze at the stars. Suddenly, something stirs in the heavens: a shooting star streaks across the sky, the first of many. The large, rapid ones leave glowing trails in their wake, which burn in the night sky – and my retina – for a few moments. I just lie there for about three quarters of an hour, my body in the warm sleeping shell, my face exposed to the icy mountain air. This time, I have no trouble dropping off.

At seven o'clock, it's time to get up. After ten hours in the bivouac, the temperature inside has dropped somewhat. But that's hardly surprising seeing as the ventilation slit remained open all night long. The inside of the weather guard is blanketed in hoarfrost. As I clamber out, I brush against the orange-colored material and get a wet head. The fact that my body is already warm, however, makes the transition into the cold morning air perfectly bearable. The ground, my rucksack and the bivouac are covered in morning frost. The wind is still calm, which makes dismantling and tidying up the campsite a cakewalk compared to last night.

After collecting all my belongings I entered my car and drove down to Zurich quite relaxed. It had been quite a comfortable night in the mountains. The Polarmond bivouac surely passed the test. //



Reporter Lorenz Huber climbing up to the campsite, his bivouac and rucksack on his back. Winter nights start early in the mountains: lights on in the tent from 8 p.m. The Polarmond bivouac the next morning before being packed up: weather guard, liner, camping mat and sleeping shell in separate pieces, ready to be put away.

“When I glance up, the beauty of the view almost takes my breath away”.

Info on the Polarmond project

Polarmond's sleeping system is the culmination of an interdisciplinary collaboration. Besides Empa, the Institute for Product Design, Development and Construction (IPEK), the University of Applied Sciences Rapperswil and the Swiss Textile College were also involved. After a product development phase that lasted nearly four years, a bivouac and sit-in tent version is due to hit the market in summer of 2016 – available in sports and outdoor stores and in the webshop of Polarmond.

The sleeping system has a modular structure and includes a sleeping bag, bivouac and sleeping mat, all rolled into one handy product. Usable at temperatures as low as minus 30 degrees Celsius, it should be possible to maintain a temperature of 25 degrees inside, underneath the liner.

Researchers Martin Camenzind and Matthew Morrissey flew the flag for Empa during the project, helping to solve the problem of thermal insulation and dehumidification.

Further info at www.mikeott.ch/wordpress

In November there is little traffic out and about on the Furka Pass. Our roving reporter spent the night near the pass road to test out the tent.