

## DSM – Bright Science. Brighter Living.™

Royal DSM is a global science-based company active in health, nutrition and materials. By connecting its unique competences in Life Sciences and Materials Sciences DSM is driving economic prosperity, environmental progress and social advances to create sustainable value for all stakeholders simultaneously. DSM delivers innovative solutions that nourish, protect and improve performance in global markets such as food and dietary supplements, personal care, feed, medical devices, automotive, paints, electrical and electronics, life protection, alternative energy and bio-based materials. DSM has around 21,000 employees and delivers annual net sales of more than 9 billion. The company is listed on Euronext Amsterdam. More information can be found at [www.dsm.com](http://www.dsm.com).

### DSM (China) Limited

Add: No.476 Li Bing Road, Zhangjiang Hi-Tech Park,  
Pudong New Area, Shanghai, China, 201203

Tel: +86 21 61418188

Fax: +86 21 61418088

Email: [Cynthia.wu@dsm.com](mailto:Cynthia.wu@dsm.com)



# CoolLite™ FUNCTIONAL FABRIC

HEALTH · NUTRITION · MATERIALS



# CoolLite THE ULTIMATE FABRIC FOR SUMMER

CoolLite™ is a functional fabric developed by Royal Dutch DSM by utilizing proprietary technology, offering excellent long-lasting cool feeling and moisture wicking performance.

Many fiber producers also promote that their fabrics have cool feeling characteristics, however, polyester fiber-based fabrics cannot last long in cool feeling as they reach the effect by releasing sweat; while cotton and viscose-based fabrics absorb water molecules into fiber and form sponge-like structures however will make human body feel moist and stuffy after quickly reaching saturation; bamboo fiber-based textiles make people feel cool in the initial stage of sleep by heat storage but will reach full heat capacity quickly.

CoolLite™ employs DSM's proprietary fiber with ultrahigh crystalline structure, which possess an ultrahigh thermal conductivity, greater than stainless steel and titanium. As a result, the Q-Max heat dissipation value of the fabric reaches up to 0.32w/cm<sup>2</sup>, far exceeding the technical standard 0.1w/cm<sup>2</sup> for cool feeling functional fabrics as specified by BOKEN, the Japanese textile institute.

Benefiting its unique long-last cooling characteristic, CoolLite™ is applied in benlien, cushion, shirt and outdoor clothes. Through professional fabric design CoolLite™ dissipate body heat from the contact surface and volatilize sweat moisture quickly. Cool feeling products made from CoolLite™ can quickly and balance the temperatures of the whole body, resulting a very comfortable environment for human activities.

## Fibers in CoolLite™

CoolLite™ adopts DSM proprietary anisotropic functional fiber with ultrahigh crystallinity, which has a thermal conductivity higher than stainless steel and metal titanium as crystal therein are arranged in a highly ordered manner and as a result, energy quanta are transmitted towards the axial direction of fiber through lattice vibration but no longer in an astatic manner by Wiedermann-Franz effect. Compared with other fibers, the fiber for CoolLite™ has a thermal conductivity 400 times that of natural fibers such as cotton and silk and over 230 times that of other functional fibers such as polyester, viscose (i.e. regenerated cellulose fiber), etc.

Thermal conductivity of materials:

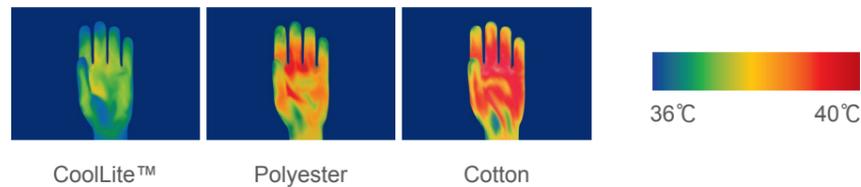
Materials	Thermal conductivity (W/m.k)
Ultrahigh crystallinity fiber (axial)	20
Titanium	15.6-22.5
Stainless stell	16.3-24
Leather	0.18-0.19
Flax	0.09
Polyester	0.084
Cotton	0.071-0.073
Wool	0.052-0.055
Viscose	0.055-0.071
Silk	0.05-0.055

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## The facts of CoolLite™

CoolLite™ has high thermal conductivity and heat dispersion rate. The fabric transfers heat very quickly from the inside to the outside of the fabric, which prevents heat accumulation on the body surface. Simultaneously, with the character of continuous heat absorption and dispersion, CoolLite™ gives a lasting cool feel and minimizes sweating. When the Q-Max heat irradiation value is greater than  $0.1\text{w}/\text{cm}^2$ , a fabric can be considered a cool feeling fabric. According to the technical standard of Japanese textile institute BOKEN, while the Q-Max value of CoolLite™ reaches up to  $0.32\text{w}/\text{cm}^2$ , far higher than such standard.

Experiments show that after wearing gloves made of CoolLite™ for a long time, the temperature of hands is close to body temperature, whereas 3-4°C higher than body temperature if gloves made of other fibers such as cotton and polyester.



