

Insulated Outerwear: How to Choose

When the air turns cold and your activity has slowed, you need a puffy—an insulated jacket designed to hold your body heat close to your skin and buffer you from the surrounding cold air.



When choosing one, these are key factors to consider:

- Down or synthetic insulation.
- Where you plan to use it.
- Weather conditions.
- Fit and features.

This article will help point you to the best insulated jacket for your needs.

Types of Insulation

Your choices:

Down: Nature's best insulator—the most warmth for the least weight and bulk. Just don't get it wet.

Water-repellent down: Down treated with a molecular-level polymer that can withstand mist or light moisture. That's a big plus, but you still shouldn't let it get soaked.

Synthetic materials: Water-repellent, quick-drying fibers engineered to mimic down's loft, low weight and compressibility. Down edges synthetics in all those areas, but synthetics are getting better with each new generation of products.

Fleece: Best for chilly conditions, but not serious cold. Fleece jackets, vests and pullovers are more commonly worn as a middle layer (the insulating layer) in a 3-part [layering system](#) used to regulate heat and perspiration during vigorous activity. Fleece can be synthetic or wool.

	Pros	Cons	Best for
Down	-Lightest -Most compressible -Most warmth per weight	-Won't insulate if wet -Slow to dry -More expensive	-Dry conditions -Mild activity
Water-repellent down	-Same weight, warmth and compressibility as untreated down -Insulates even if exposed to light rain Dries a little faster	-Vulnerable to heavy rain or getting submerged -More expensive	-Dry or damp conditions -Mild activity
Synthetic fibers	-Water repellent -Relatively quick to dry -Less expensive	-Slightly bulkier, heavier and less breathable -Less durable	-All conditions -Mild activity
Fleece	-Soft and breathable -Dries quickly -Less expensive	-Modest warmth -Most bulky option	-Cool conditions -High activity

Down

What down is:

- Natural plumage that serves as the undercoating of geese and ducks.
- When clustered together, high-lofting down plumules (tufts) trap air with unequalled efficiency.
- An exceptional insulator—valued for being light, easy to compress and breathable. Durable, too: If cared for properly, down plumules retain their near-original lofting ability for decades. Down's luxurious feel adds to its popularity.



How down is graded:

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- "Fill power" measures how many cubic inches 1 oz. of down can fill inside a lab container.
- Fill power can range from 450 to 900. In outdoor gear, fill-power ratings commonly fall between 600 and 800.
- A higher fill power indicates higher quality and results in a lighter product.
- Premium down comes from very mature geese and is graded 750 to 800+.

Down vs. moisture:

- If down gets wet, it goes flat and can no longer insulate. In addition, down is very slow to dry, often requiring a day or more. This is down's big flaw.
- In 2012, several **water-repellent treatments** for down were introduced. They involve a durable water repellent being applied to down plumules at a molecular level. (Pretty amazing.) Treated down can retain its loft if exposed to a mist or light moisture. Yet it can still go flat if hit by heavy rain or gets dunked in a stream. Treated down dries a little faster than untreated down.

Bottom line: If a) low weight and the ability to cram a big jacket into a tiny space are your priorities, b) you travel in dry conditions or shield your jacket from moisture, and c) you are willing to pay a bit more up front, you want down insulation.

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Synthetics

What synthetic insulation is:

- Ultrafine fibers of polyester, formed either in short staples (2" or less) or long, continuous filaments. In both designs, the fibers intertwine and create dense, warmth-trapping air pockets.
- Two major names are PrimaLoft® and Climashield®. PrimaLoft works primarily with short-staple designs. PrimaLoft One is its premium option. Climashield focuses on continuous-filament products.



- Outdoor brands sometimes apply their own proprietary tweaks to an insulation. One example is ThermoBall™ (shown at right) from The North Face. TNF shaped PrimaLoft insulation into tiny puffs and packs them densely into apparel baffles. The goal is to replicate down's loft, weight and compressibility.
- Ultrahiker Andrew Skurka, author of *The Ultimate Hiker's Gear Guide*, writes that short staples are soft and compressible but could potentially shift over time and cause uneven insulation. Continuous filaments, he writes, tend to be stiffer and less compressible but are not prone to tearing or clumping, "so their shape and warmth remains more consistent over time."



How synthetics are graded:

- Clo = a unit of measure for the warmth provided by synthetic fibers.
- Clo values are rarely provided by gearmakers. PrimaLoft estimates its insulation products offer the equivalent of 500 to 550 fill-power down. The North Face calculates that ThermoBall offers the thermal efficiency of 600 down.

