

Underwear (Base Layer): How to Choose

Want a comfort boost on your next outdoor adventure? Ditch those cotton undies and that souvenir concert T-shirt and upgrade to a moisture-wicking base layer. As the next-to-skin layer of your layering system, its role is to move sweat away from your body.



This article explains your underwear options. See the REI Expert Advice article, [Layering Basics](#), for more information.

Why Wicking Underwear Beats Cotton

Moisture-wicking underwear:

- Helps transport perspiration away from skin.
- Dries much faster than conventional cotton underwear.
- Reduces the risk of dramatic swings in body temperature.

In very windy or extremely cold conditions, such advantages are potentially life-saving.

Underwear Comparison Chart

Here's how the primary fabrics used in wicking underwear stack up:

	Synthetics	Wool	Silk (Treated)
Leading brands	Capilene; Ex Officio; Marmot; Mountain Hardwear; REI; Polartec Power Dry; The North Face; Under Armour.	Ibex; Icebreaker; Patagonia; SmartWool.	REI.
Moisture wicking	Excellent Nonabsorbent fibers transport moisture away from skin, spreading it over the garment's outer surface to speed evaporation.	Excellent Wool fibers absorb moisture (as much as 36% of its weight), then gradually release it through evaporation.	Good Transports moisture away from skin more slowly than synthetics.
Drying time	Excellent Dries faster than any fabric on this list.	Good Slower to dry than synthetics, but often feels dry on skin.	Fair to good Silk absorbs some moisture and is thus fairly slow to dry.
Temperature regulation	Fair to good If breezes arise before it dries, a wearer could get chilled. In hot, humid conditions, faster-drying synthetic layers are usually best.	Very good Surprisingly comfortable on warm days; excellent for cool days. Offers more warmth than a synthetic garment of the same thickness.	Very good (in low temperatures) As nice as silk feels, people typically find it too warm for vigorous warm-weather activity. Good insulator when it's cool or cold out.
Odor resistance	Poor to fair When worn for extended periods, synthetic fabrics readily collect bacteria that cause odors. Best if laundered after every use.	Excellent Wool is naturally antibacterial, usually for the life of the garment. Can be worn on consecutive days with minimal odor buildup.	Fair Best if laundered after every use.

By T.D. Wood

[Read Author Bio](#)

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Stretch	Very good	Very good	Good
	Above-average elasticity. Retains shape after being stressed.	Above-average elasticity. Retains shape after being stressed.	Moderate elasticity. Usually retains shape after being stressed.
Price	Good	Expensive	Fair
	Moderately priced.	Natural fibers tend to be costly.	Borderline expensive.
Suggested uses	<p>* All activities, all conditions.</p> <p>* Best in this group for rainy conditions and for heat and high humidity.</p> <p>* Snug fit best for cold weather, loose fit for mild days.</p>	<p>* Most activities, most conditions. If paddling or in rainy conditions, faster-drying synthetics are a better option.</p> <p>* Best in this group for cool conditions.</p>	<p>* Moderate cool-weather activities and snowsports.</p> <p>* When stationary (spectator sports) or post-activity lounging indoors.</p>

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Fabric Overview

Some additional details about your primary fiber options:

Synthetics

This refers principally to polyester and polyester blends. Some underwear blends use high percentages of nylon (as a means of increasing abrasion resistance), or they add small amounts of spandex or elastin (to enhance stretch). Polyester, though, is the dominant synthetic fiber used in wicking first layers.



Pros:

- Feels soft against skin.
- Lightest in this group.
- Moisture-wicking.
- Abrasion- and wrinkle-resistant.
- Easy care.

Cons:

- Odors may build if worn repeatedly on multiday outings.
- Potentially vulnerable to staining.
- Petroleum-based fiber.

Merino Wool

Merino wool has virtually replaced traditional wool thanks to its soft "ultrafine" fibers. Many people are surprised to learn that lightweight merino wool creates a terrific all-season base layer.



Pros:

- Lightweight, soft on skin and not itchy.
- Usually machine washable.
- Stain- and wrinkle-resistant.
- Natural fiber.

Cons:

- Not as fast drying as synthetics.
- Potentially vulnerable to shrinkage.

Silk (Treated Silk)

Silk underwear is largely a specialty fabric, intended primarily for cool- and cold-weather usage. "Treated" indicates the silk has been chemically modified to enhance wicking (a fabric's capacity for moving perspiration off skin to speed its evaporation). Fans of silk are attracted to its smooth texture.

Pros:

- Soft, luxurious texture.
- Thin; adds no bulk and layers well.
- Natural fiber.

