

## E.COOLINE® – THE UNIQUE 3D COOLING SYSTEM

Climate is changing and temperatures are increasing worldwide. Already today there are a lot of environments and conditions where people suffer from heat which influences their performance, health and well-being. Therefore we have developed the mobile cooling system E.COOLINE.

At first sight it seems to be a new functional textile – but E.COOLINE is much more. Our objective is to offer a cooling system which improves performance and health in all conditions.

- Temperature
- Humidity
- Air Movement
- Air permeability of clothing

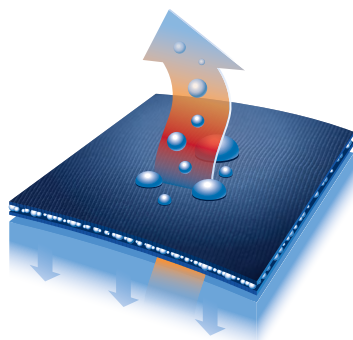


Figure 1

Therefore, we require knowledge about the physical effects of evaporation heat and heat capacity as well as the physical and biological basics about heat regulation of the human body.

The body's core temperature of 37 °C is necessary to ensure that all important body functions work well. Temperatures above or below will result in less effective processes, fatigue and health risks on the long run. Therefore the body mobilizes a lot of energy, cardiac work and sweat to keep this core temperature of 37 °C stable, which results in a lower energy resource for other processes which leads to lower performance in working or other activities.

A cooling system as E.COOLINE can support the body's efforts, keep the core temperature more stable and therefore leads to better performance and health.

As a natural physical cooling system, the most important factors to define the effective use of E.COOLINE are:

The perfect environment has an ambient temperature above 18 °C, 30-70 % humidity and some air movement. A little wind or only moving yourself is ideal (similar to the wind chill factor). In these environments the E.COOLINE cooling system works perfectly according to the physical principle of evaporation heat. It cools more with higher temperatures and less with lower temperatures like a natural air condition – mobile for hours. Your body temperature keeps its 37 °C and works perfectly. If the E.COOLINE system is used under protective clothing it is necessary that there is a possibility of air exchange. (See Fig. 1)

What if the conditions are not ideal? Sometimes the air exchange of the

protective clothing is not perfect, the user sweats but does not move at all or there is no air movement or higher humidity of over 90 %. In such cases the system has to be used differently depending on the environment. **But it always cools.**

The specific construction of the E.COOLINE system allows a very good temperature exchange. Therefore, it has the best precondition to cool down the water-activated products in a very fast and easy way. And – the heat capacity is much better than with most other materials as water or gel-packs. That's why the system is working very well – and it stays dry.

Because of the 3D-fleece construction in E.COOLINE, the water is bound in a loose way and the activated product takes a temperature of ca. 10°C\* in a fridge in less than 30 minutes\*\*. You can also use a

simple mobile cooling box or cooling bag with cooling packs or small zipper bags with crushed ice inside which is available at most places.

If you use a freezer, please do not store the products longer than 20 minutes so that they will not freeze because then they could become hard and uncomfortable and you will damage them on the long run.

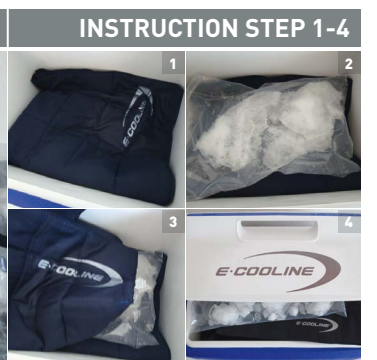
When using the precooled product, it cools the body for about 1-2 hours. If you feel, that the cooling effect reduces after a certain time, put the product back to the fridge, freezer or cooling bag again and again. Using the cooling box or bag you are mobile with a cooling system for hours.

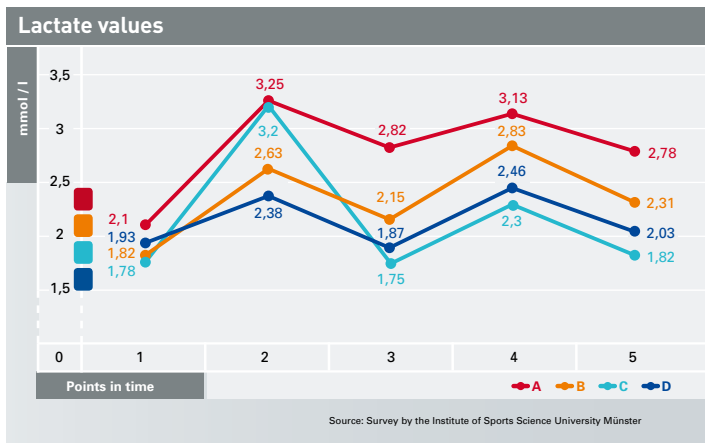
### RECOMMENDATION

If you use 2 E.COOLINE products, leave one in the fridge or cool box and exchange it easily with the other one after use.

