<For reference>

June5, 2024

Liberta Co.,Ltd.

Sumitomo Chemical Co.,Ltd.

Utax Co.,Ltd.

HYO-GEKI α (Ice Blast) : Japanese Cooling Sensation Technology

Sumitomo Chemical's Comformer®, Temperature Control Resin × UTAX's Cool Touch Printing

to realize clothing with self-acting temperature control

Liberta Co., Ltd. (Liberta) launches in Japan HYO-GEKI α (Ice Blast for global market), an upgraded version of HYO-GEKI FREEZE TECH, a cooling wear which is the combination of fabric made with the world's first*1 solid polymer-based temperature control material, Comformer® by Sumitomo Chemical Co., Ltd (Sumitomo Chemical) and the world's top-level technology, Cool Touch Printing, by Utax Co., Ltd. (Utax). (*For product details, please refer to the separate sheets.) HYO-GEKI α (Ice Blast) is composed of Japanese cooling sensation technologies.

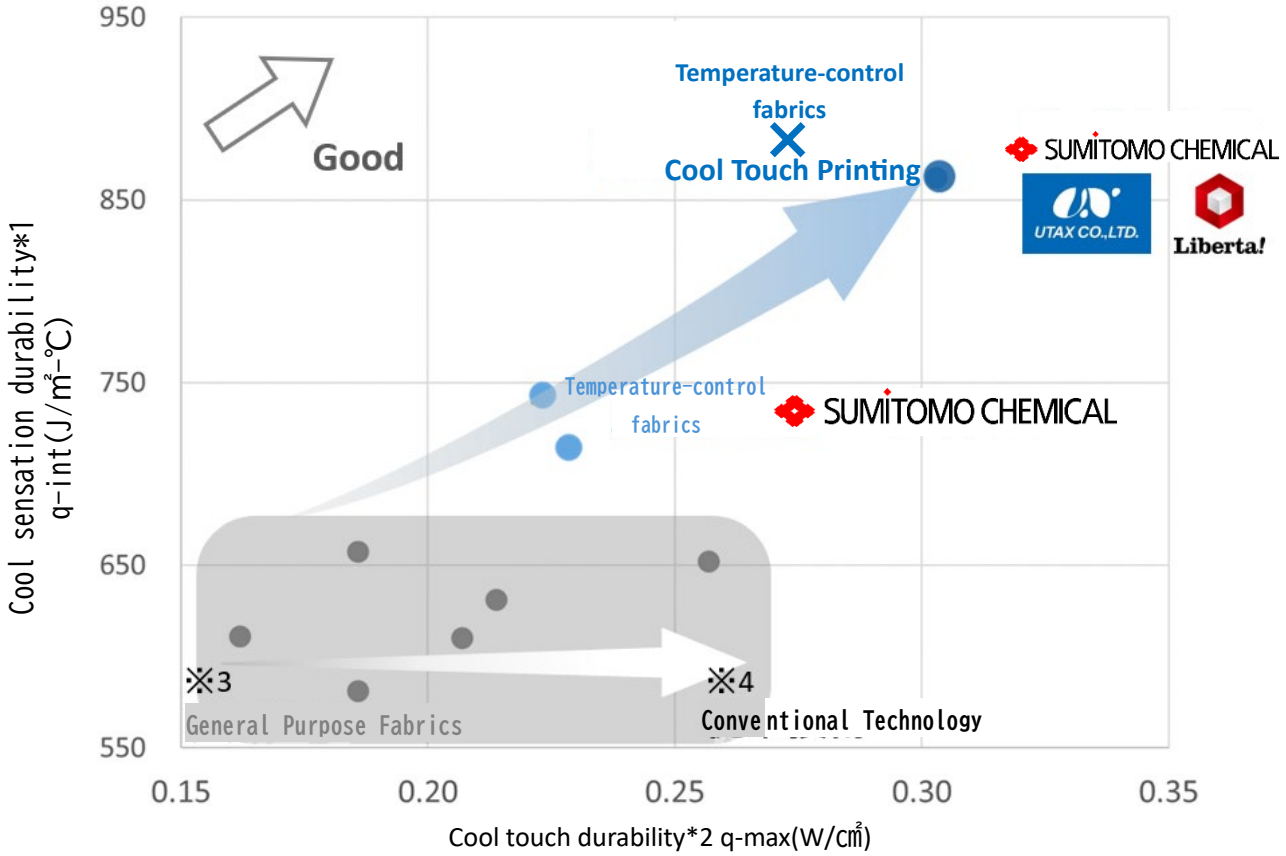
*1 As of the announcement on May 21, 2024, this is the only commercially available olefin resin, according to research by Sumitomo Chemical.

