

Restoring DWR (Durable Water Repellent) in Rainwear

Adapted from an article at www.rei.com

Want to stay D-R-Y when it rains? You need outerwear with a high-performing DWR (Durable Water Repellent).

Virtually all rainwear have their exteriors treated with a durable water repellent (DWR) finish. Much discussion ordinarily surrounds what's at work inside a rain jacket (Is it Gore-Tex? eVent? REI Elements? MemBrain?). But rainwear's first line of defense against precipitation is actually the DWR applied to its outermost fibers.

True, a waterproof/breathable membrane will stop water from penetrating a rain jacket's interior. But a DWR prevents precipitation from saturating the jacket's exterior, known as its "face fabric." Without a DWR, a rain jacket's exterior could become waterlogged and heavy; the damp fabric would tend to sag and cling to your skin.

A key point about DWRs is that they diminish in performance due to a number of factors—dirt, body oils, exposure to campfire smoke, abrasion and repeated launderings. Often they can be revived by a washing and a few minutes of tumbling in a clothes dryer set on low or medium heat. With heavily used garments, DWRs eventually need to be reapplied by a spray-on or wash-in product.

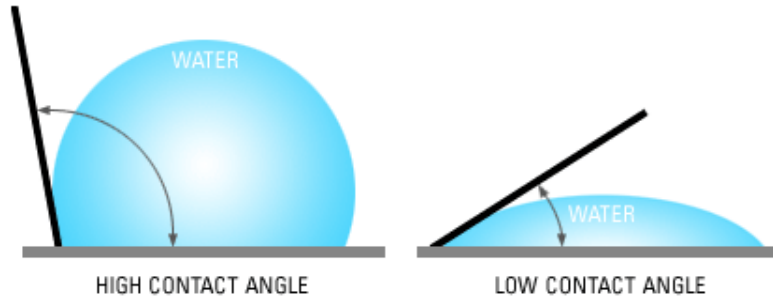
DWR Basics

DWRs are applied in a way that does not inhibit breathability. DWRs do not "coat" the textile surface; instead they bond to the textile's fibers and do not fill in the interstitial spaces between those fibers.

DWRs consist of chemical compounds, usually fluorocarbons. Silicone and hydrocarbons are also sometimes used. Nonchemical DWRs are being studied, though so far none offers the performance standards achieved by chemical DWRs.

How DWRs Work

A DWR is at its best when a waterproof (or water-resistant) garment is new. Any moisture that falls on the garment's face fabric beads up almost instantaneously and slides right off. It's an impressive, reassuring sight, all due to the presence of a durable water repellent on the fabric. DWRs work by increasing the "contact angle" or "surface tension" created when water contacts a textile. Basically, a high contact angle creates a microscopically "spiky" surface that suspends water droplets on the outer fringe of the fabric.



An optimized DWR keeps droplets in a rounder shape—like a dome-shaped bead. The rounder the droplet, the easier it rolls off the fabric. A low contact angle permits droplets to assume a flatter shape, one that can spread out like a splotch, cling to the fabric's surface and eventually seep into it.

Big differences may exist in DWR effectiveness from brand to brand. This is mainly due to the amount of the chemical used or the type of chemicals themselves.

Sizing Up DWRs

Manufacturers generally measure DWR effectiveness by a spray test. Water is sprayed onto a textile, and the amount that sticks is visually assessed. A score of 90 points indicated that roughly 90% of the fabric has no water sticking to it. The higher the number, the better the performance. The test is then repeated after a number of washings to determine durability. Test scores and the number of washings are combined to create a rating. For example, a 90/10 rating means the spray test achieved a total of 90 points after 10 washes.

Not all manufacturers publish DWR performance ratings, but here is a basic guide for interpreting any that you find:

- Good: 80 points after 10 washes. This is a basic outerwear finish.
- Excellent: 80 points after 20 washes. Marmot, for example, uses this as its minimum rating for outerwear.
- Superior: 80 points after 50 to 100 washes.

DWRs are vulnerable to deterioration. The molecular chain is affected by rubbing and can be "masked" by dirt and oils. This reduces the surface tension and allows water to flatten out, adhere to and wet the textile.

When Do DWRs Need Maintenance?

Test your rainwear by sprinkling or spraying some drops on its exterior. Does it bead up and roll off? If you give the fabric a single strong shake, does most of the moisture fly off? If so, your DWR is in good shape.

If, however, the water sits on the fabric and that section begins to darken slightly, water is making its way to the fibers and wetting the fabric. This indicates your rainwear needs attention.