Cons:

- Some styles require hand washing; machine washing can cause shrinkage.
- Potentially vulnerable to abrasion and sunlight.

Fabric Weights

Though classified as "underwear," every top in this category is appropriate for use as a stand-alone garment. Microweight and lightweight T-shirts are standard summertime attire for active outdoor types—when hiking, riding, climbing, taking training runs, you name it—and they're excellent for gym workouts.

When selecting tops and bottoms for use as base layers (actual *underwear*), anticipate the conditions you'll face when choosing the heft of the fabric. Here are our general guidelines:

- **Microweight:** For mild to cool conditions. (At REI, you'll find garments identified as micros within the Lightweight category.)
- **Lightweight:** Cool to moderately cold conditions.
- **Midweight:** Moderately cold to cold conditions.
- **Heavyweight:** Cold, frigid or blustery conditions.

If you get cold easily, choose a heavier fabric. Just know that if conditions become unexpectedly mild, a mid-weight or heavyweight first layer could feel too warm during vigorous activity.

Tip: Backpacking? Carry an extra micro or lightweight top. At the end of a sweaty day, you can change into a clean, dry shirt for sleeping.

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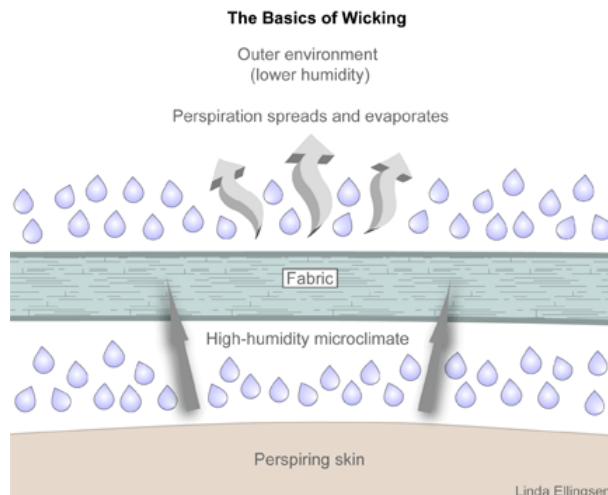
A few words on fit: The warmer the conditions, the looser you want your base layer to be. Snug-fitting base layers keep body-generated warmth close to your skin, boosting comfort in cool conditions. When temperatures heat up, it's best to let your next-to-skin layers hang loose to accommodate lots of air circulation. If a garment's advertising promotes an "athletic fit," figure its fit will be on the snug side.

What Does Wicking Mean?

People understandably find it odd to hear "wick" used as a verb. A "wicking" T-shirt? Sounds strange at first. Here's an explanation of this phenomenon for nonscientific minds:

Candle Wicks

Think of a candle wick—usually a braided, wax-coated cord of cotton. When lit, the wax coating melts away. Melted wax becomes the fuel source for the flame, and the wick draws ("wicks") melted wax to the flame, where it vaporizes. The flame continues to burn because the wick steadily draws more liquefied fuel to it. An oil lamp works on the same principle, drawing (wicking) fuel to the flame. This act of wicking a liquid along a fibrous path is known as capillary action.



Wicking: Synthetic Fabrics

Capillary action also occurs with synthetic performance underwear. Here's how:

1. An active person wearing a polyester T-shirt begins to sweat.
2. A high-humidity "microclimate" is created between the person's sweating skin and the shirt covering the skin.
3. Perspiration vapor and moisture condense on the garment's interior (its underside).
4. Because everything in nature moves toward equilibrium, the high-humidity air mass between skin and garment will seek a path to a lower-humidity environment. The difference (gradient) between temperature and humidity on both sides of the garment becomes the driving force that moves the warmer, wetter air beneath the garment toward the cooler, dryer air on the outside.
5. Wicking takes place when perspiration moisture travels along the surface of the fiber but is not absorbed into the fiber. (Synthetic fibers are, essentially, plastic—and virtually nonabsorbent). Moisture escapes to the outside through the interstitial spaces (the minuscule holes) between the knitted yarns.
6. Moisture is dispersed across the fabric's exterior, where it evaporates after contacting the lower-humidity environment outside the shirt.

Wicking is enhanced by:

Fabric construction:

- Fibers with an altered texture (roughened or grooved) can transport moisture more quickly.
- Fabrics such as Polartec PowerDry use a 2-sided "bi-component" construction. Such fabrics typically position thinner yarns closer to the skin (sometimes dotted with moisture-collecting "touch spots") and place larger yarns on the garment's exterior, providing more surface area for moisture dispersal and evaporation

Chemical treatments:

- Some type of chemical finish is applied to nearly every synthetic fabric in order to boost wicking performance. The finish usually convey some degree of hydrophilic (water-attracting) attributes to polyester, allowing it to more speedily draw moisture along its nonabsorbent fibers and transport it to the garment's exterior.