Other existing cooling sensation products, though they provide an excellent cool touch, have had difficulty maintaining the cool sensation for a long time.

The new HYO-GEKI α (Ice Blast) has resolved this issue. It is an epoch-making product that sustains cool sensation for much longer by adding a new temperature control function to the excellent cool touch function inherited from previous products. The most important feature is that the clothing automatically controls temperature through the action of the thermoregulation fibers (*the capacity and range of thermoregulation may be limited under severe conditions).

Cooling performance evaluation data

Temperature-control fabric: Comformer® knitted fabric*5



<Notes>

1 Cool sensation durability: Contact heat transfer q-int (measured by Unitika Garmentech Co., Ltd.) Test Conditions: test environment: 20℃(68℉), 65%RH; hot plate temperature: ΔT=10℃(50℉); integrated heat consumption during 60 seconds cumulative time.

*2 Cool touch: Maximum heat flux q-max (measured by Unitika Garmentech Co., Ltd.); test conditions: test environment 20℃(68℉), 65%RH; hot plate temperature ΔT=20℃(68℉)

*3 General purpose fabric: fabric without any cool touch properties

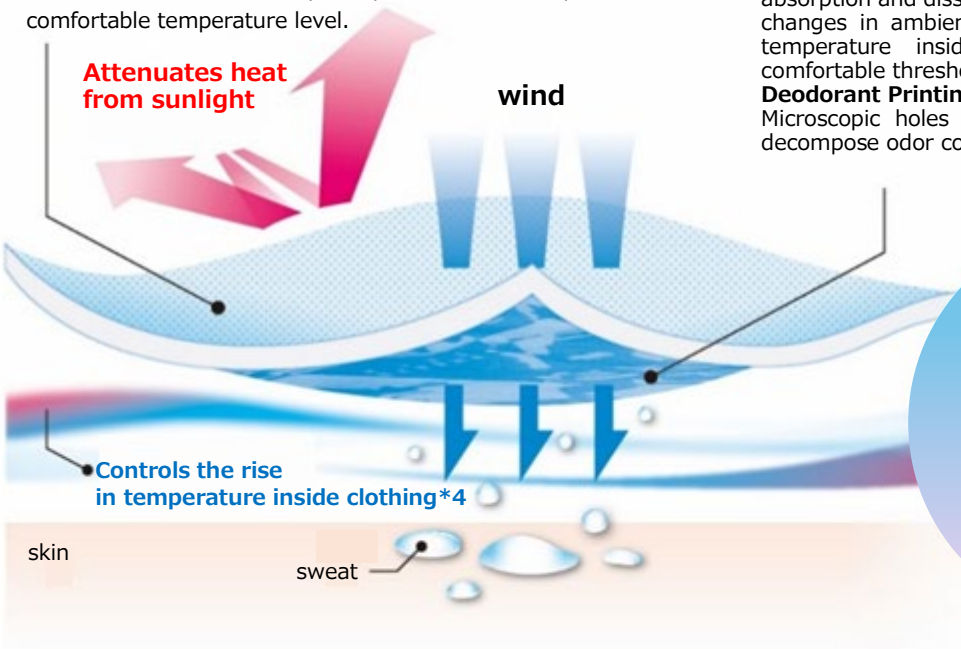
*4 Conventional Technology: Technology to increase cooling sensation by using resin with high thermal conductivity, thin thread, cool-feeling knitting method or applying certain cooling treatment except for temperature control fabrics.

*5 The degree of cool sensation the knitted fabric provides may depend on the use rate of Comformer® and other conditions.

How HYO-GEKI α (Ice Blast) works

Cool Touch, Temperature-control Fabric

The original knitted textile with fibers made with Comformer®, temperature-control resin, combined with heat-blocking fibers that attenuate sun heat. It controls the rise of temperature inside the clothing under extremely hot weather or a rise in body temperature and keep it to a comfortable temperature level.