**COOL TO GO (CTG)** – developed with the physiotherapist of a National Soccer Team. Use „crushed ice“ in small zipper bags and put the products (vest, cap,...) in layers with the ice bags in a simple cool box (plastic box) or cooling bag. There you can reload it again and again for over 8-10 hours and you can use it everywhere.

\* temperatures of less than 10 °C can affect the lymphatic system or cool the muscle area. Therefore take care not to use colder products as ice or ice water.  
\*\* depending on the fridge and the size of the product (vests longer, head gear shorter time)





- A Control conditions: no cooling**
- B PRE COOLING: 20 min. Cooling only before first stress test**
- C INTER COOLING: 20 min. Cooling only during break**
- D PRE - & INTER COOLING: 20 min. before and 20 min. between stress tests**

**Figure 2:** The minimum time to use the E.COOLINE system before activities: at least 20 - 30 min. In breaks 20 min. would be great but any time is useful. As much breaks you have the better it is.

## THE INDIVIDUAL WAY OF COOLING

Cooling during activities is named DURA COOLING. This is normally the best and most effective way because you have the possibility to react directly to the heat stress. Especially the E.COOLINE system has the power to react individually because of its heat dependent function of evaporation cooling.

In some cases, it is not possible to use a cooling product during the activities or it is not possible to use the heat capacity way with crushed ice or a fridge, but you do have protection clothing which does not allow any air exchange.

Studies at the University of Munster and Dortmund proved that the E.COOLINE cooling system is still very effective even if you only use the system before your activities, in breaks and after.

### 1. PRE COOLING & INTER COOLING

PRE COOLING means to cool down your body before you enter a hot environment or start any activities in hot conditions. The heat affects you much later and body parameters are much better. This is especially recommended if you have to wear protective clothing (breathable or not breathable) or if you do not have the possibility to use the

cooling system during your activities. The same for INTER COOLING in breaks to cool the body down again and keep the energy- and health-saving effect for the next activities.

With PRE COOLING and/or INTER COOLING you have the effect that the body temperature does not rise as fast as without cooling. The studies with E.COOLINE showed much better lactate data, a lower core temperature and lower energy consumption of the body. (See Fig. 2)

### DID YOU KNOW THAT?

**The Finnish sauna world champion takes a shower about 15 min. with cold water before entering the sauna. His body temperature drops and the heat is affecting him much later. This is also PRE COOLING!**

### 2. POST COOLING

Regeneration is an important process to get rid of heat stress symptoms not only in sports but also at the workplace. In places with high ambient temperatures and high physical efforts, it is advisable to wear the E.COOLINE system also after working/training. The body recovers more quickly when the body is cooled down. Lactate and other metabolic data achieve

their normal levels much faster than without.

### TIME TO WEAR BEFORE OR AFTER WORKING/TRAINING: 20 - 30 MINUTES

### HOW TO USE E.COOLINE

Check temperature, clothes, humidity and work as well as working processes to check which way of using the E.COOLINE system is working best. Please be aware that also in countries where the humidity is high outside there is a much lower humidity for example at places of fire or very hot temperatures as at ovens (fire brigade,

glass and steel industries). In these cases, DURA COOLING with evaporative cooling is working very well.

To show you the most likely situations check your climate situation and use the E.COOLINE system the most appropriate way. (See Fig. 3)

If you have got any questions or require more information, do not hesitate to contact us.

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**Figure 3:** Overview

	Humidity up to 70%	Humidity 70%-90%	Humidity 90%-100%
<b>Everyday &amp; workers clothing (breathable)</b>	<b>DURA COOLING</b> PRE COOLING INTER COOLING POST COOLING	<b>DURA COOLING</b> PRE COOLING INTER COOLING POST COOLING	<b>DURA COOLING-CTG</b> PRE COOLING-CTG INTER COOLING-CTG POST COOLING-CTG
<b>Protective clothing (breathable)</b>	<b>DURA COOLING</b> PRE COOLING INTER COOLING POST COOLING	<b>DURA COOLING-CTG</b> PRE COOLING INTER COOLING POST COOLING	<b>DURA COOLING-CTG</b> PRE COOLING-CTG INTER COOLING-CTG POST COOLING-CTG
<b>Protective suits (not breathable) or other unbreathable fabrics</b>	<b>DURA COOLING-CTG</b> PRE COOLING INTER COOLING POST COOLING	<b>DURA COOLING-CTG</b> PRE COOLING-CTG INTER COOLING-CTG POST COOLING-CTG	<b>DURA COOLING-CTG</b> PRE COOLING-CTG INTER COOLING-CTG POST COOLING-CTG

**Legend:** **DURA COOLING:** Cooling during activities. **PRE COOLING:** COOLING at least 20 min. before activities **INTER COOLING:** COOLING in any break possible between the activities **POST COOLING:** COOLING after activities for regeneration to reduce body parameters faster **CTG:** COOLING with precooled E.COOLINE products (fridge or CTG - Cool to Go)



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