Note: Polyester, while synthetic, does have a very small absorption rate, roughly 0.4% of its weight. (In contrast, cotton can absorb 7% of its weight.) Polyester's absorption rate is so minimal that it is generally regarded as nonabsorbent.

Wicking: Merino Wool

Technically, it can be argued that wool does not wick moisture. The end result, however—fibers moving perspiration away from skin and dispersing it through evaporation—is the same.

Rather than straining perspiration moisture and vapor through the tiny, tiny gaps in a nonabsorbent synthetic knit, wool's inner core (cortex) absorbs moisture—between 27% and 36% of its weight.

This absorbed moisture is then impacted by the lower humidity, air movement and (potentially) sunlight on the outside of the garment. The result: evaporation.

With so much moisture being absorbed, will a wool garment feel soggy? If it becomes saturated and is confined to a damp or high-humidity environment, it could. (Synthetics are often a better choice when persistent rain is likely.)

Yet wool has the capacity to both absorb moisture (in a vaporous state such as perspiration) while also resisting water (in a liquid state such as light rain). This is one of the almost-too-good-to-be-true marvels of wool.

Wool fibers have a scaly exterior layer called the cuticle, and that is overlaid with the epicuticle, itself coated with lanolin, a waxy, water-shedding film. It is the epicuticle and its waxy coating that makes wool resistant to mist and light rain (hydrophobic). It is this hydrophobic layer that touches your skin, minimizing (or eliminating) any sensation of dampness.

A very sweaty person can overwhelm any fabric. During those moments a wool garment will likely feel less damp and clammy on your skin than a synthetic garment, but it may feel weightier. A synthetic garment will dry out and feel lighter more quickly.

Wool and Temperature Regulation

Some people may be hesitant to consider wearing wool as a next-to-skin fabric.

Realize that performance wool underwear uses merino wool, which consists of "ultrafine" fibers just 17.5 microns in width, fine enough that people will not experience the scratchy sensation often associated with traditional wool. The average human hair, just for comparison, measures 60 microns.

A property unique to wool is its ability to release small amounts of heat as it absorbs water. This effect is known by the arcane term "heat of sorption." Energy, in the form of small amounts of heat, is produced through the work of moisture-absorption by wool fibers. Thus, in damp conditions, a wearer could potentially collect a small amount of comfort from this phenomenon. This is in addition to the countless warmth-trapping air pockets created by all the crimps inherent merino wool fibers.

Could that make wool too warm in hot conditions? Not necessarily. Evaporating moisture within the cortex can cool the air between the wool fabric and your skin, promoting a stable body temperature. Also, breathable wool fibers can buffer skin from air heated by the sun the same way they can trap warmed air and keep it close to skin in cool conditions.

Admittedly, these nuances can be tough to detect in the field, and when conditions turn seriously cold, you will obviously need more than a lightweight wool tee to maintain a comfortable body temperature.

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I am less resistant towards cold, and like to wear woolen undergarments in the chilled weather, but it becomes hard to avoid fungal infection if the inner clothes remain moist for too long.

Therefore, if you are going to wear too many clothes during winters, you must take care that you can avoid making them wet while doing household work. Furthermore, you must look for fashionable inner wear on the web space regularly, and buy them in bulk, if you get heavy discount on them.

Posted by Mellisat on Sep 06, 2012 23:01 PM

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I love this article about all the benefits about wool. It's an amazing fabric. I moved from Norway to NYC last year and had such a hard time finding warm clothing (wool) for my small kids, so I opened an online store selling merino and alpaca wool for babies. My mission is to let parents understand how easy it is to dress with thin, soft wool so the kids can play outside all year. A layer with merino under the other clothes is a very good start for comfy, warm babies. Here's what most babies in Norway wear in night time
<http://ellaswool.com/collections/clothes/products/baby-pyjama>

Posted by Becca Johansen on Oct 05, 2012 20:57 PM

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Additional information not mentioned in the article.

- * Polyester is recyclable while wool and silk are not
- * Wool feels very itchy against bare skin
- * Wool is prone to moth damage without proper storage care

Posted by allgoo19 on Nov 15, 2012 19:20 PM

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What happened to polypropylene?

What's has the best thermal retention when dry? I don't want something that feels cold against my skin either.

Posted by JasonOr on Nov 28, 2012 16:09 PM

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