Cool Touch, Temperature-control Printing

Cool Touch Printing
Its heat-absorbing feature provides lasting cool sensation by utilizing perspiration and moisture to lower the fabric's temperature. *1

Temperature-control printing
The cool sensation is maintained by repetitive absorption and dissipation of heat in response to changes in ambient temperature, keeping the temperature inside the clothing within a comfortable threshold. *2

Deodorant Printing
Microscopic holes on the surface adsorb and decompose odor components. *3

Advancements

Reacts to perspiration and wind to create a cooling sensation*4
The cooling sensation lasts approximately 1.5 times longer*2 than conventional products*5

<Notes>
*1[Lasting cool sensation] While the cool touch printing reacts to moisture *2 Comparison test based on contact heat transfer(by the manufacturer)
*3 Based on gas removal performance evaluation test *4 Based on in-house simulation test *5 Compared to our Freeze Tech Regular Fit Series

Sumitomo Chemical's Comformer®: The world's first*1 solid polymer-type temperature-control material

Self-acting temperature controls of Comformer® fiber and fabrics make them materials of the future.

Sumitomo Chemical has developed a temperature control resin (Comformer®) based on its own material design technology. Comformer® is a new polymer designed to utilize the latent heat *3 generated by the phase transition *2 of the resin components. Unlike other existing temperature control materials *4, its greatest feature is its ability to absorb and dissipate heat while maintaining a solid state.

Comformer® can be used the same way as general synthetic fibers such as polyester and nylon; processed into long fibers (yarns) by melt spinning for use in clothing. In case of a sharp change in environmental temperature, Comformer® fiber moderates the temperature change inside the clothing, allowing the clothing to maintain a comfortable temperature for longer time.
Furthermore, Comformer® is made of 30-40% plant-derived components, making it an earth-friendly material of the future.
We are also planning to exhibit and sell HYO-GEKI α (Ice Blast), a Comformer® product, at the Sumitomo Pavilion at Expo 2025 Osaka, Kansai, Japan to be held from April 2025.

<Notes>
*1 As of the announcement on May 21, 2024, this is the only commercially available olefin resin, according to research by Sumitomo Chemical.
*2 Phase transition: A change in the state of matter, i.e., from solid to liquid and vice versa.
*3 Latent heat: Heat supplied or extracted during a phase transition. During the state change from solid to liquid (melting), heat is taken away from the surroundings (heat absorption). Conversely, during the state change from liquid to solid (solidification), heat is supplied to the surroundings (heat dissipation).
*4 existing temperature control materials: Materials that undergo a solid↔liquid change during phase transition (heat absorption/desorption)

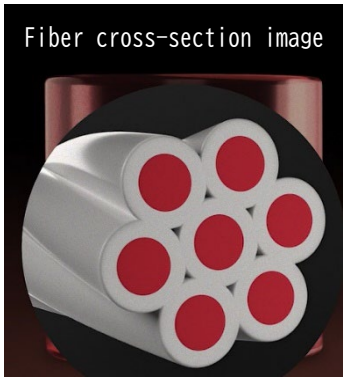
■How Comformer®, the temperature control resin, is made into fiber