Synthetics vs. moisture:

- Synthetic fibers are far more resistant to moisture to down, though if soaked their ability to insulate will be strongly compromised. Wet synthetics can provide more insulation than wet down, but just incrementally more.
- Synthetic fibers dry faster than down. Sun, moving air, even body heat can help them dry out within a day, maybe within hours.
- Insulation has a better chance of staying dry if the durable water repellent (DWR) on the shell of your jacket is in good shape. See the REI Expert Advice article DWR Care for details.

Bottom line: If you want a warm jacket and a) don't mind just a little extra bulk and weight, b) prefer not to fret over water's impact on its insulation, and c) want to save a few bucks, you want synthetic insulation.

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Fleece

Advantages: Very good breathability, making it a wise choice when insulation is needed during aerobic activity. (Down and synthetic fills are best worn for moderate to sedentary activities.) Dries quickly when wet.



Disadvantages: Not for serious or prolonged cold. Fleece is also bulky and heavy when compared to down and synthetics. While most synthetic fleeces dry quickly, a few are prone to retaining water (and it's hard to tell which fleece items are the exception to the rule). Wind can also permeate fleece pretty easily unless it contains a wind-blocking membrane (which inhibits stretch) or is worn under a jacket.

Overview: Fleece comes in weights: light, mid and heavy. Heavier garments, logically, are better suited to colder conditions. Polartec is one of the best-known brand names. Its Classic fleece categories—100 (lightweight), 200 (mid) and 300 (heavy)—are in widespread use. Its newer Thermal Pro and Thermal Pro High Loft products offer lower weight and reduced bulk. Some fleece-like pullovers are engineered to provide extra stretch, wind-resistance, water-resistance or some combination of all of these.

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Buying and Wearing Tips

Anticipate the weather. Expect wet conditions? Bring a waterproof/breathable shell, even if your jacket uses synthetic insulation, in case of a downpour. Will it be cool instead of cold? You may need only midweight fleece.

Jacket or vest? It's a matter of personal preference. Vests are often preferred by high-energy, high-metabolism types who understand their tolerance for cold and need a just-enough insulation buffer for their core. Get chilled easily? Carry a jacket. A few, such as the [REI Spruce Run Jacket](#), offer zip-off sleeves.

Hood or no hood? Another personal preference. You may appreciate the certainty of having an attached hood—no “Where's my hat?” moments. For serious cold, a fur ruff around a hood's opening can be a big plus.

Fit. If possible, try on different sizes of the same jacket. Envision how well other layers will fit underneath. Raise your hands over your head; ideally the core of your body will remain covered and insulated when you're stretched out.

Features: Check the pockets. Is their number and location right for you? Also worth checking: the snugness of cuffs, the availability of a drawcord in the hem, the maximum height of the front zipper.

Understanding Heat Transfer

How do insulated jackets work? Keep in mind that everything in nature moves toward equilibrium. Cold air cools a warm object, and the process works simultaneously in reverse.


Insulation experts like to point out that people don't get cold, they lose heat. Our individual metabolisms create body heat. We lose that heat 4 ways:

1. **Conduction:** Occurs through the surfaces we touch, particularly the ground below us. Ever sit on a snow drift or a block of ice? That chill you felt on your back side was heat loss caused by conduction.
2. **Convection:** Air circulation carries away body heat. Think about standing outside on a 20F day while wearing fleece. Now think about the same day with a 20 mph wind. The cold air will blow through the fleece and displace the warm air, causing your body temperature to drop unless you add a shell. The shell by itself does not add any insulation, but does cut the wind. That cuts heat loss due to convection. Convection requires moving air. Air temperature alone does not cause convection; that would be conduction. The cold air temperature will cause your body temperature to drop unless you bundle up.
3. **Radiation:** Our bodies are heat-generating machines. When our activity level slows, so does our heat-making ability. Radiation is why your face feels warmer than your back when looking at the sun. The air temperature is the same, but the radiant heat from the sun warms you. The opposite is also true when looking at space at night. This is why it is warmer to sleep under a leafy tree. Radiation is a complicated subject; even for engineering students find it to be a difficult concept.

- 4. **Evaporation:** When we sweat, the moisture's evaporation cools our skin. This is good when we're warm, but less than ideal when active in cold conditions. Of course, humans are exhaling moisture and evaporating moisture from our skin all the time, not just when sweating. It's just more noticeable during activity.

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