

## Condensation is Normal

Modern equipment, when used properly, makes it possible to camp in safety and comfort in most conditions. However, expedition experts and travel influencers don't often talk about the difficulties of certain localities or climates, leaving hikers and campers concerned for their safety when encountering unforeseen difficulties. For example, waking up to find condensation inside the tent and coating all gear and clothing. Advances in tent design and construction have greatly reduced condensation, but it is still present under certain conditions.

## How Condensation Occurs

Air can hold water vapor, which is called humidity, in limited amounts dependent on the temperature of the air. Relative humidity is simply the ratio of actual humidity to the maximum amount the air can hold at that temperature. If the air is cooled below the holding capacity of the air temperature, the dew point, then excess humidity will condense out, either as fog or as dew (condensate) on the cold surface(s) that is cooling the air. We call the condensate many things: dew, fog, clouds, rain, snow, frost, or condensation. The fog on an automobile windshield, bathroom mirror and ski goggles are all the same as condensation on tent walls, caused by the wall being cooler than the dew point of the adjacent air. The type of material has little to do with condensation forming.

A surface that wets easily can have an almost invisible film of water, the same water on a harder to wet surface will form tiny droplets, the familiar fog. Highly porous surfaces will absorb the water, thus taking it out of sight as well as making it hard to dry out. As long as the surface is as cold, or colder than the dew point no net evaporation can occur and condensation will increase or remain the same. Claims have been made that porous tents will let humidity out through the pores, this is true only if the fabric is warmer than the dew point. Once the tent reaches the dew point, any humidity trying to pass through will condense until the fabric is sealed with water, thus acting like a coated surface. If condensate freezes, or is frost, it is almost impossible to remove from porous fabric until warmed to melt and evaporate. Most coated surfaces shed ice fairly easily, especially if silicone coated. All Warmlite® tents are silicon coated.

To minimize condensation, you must minimize contact of humid air with the cold tent surface. This can be done partly in the tent design with vents designed to remove humidity inside the tent, and by shielding the cold outer wall with a sealed inner wall. Warmlite® offers both single and double walled tents. If the inner wall is porous it will not block humidity to the outer wall: as much condensation will occur as if inner wall was absent, in which case the inner wall only hides condensation, and maybe keeps some of it from dripping off.

Condensation seldom occurs when there is strong airflow or wind: airflow removes excess humidity and warms the tent air temperature. Improper ventilation inside a tent create still air conditions that leave the air temperature within the tent to the mercy of the elements, for example a greenhouse effect from solar radiation from a clear sky creating a higher capacity for relative humidity then quickly chilling during a rain allowing humidity to build up inside and lead to heavy condensation. At Warmlite® we have designed a ventilation system that will create proper airflow even in still air, with no help from wind. We use a chimney-like effect for

ventilation. High vents to let the light weight, warm humid air out, and low vents to let cool, dry air in. The location of these vents is important to get proper inside airflow, moving humidity directly to the top vent and reducing circulation back along walls. It is especially important that no middle height vents are open, such as doors, since such openings will short circuit the intended vent circulation.

The inner wall must be kept as warm as possible to keep it above dew point. It should thus be completely shielded by the outer wall so there will be a still air insulating gap between the walls. It is important that the tent be set up tightly as possible as Warmlite® tents are designed to have and maintain this air gap between the walls and the vents remain open as intended to allow proper airflow.

High quality tents are made of nylon because of nylon's superior strength and outstanding wear resistance. But, nylon can expand if wet. Rain or dew can make your tightly set, smooth tent expand to become loose and begin flapping. Elastic shock cords on stake out lines only make the tent more likely to flap in wind. Warmlite® uses adjustable stake out cords on the cones so you can remove slack without moving the stakes.

## How to Avoid Humidity Build-up within your Warmlite® Tent

### **1. Avoid drying sweat soaked or rain-soaked clothes inside your tent.**

Keep any wet items in a plastic bag in your tent unless humidity is low and there's no danger of condensation, or dry all wet items outside.

### **2. Block ground vapors coming the through floor**

Purchase a Warmlite® tent footprint. This will prevent humidity within the ground underneath your tent from rising up through the floor of your tent and creating condensation on the tent floor and walls. It will also protect the floor of your tent from the elements and extend its life.

### **3. Cooking**

We suggest never cooking inside your Warmlite® tent, as the fabric can be flammable and the burning of cookstoves in a small space can create elevated levels of carbon dioxide or carbon monoxide which are dangerous to humans.

### **4. Choosing ground to set-up camp on**

Try to set up your tent on rocky, frozen, or extremely dry ground. This will prevent against ground humidity becoming a problem.

### **5. Sweating**

Avoid over-dressing when hiking, camping, and sleeping. This will prevent sweating and will decrease humidity levels within the tent.

## **6. Use Vapor Barrier Technology**

In very dry conditions, moisture from the skin can evaporate, not only dehydrating you but within a tent it can increase the humidity levels and thus potential for condensation. You can stop unwanted evaporation drying by covering your skin with a vapor barrier. Vapor barrier gloves, socks, pants, shirts and sleeping bags are available from Warmlite®. Blocking the escape of water lets humidity at the skin stabilize at a comfortable level, preventing unwanted heat and moisture loss. Vapor Barrier also has the side benefit of keeping clothing from soaking up sweat or getting wet from condensation. The human body typically loses about 4 lbs. of water in a night, that's 8 cups of water. The heat taken from the body to evaporate this much water would be enough to melt 28 lbs. of ice! Using any Warmlite® sleeping bag can prevent much of that heat and water loss.

## **7. Wet gear**

If you encounter rain or wet conditions, avoid entering your tent while this gear is still wet. If possible, shake or wipe gear dry before bringing it into the tent. If this is not possible, fold gear inside out and place inside a water proof bag to prevent it wetting other gear, clothing, or the inside of the tent.

### **Still Have Condensation?**

If condensation still occurs, wipe it off as soon as you see it with a handi-wipe. When you get out of the tent, wipe the outside so it can dry quickly while you prepare breakfast, then you can pack a dry and light tent, ready for another night.