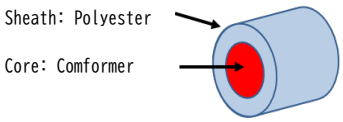
temperature control resins

Comformer®

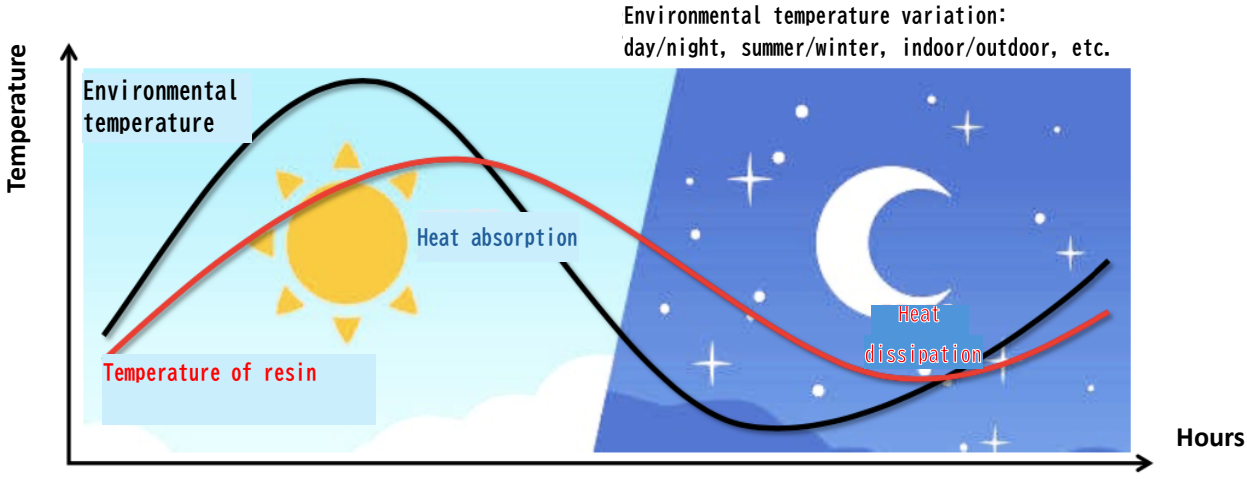
short fiber

long fiber





■How the comfortable temperature level is maintained



Daytime

Heat input from the environment is internally absorbed by the resin
→ The resin itself does not easily rise in temperature.

Nighttime

Heat dissipation to the environment due to structural changes inside the resin
→ The resin itself does not quickly drop in temperature.

■ Differences between Comformer® and other existing temperature control materials

Both Comformer® and other existing temperature control materials *4 are based on the mechanism of latent heat. The major difference is that the Comformer® absorbs and dissipates heat in a solid state, while the existing temperature control materials undergoes a change of state: solid ⇆ liquid. Comformer® can be used as a fiber material, and the amount that can be placed in the fiber is greater than that of other existing temperature control materials, resulting in a higher temperature control effect*5.

*5 In general, the more weight of a temperature-regulating material is used in a product, the higher its temperature-regulating capacity. Each material's amount of latent heat (J/g) during heat absorption/desorption is constant.

● **Comformer®**

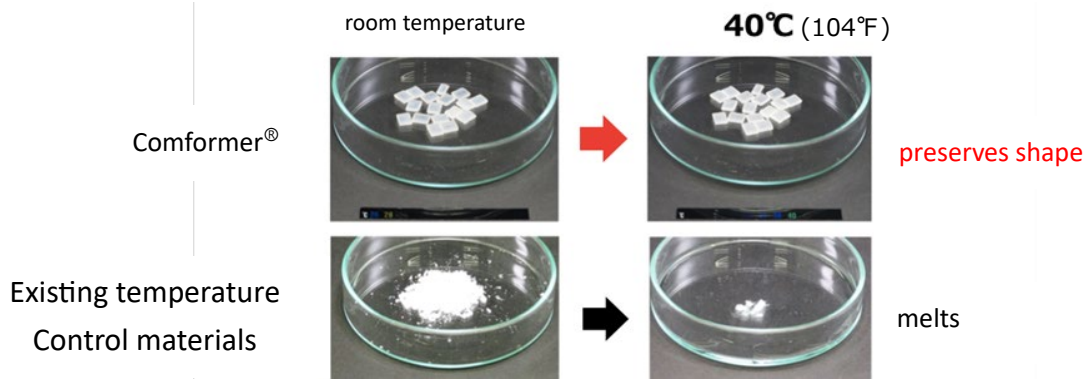
→ Comformer® has a substructure that undergoes a phase transition at a specific temperature and absorbs and dissipates heat in a solid state. It can be used as fiber material as it is.

Existing temperature control materials

→The material changes state to solid ⇆ liquid, thereby absorbing and dissipating heat.

When fibered, the material is microencapsulated into the fiber.