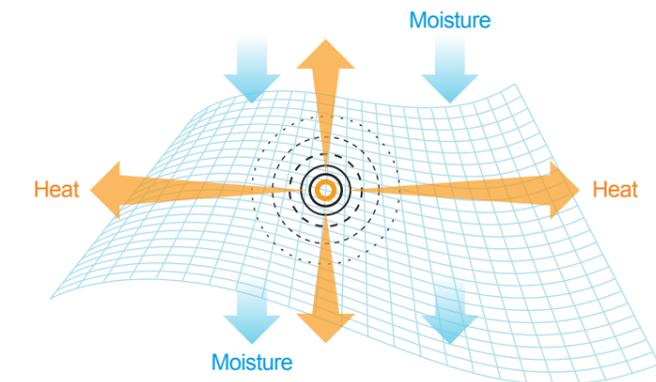
When CoolLite™ is blended with other materials in certain proportions, it achieves more than twice the sensation of cooling than regular materials. Below figures show the palm temperature on different fabrics for 15 minutes at ambient temperature (26.6°C). The palm temperature on CoolLite™ and hemp blending fabric is 2 degrees lower than that on cotton fabric.



## Other benefits of CoolLite™

### Moisture wicking

CoolLite™ fabric can release and volatilize sweat moisture quickly through professional fabric design so as to keep the human body cool and dry and bring people comfort in summer time.



### Easy to clean

CoolLite™ is smooth on the surface, stain resistant and dries quickly after being washed with a washing machine, meeting the character of fabric for summer use that are changed and washed frequently.

### Softness and comfort

CoolLite™ is soft and smooth on the surface, has excellent somatic comfort and brings consumers the smoothness of silk and cool feeling.

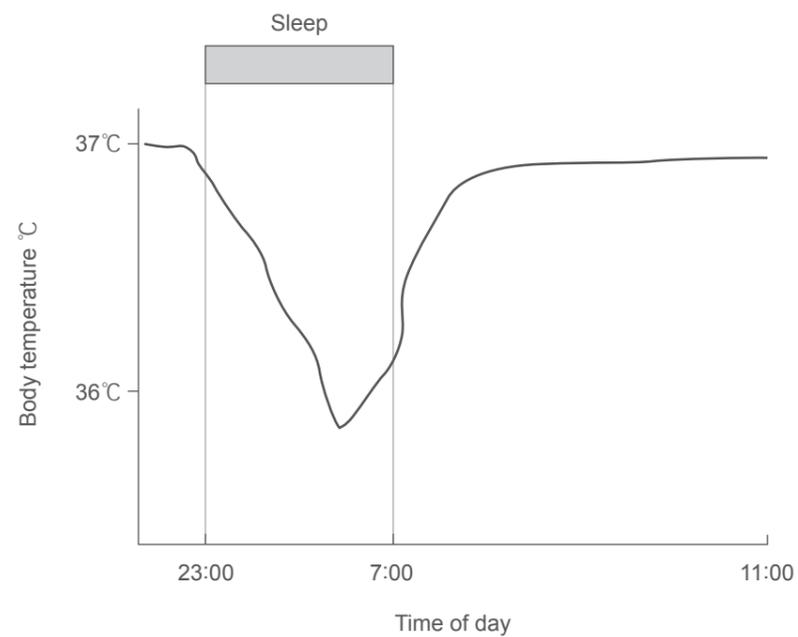
### Fungus resistance and acarid preventing

Traditional fabric for summer use such as cotton, flax and viscose are easy to get damp, mildew and breed fungus and acarid as people sweat, causing great harm to people's skin, respiratory track and immune system. CoolLite™ adopts fiber made from ultrahigh purity raw material, which itself is used for biomedical purposes and has excellent biosafety, so it could restrain the breeding of fungus and acarid.

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## CoolLite™ in bedlinen

During the night sleep, human body automatically keeps regulating temperature balance to help people staying in deep sleep as shown below. Through continuous heat production and dissipation (such as sweat) the skin temperature goes down and people fall into deep sleep before awoken. In the summer, circumstances such as hot room temperature and stuffy bedding prevent people falling into sleep easily. Moreover, if the quilts, mattresses and pillows can not promptly dissipate the heat, the sweat will make bedding hot and humid which is adverse to sleep quality and health in following sleeping hours. Even in an air-conditioned room, more than 80% of human body are covered by the bedding. Parts of body with high temperature such as head and back will have unbalanced skin temperature and prevent people from deep sleep.



CoolLite™ is a suitable fabric for summer bedding with unique features. CoolLite™ can be applied in mat, bed sheet, mattress and pillow with proportions of cotton, hemp and other fibers blended. The bedding made with CoolLite™ speeds up heat release and keeps the body in the optimum temperature range for sleep. It relieves stuffiness and humid feeling by minimizing sweating for the whole night. By transferring the heat from hot part such as back to cold part such as arms it balances body temperature effectively. CoolLite™ significantly enhance the comfort of bedding and improve the quality of sleep.

Bedding made of CoolLite™ is not susceptible to fungus and acarid. In addition, it is stain resistant and easy to clean. Combined with a natural smooth and soft touch, it constitutes the best bedding materials for a comfortable deep sleep in summer.

