

## Application of Composite Materials in the Field of Outdoor Sports

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**Abstract:** Outdoor sports are extreme and submaximal exercise and very challenging and stimulating, and has embraced nature, challenge themselves, and can cultivate personal perseverance, teamwork, enhance field survival ability. The main feature is the outdoor sportswear cut compact, strong, including wind and rain resistance, air permeability, thermal insulation, abrasion resistance, tensile tear resistance, and other security identity. These fabrics are generally difficult to meet the more demanding requirements, and with the development of science and technology, new composite materials have a more powerful, through a combination of multi-layered material and stitching, the collections in a variety of new features for the majority of outdoor sports enthusiasts to bring the gospel, but also highlights the charm of modern composite materials.

### Outdoor sports clothing performance requirements and common materials.

Determine the characteristics of outdoor sports outdoor sports clothing with the performance. Due to a wide range of outdoor sports, and the characteristics of each are not identical, so we asked for outdoor sports clothing also has a variety of functions.

**Moisture Control.** Outdoor sports moisture control is very important, including water resistance, hydrophilic and water conductivity. When confronted with a large Rainy weather. A rain soaked clothing to avoid body movement; when the players a lot of sweat, a moisture wicking of Sportswear and can quickly be holding off the body sweat, to avoid discomfort.

**Temperature Control.** The body temperature is not too high and not too low either. Temperature is too high, people easily dehydrated heatstroke; temperature is too low, will Frostbite athletes. Therefore, the outdoor clothing must be able to control the temperature well. The main categories of clothing to keep warm by adding to achieved. For skiing and other sports, because of the larger wind speed, is likely to cause athlete temperature drops, so the outdoor sportswear wind resistance is particularly important in the temperature control.

**Physical control.** Outdoor Games athletes consume a lot of energy, so to save energy through the clothing will help athletes better reference and outdoor sports. Usually the right to control the body's elastic stretching several major muscle groups, avoid the unnecessary shock excessive energy loss.

**Bacterial control.** Outdoor Games once last longer, wash conditions are not even difficult conditions, in order to prevent the bacteria Breeding and other factors affecting the health of athletes, we must consider outdoor sportswear antibacterial properties.

**Distress message.** The risk coefficient is relatively large outdoor sports, outdoor sports clothing so to be able to reflect the identity of adequate security. Color To try to bright (green, etc. to avoid

hidden color), so that once the danger, rescue workers can identify with clothing, fast super quick to find and rescue the wounded, and reduce mortality.

### **Outdoor sports apparel multilayer structure**

In order to meet these demanding requirements of many special and outdoor sports apparel and more multi-layer structure to achieve different functions the rational combination. Generally use a combination of three layers of clothing each other or alone is enough to cope with complex environments, from the inside out into personal layer, an intermediate layer and the outermost layer.

**Personal layer.** Proximity refers to the personal level of the skin layer, because most outdoor sports sweat, especially in the large temperature difference between places. In case not successfully sweat vapor discharge from the body will affect the comfort of the clothes, and may even cause physical frostbite. In addition, personal layer must have appropriate elasticity and recovery, clothes neither too loose nor too tight. Warm clothes are too loose will affect clothes sex, too tight will affect the freedom of activity.

**Intermediate layer.** Play a major role in the middle layer of warm, usually fleece. Fleece is a feather, wool and a variety of people from Chemical fiber material made with lightweight, comfort features, and can and wool as in the humid conditions Keep warm. However, the traditional windproof fleece is bad, and the new material windstoppe basically solved the problem. windstopper uses a Gore-Tex membrane is similar, although it is not waterproof, but a good wind performance, than the average fleece lot stronger.

**Outermost.** The outermost layer of skin, clothing, just like human skin. To play the outermost layer windproof, waterproof, breathable performance. At present, often used within the ordinary fabric, a composite layer having a microporous film. For example, Waterproof / Breathable (anti-Breathable water, such as the use of laminated Oore-Tex nylon material), Waterproof / On-Breathable (waterproof airtight type, Raincoats tent a class of heavy PVC coated nylon material), WaterResistant / Repellent (retaining type, can only block A small amount of water is tightly woven nylon fabric). In addition, also the permeability of the outermost layer must have the characteristic. When the body through sweat steam when the intermediate layer next to the skin layer and spread to the outermost layer, breathable clothing can be ruled out as quickly as possible so that water vapor, without blocking the conduction of water, the body becomes dry quickly. Of course, the multi-layered concept in outdoor sports is very flexible and can be freely combined according to the ambient temperature. In the warmer environment, you can take off the intermediate layer or outermost layer. In a cold environment, can wear a plurality of intermediate layers. In addition, many are now used for outdoor sportswear fabrics are also multi-layer Design. The moisture absorption process management into a conduction evaporation of a multilayer fabric design, fabric composite with different functions at the same time with a variety of functions.