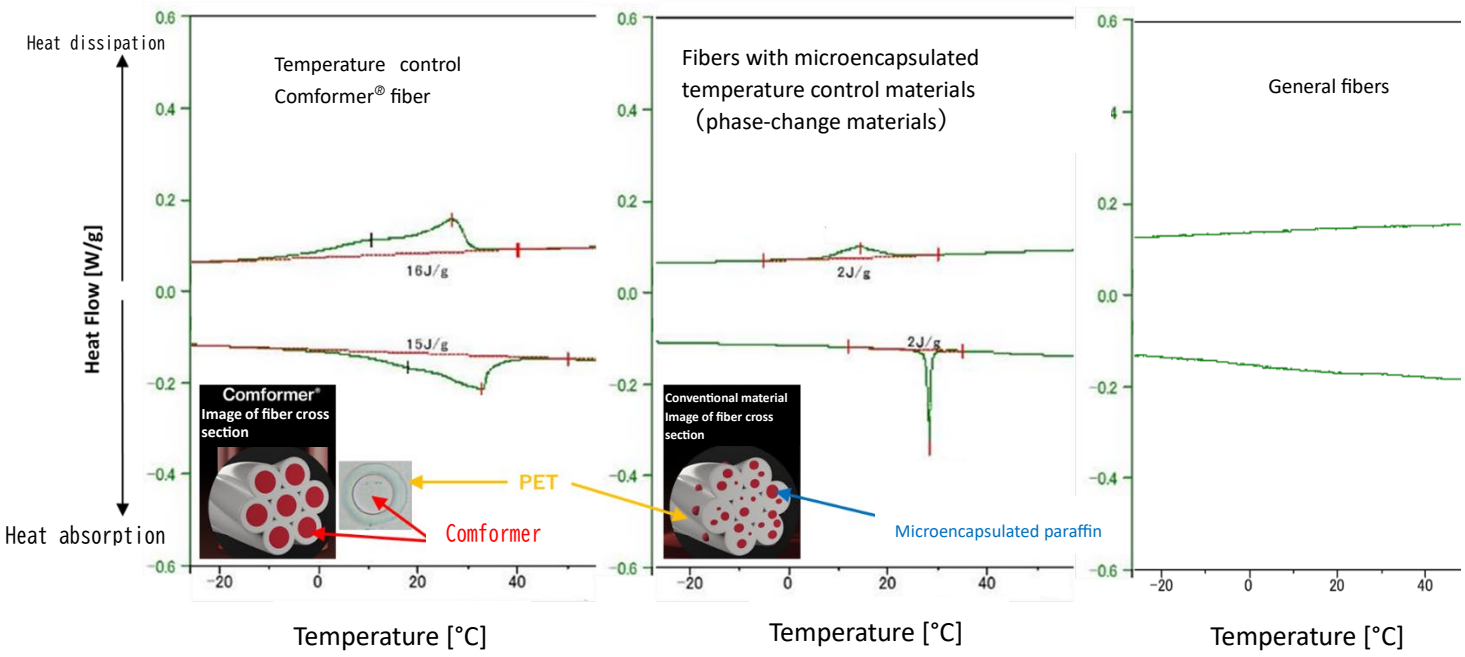
Because only a limited amount can be kneaded into the fiber, its temperature control performance is also



■ Heat absorption and dissipation capacity of temperature control Comformer® fiber

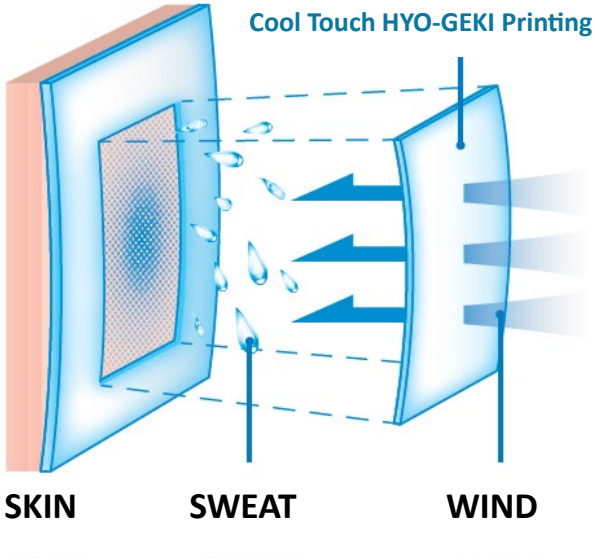
Capable at a wide range of environmental temperatures

The graph below compares the heat absorption and heat dissipation effects of three fibers: a fiber using Comformer®, a fiber using other existing temperature-regulating materials, and a general fiber with no temperature control function. It can be observed that fibers using Comformer® absorb and dissipate heat in response to a wider range of environmental temperatures. Heat absorption and dissipation can be observed in other existing temperature control materials as well, but only under certain temperatures. Heat absorption and dissipation effects are not confirmed in general fibers.