The performance of DWRs can be diminished by:

- Dirt and body oils: Fix it by laundering the item, then giving it a 10- to 15-minute spin in a clothes dryer at medium heat.
- Multiple launderings: Keeping a rainwear item (and its DWR) clean is universally recommended, but after dozen or two washings, a frequently laundered DWR may need revival. If not badly soiled, all a garment may need is a short spin in a clothes dryer at medium heat. Yet if the fabric continues to show blotches of wetness, the next fix is to reapply a DWR with a spray-in or wash-in product.
- Abrasion: Lab tests at REI have shown DWRs can withstand a lot of abuse, but constant abrasion against rocks can scrape away the finish. This is fixable by reapplying a DWR with a spray-in or wash-in product. (Some textiles pros tell us they favor spray-on products; wash-in products may impact linings.) Contact with a pack's hipbelt and shoulder straps will not likely wear away a DWR, but such rubbing can diminish performance by breaking down the surface tension water when it contacts the fabric (as explained in the next section). A 10-minute spin in a dryer (medium heat) may be all that's needed to improve performance.

How to Revive DWRs

First step: Cleaning. Get a bottle of a special cleaning agent such as Nikwax Tech Wash. Follow the cleaning instructions described on the bottle or on the rainwear label. Washing away dirt and oils does much to restore a DWR's water-shedding abilities.

Next step: Apply heat. After washing, exposure to heat does the most to bring a DWR back to life. Generally speaking, you should place the garment in a dryer set for medium heat for up to 15 minutes.

- Gore-Tex: W.L. Gore recommends touching up Gore-Tex items with a steam iron (at a warm setting). It is considered wise for first-time users to place a towel between the iron and garment during the touch-up.
- eVent: Follow manufacturer instructions. The maker of eVent does not encourage the use of dryers, advocating hang drying. More commonly it promotes touch-ups with a steam iron (at a warm setting). As with Gore-Tex, placing a towel between the iron and face fabric is a smart move for first-timers.

As long as the DWR has not been worn off of the fabric, then heat can revive the DWR. The DWR chemical is drawn toward the heat and the molecular chain is straightened out to maximize performance.

It is suggested that you launder the rainwear first, and then give it some heat by putting it in a medium-heat dryer for about 15 minutes. If the jacket is clean you can just do the dryer thing and it should help. Maybe not like new, but better. The garment must be clean or the dirt and oils will still reduce the effectiveness of the DWR.

Due to inconsistencies in dryer temperatures it is smart to remove the garment from the dryer immediately. Fins inside some dryers may remain hot and could pose a melting risk to the fabric if the garment wound up lying on a hot fin. At medium heat, though, a fabric meltdown is highly unlikely.

How to Reapply DWRs

Occasional step: Reapplication. A durable water repellent is just that—durable. It is hard to rub it off, but it can happen. These factors may prompt the need for a reapplication:

- Abrasion from rock: It acts a little like sandpaper on a fabric, and enough sustained contact with rock can cause a DWR to be scraped away.
- Contact with pack hipbelts and shoulder straps: This sort of friction may not wear away a DWR, but it can diminish a DWR's performance in those areas. A short tumble in a dryer might be all that is needed to restore the DWR.
- Multiple washings: Each item is different, but after a few dozen launderings it's possible a garment may need to have its DWR reapplied. How to tell? Time in a dryer should always give a rainwear item the DWR reactivation boost it needs. If wet splotches still appear during rain showers, reapplication is the next step.

The fix: A DWR can be reapplied via a spray-on or wash-in DWR revival product from companies such as Granger's, Nikwax, ReviveX or Sport-Wash.

Follow instructions on the product. Spray-on products are preferred because they get more of the DWR directly on the fabric. Wash-in products may affect the wicking ability of linings or trim. When manufactured, a rainwear item has its DWR heat-set at the factory. Likewise, most aftermarket DWR treatments require heat-setting in a clothes dryer. Follow the instructions on the treatment product you select.

Tip: Fluorocarbon-based DWR revivers sometimes can be selectively layered on a garment's high-abrasion areas without treating the entire garment. However, the garment must be able to accept ironing. Check the garment's care instructions regarding use of iron before trying the following:

1. Spray worn abraded areas.
2. Use the synthetic setting on an iron (one with a trusted thermostat) to apply low to medium heat. It's a process similar to starching the collar of a dress shirt.

This is a trick used by mountaineering guides to treat high-abrasion areas such as shoulders and waistbelt areas.