### **The material is often used for outdoor sports clothing**

**Moisture Control Materials.** Cleancool is a relatively new fiber, used for recreation, sports, underwear and other clothing. Woven by Cleancool Fabrics and products set two moisture wicking and anti-bacterial deodorant popular features in one, you can also pass the most stringent in the world Georgia in the United States AATCC. 100 anti-bacterial moisture wicking test and related tests. Its grooved fiber fabrics and unique design Meter, so that the wearer always keep dry skin feeling

cool, while silver fiber contains ingredients can in a very short time Intra kill a variety of harmful bacteria and remove odor common, with a permanent feature, sports, leisure and home Ideal for clothing. DuPont Coolmax developed a strong wicking performance polyester fibers. It has four grooves cross section can be quickly discharged from the sweat to evaporate and dry layer outside, to keep the body dry, do outdoor sports underwear is an ideal material.

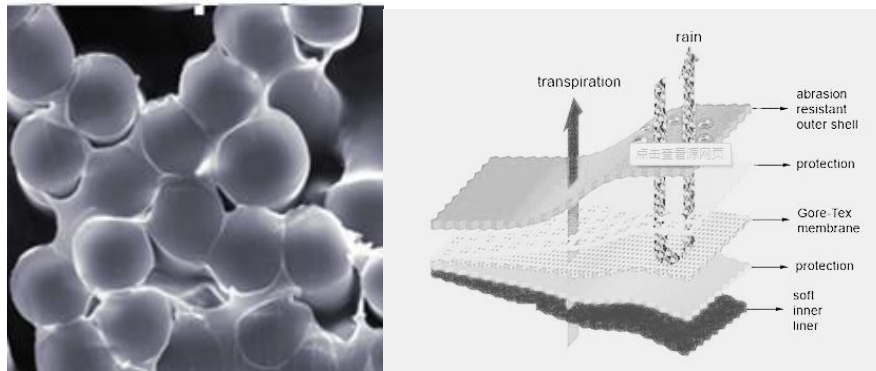


Fig. 1 Gore-Tex Fabric

Source: <http://www.fabric114.com>

Gore. tex is a porous PTFE fiber membrane laminated film made with waterproof and breathable performance. This film can be like human skin, like breathing, the excess water vapor derived from the body, but also the outside world cut off from the invasion of rain and snow. It is waterproof and breathable can not solve the compatibility problems, and also has a weather-resistant, in Europe as the "Century of the cloth."

**Temperature control material.** Polartec is the United States launched MaldenMills material is by far the most popular outdoor market napping production Goods. Polartec fleece than normal to light, soft, warm, and can not afford to velvet. Not only does it dry faster, and stretch Shrinkage is also good .Outlast is a way to absorb, store and release body heat thermoregulation material, can make our body to maintain normal body temperature in extreme weather. Often used as quick-drying underwear and socks materials. Exceltech material is polyamino acid of the wet coating method to complete. Polyamino acid is an imitation of the type of protein polymer, it is very close to the molecular composition of the skin. Exceltech full advantage of the high water vapor permeability of such polymers. This material had been worn by Everest expedition, was also used as a ski suit and slalom competitions were many winners wear. Exceltech even at minus 20. C will not lose when soft feel, is an ideal winter sports clothing materials. ThermaStart fabric is a fabric with polyester hollow fiber as raw material, the heating speed, high thermal efficiency. Compared with polypropylene, polyester / polyamide fiber thermal rate increased by 23%, water 40% higher transmission speeds, a 30% increase permeability.

**Physical control material.** Lycra is one of the most widely used material sportswear most indispensable, and its use far beyond the scope of sports apparel. This artificial elastic fiber, its anti-pull characteristics and the extent of smooth woven into clothing after the close of the body,] greatly stretch where the elements are ideal for sports. Many outdoor sports more intense, movement of the great range of motion, flexibility if sportswear bad, it will make the joints, muscle activity and active range is limited, affecting the body's movement. But the addition of Lycra sportswear not only has a good scalability can better increase the comfort of clothing, but also to maintain muscle coordination and prevent any excess muscle tremors and loss of energy, improve the speed,

endurance and strength athletes, etc. Powerstretch material has a personal four-way stretch elasticity. Even when you sweat, still dry. Light and warmth, wind resistance, abrasion resistance. Its durable nylon outer layer, can wind abrasion resistance. Soft polyester inner layer may endorse the moisture from the body surface, and thus stay dry, warm and comfortable, suitable for personal clothing. PowerStretch suitable for use in dire need of protection and freedom of movement of outdoor activities, costumes turn.

**Bacterial control material.** Cleancool woven into the fabric and its products set antibacterial deodorizing, has passed the most stringent in the world in the United States AATCC. 100 antimicrobial testing. Silver fiber contains ingredients can kill in a very short period of time to a variety of common harmful germs and remove the odor, a permanent feature, is ideal for sports, leisure and home apparel.

## Conclusion

In the rapid economic development and fast-paced life of today, people working pressure is increasing, more and more people need a way to vent pressure or physical and mental relaxation. In this environment it flourished outdoor sports, outdoor sportswear designed for research and development is also increasing attention of businesses and the scientific community. In this paper, outdoor sports and outdoor sportswear situation and development trend were summarized on the relationship between moisture wicking textile testing various indicators to analyze the characteristics of different outdoor sports discussion, depending on the characteristics of the fabric to get the performance index the importance of using concentrated mapping method and functional value evaluation, a comprehensive evaluation of its overall performance, providing a theoretical basis and practical reference for the testing and evaluation of high-performance outdoor sports underwear fabrics.

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