Comparative verification of Comformer® fibers, fibers with microencapsulated paraffin (conventional temperature-regulating material), and general fibers. The higher the value of latent heat capacity (J/g), the higher the capacity.

About Cool Touch Printing by Utax



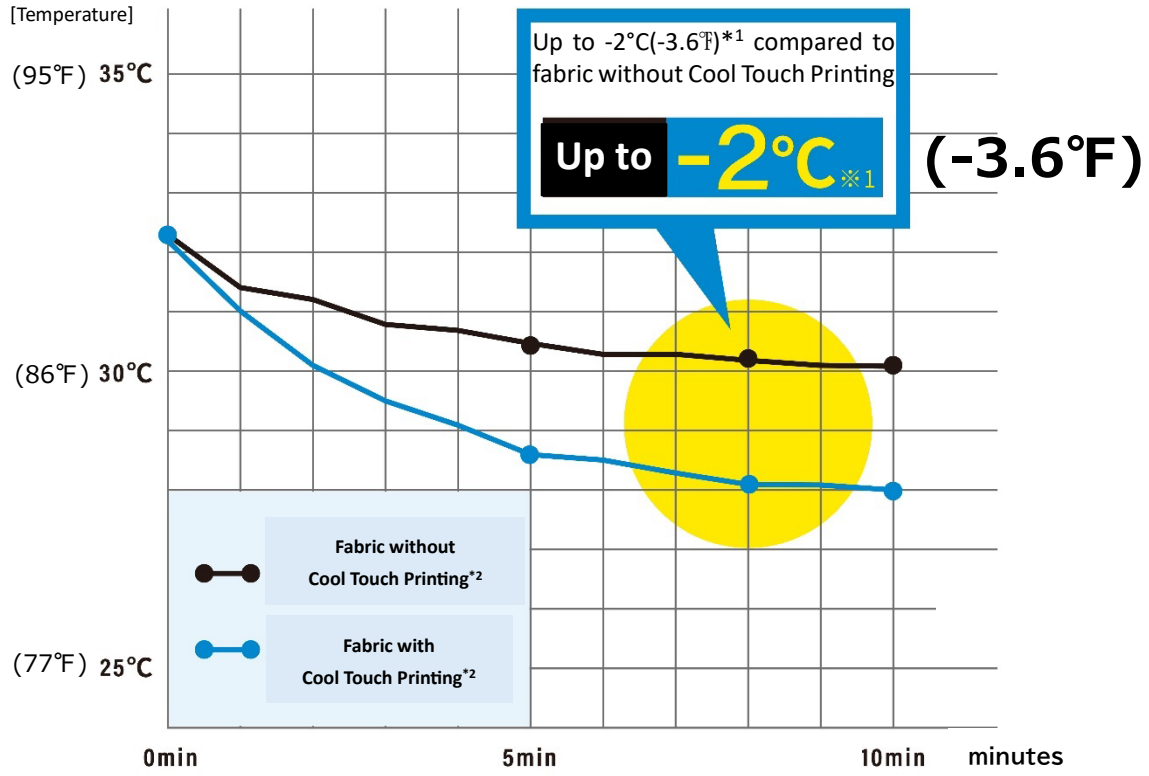
Special printing containing erythritol and xylitol is applied to the entire lining.

When fibers are treated with this special Cool Touch Printing, they absorb sweat generated from human skin, and their temperature decreases due to their heat-absorbing characteristics, providing a cooling sensation.

In midsummer conditions with high temperatures, users can experience a sustained cooling effect, making it comfortable for indoor and outdoor summer work, outdoor activities, sports, and many other situations.

