

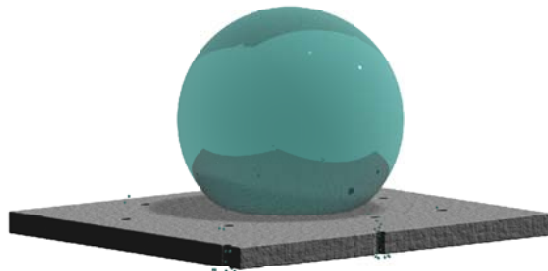
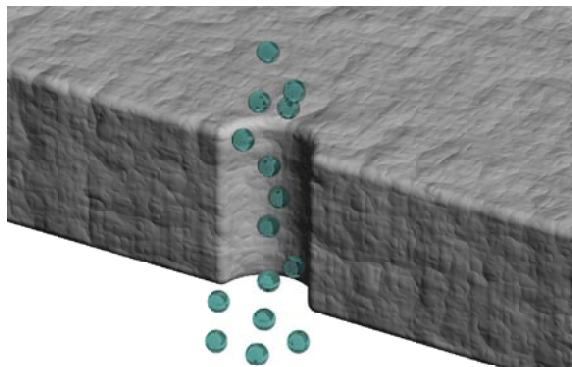
# Tech Hotline

## Vapor Permeable vs. Waterproof

No. 0307 BSc

Question: How can a material be both vapor permeable and waterproof ?

Answer: In the simplest terms it has to do with size. Water vapor is a gas consisting of individual molecules that are very small. Water vapor molecules will easily pass through pores and openings in a material. (e.g. small openings in the illustration below). More openings result in greater amounts of vapor that can pass through a material.



Water vapor moves from areas of high vapor pressure to areas of lower pressure. The ability of a material to permit the passage of water vapor is referred to as its vapor permeability.

Liquid water is formed when water vapor molecules cool and lose energy. As they cool the cohesive forces draw the molecules tightly together. The tight cohesive force creates surface tension, which draws water drops into their familiar round shape. Surface tension also allows water drops to cling to other objects. Examples of this are water drops clinging to window glass or the small curve of water at the edge of a glass (known as the meniscus). The illustration below (not to scale) shows the surface molecules. Their attraction forces are stronger than the forces trying to push water through the hole.

Surface tension will cause liquid water to bridge the small holes that water vapor can pass through. This is how a material can be both vapor permeable and waterproof.