Cooling sensation evaluation test: Marked max. -2. 0°C*1 ! (-3.6℉)

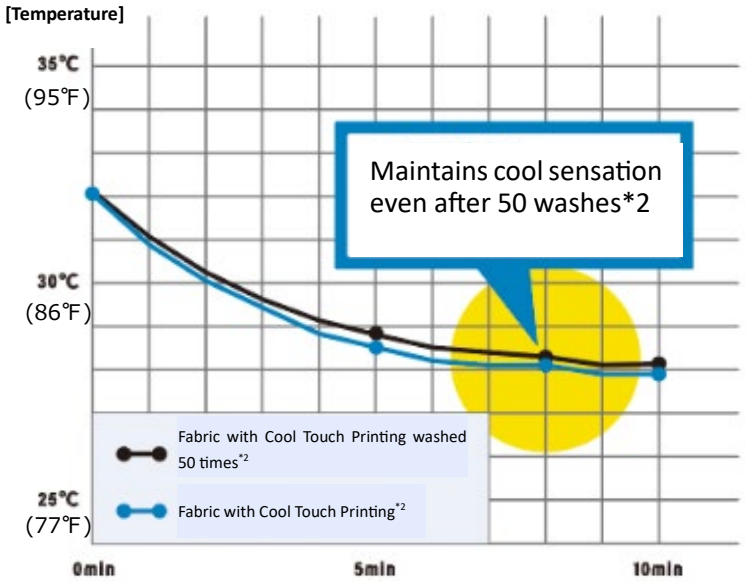
*1 Not guaranteed as temperature perception may differ by individuals in the actual use environment.



Cooling sensation test of Cool Touch Printing by a third-party organization (temperature change per minute)

■Test Description:
A sample*2 was taken from the fabric and folded in two, which was used as the specimen. Then, a humidity sensor was placed in the center of the folded inside. In an atmosphere of approximately 33°C(91.4℉), approximately 0.2 ml of water is dropped onto the center of the specimen (above the sensor), and the temperature of the wetted area is measured for 10 minutes.
(From a test evaluating Cool Touch Printing's water absorption and coolness, conducted on March 14, 2023)
※2Freeze Tech fabric without Comformer®

Wash durability test: Retained approximately 70% of performance after 50 washes[*3]!



Cooling sensation verification test of Cool Touch Printing conducted by a third-party organization (temperature change per minute)

A wash durability test for FREEZE TECH's Cool Touch Printing comparing the difference in cooling performance before and after 50 washes shows it has strong wash durability[*3], retaining approximately 70% of its initial performance, deterioration only up to -0.8°C(-1.44℉), even after 50 washes.

[*3]Not guaranteed as durability can vary depending on the laundry environment.

■Test Description:
After being washed 50 times, a sample[*2] was taken from the fabric and folded in two, which was used as the specimen. Then, a humidity sensor was placed in the center of the folded inside. In an atmosphere of approximately 33°C(91.4℉), approximately 0.2 ml of water is dropped onto the center of the specimen (above the sensor), and the temperature of the wetted area is measured for 10 minutes.
(From a test evaluating Cool Touch Printing's water absorption and coolness, conducted on March 14, 2023)
※[2]Freeze Tech fabric without Comformer®

■ Development path:

Initially, we were not looking for a cool touch. Around 2005, we started the printing processing and verification of alternative reinforcing materials for women's underwear. The developed materials were then distributed to lingerie and fast fashion manufacturers.

Later, much-anticipated mass production became possible through passing on the factory *gemba* technology, but it was not an easy path.

There were challenges beyond what we had anticipated in passing on technology. Applying a thick coating was difficult, while 50-meter-long fabric is consumed in only 5-6 minutes during verification. The technical transfer and verification tests were conducted after the factory's operation hours. So, we worked from late at night up until nearly early morning, and finally mass production was realized.

Later, the materials were adopted by sportswear manufacturers, and sales channels were expanded to other industries as well. The company, becoming aware of the demand for it in functional clothing, began the development of a new technology, Cool Touch Printing.

The history of Cool Touch Printing began around 2010 and the material was gradually adopted by the workwear and running wear industries in 2013.

Sometime around 2016, the company formed a partnership with Liberta and began full-scale production of Cool Touch Printing. Xylitol, one of the functional agents in Cool Touch Printing, dissolves to take a cooling effect. Therefore, the wash durability test seemed to be a hopelessly difficult and reckless challenge, as the agent is usually washed out by water when it dissolves. This contradicting pursuit of wash durability in something that reacts to moisture has been our major challenge and achievement. Again, we had a hard time achieving mass production because the print agent dried very easily and was prone to clogging.

However, our technology has made great strides day by day, leading to the current Cool Touch HYO-GEKI Printing.

For media inquiries regarding this release, please contact

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