

Fabrics Containing Ingeo™ Fibers Outperform Polyester and Cotton Fabrics in Sporting Applications

In terms of comfort under normal and active wear conditions, independent laboratory testing by the globally respected Hohenstein Research Institute demonstrated that Ingeo™ fibers (PLA) perform better than polyester (PET) and cotton either when combined with cotton as a plaited or as 100% PLA fabric constructions. The results confirmed the apparel industry has a new, natural based performance fabric option for sporting applications.

Made entirely from annually renewable resources such as corn, Ingeo fibers have the performance advantages often associated with synthetic materials, as well as being melt processable and complementing natural products such as cotton and wool. Ingeo fibers also have a unique property spectrum allowing the creation of products with unique hand and touch, drape, low flammability and smoke generation, excellent UV resistance, resiliency and moisture management.

Test Purpose Parameters and Scope

In two separate studies, the Hohenstein testing assessed the total wear comfort of Ingeo*/cotton vs. PET/cotton in plaited fabrics and 100% PLA vs. 100% cotton fabrics for use in sporting applications. Four fabrics were tested:

Fabric 1 consisted of “untreated” Ingeo fibers on the inside and cotton on the outside.

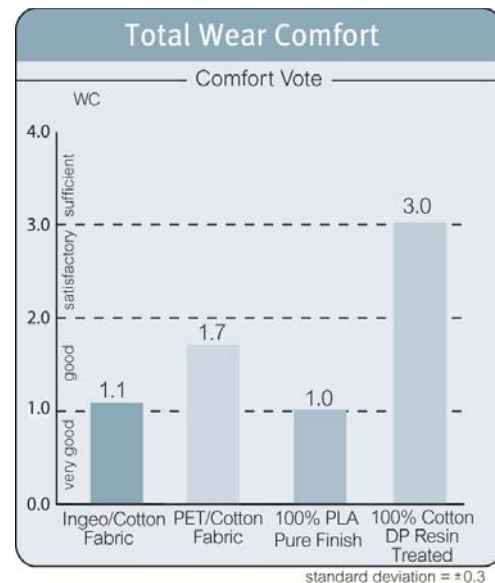
Fabric 2 consisted of “treated” PET fibers on the inside and cotton on the outside (the PET fiber was treated with a proprietary commercialized “wicking” finish).

Fabric 3 consisted of “untreated” 100% Ingeo fibers*.

Fabric 4 was treated with Durable Press Resin Finish* and consisted of 100% cotton fibers.

All fabrics were washed once in 60° water prior to testing.

figure 1



*For the purpose of simplifying plotting the data, the Ingeo fiber/Cotton fabric will be identified as Ingeo/Cotton, the fabric consisting of 100% Ingeo fiber will be identified as 100% PLA Pure Finish and the Durable Press resin treated cotton fabric will be identified as 100% Cotton DP resin treated.

In order to complete the evaluation, two separate aspects of overall comfort were examined:

skin model

Taking three single measurements on three different items, this model simulates the dry and sweating of human skin to determine the specific thermophysiological quantities of textile layers relevant to wear comfort.

sensorial comfort characteristics

Using 10 single measurements per sample, this testing represents the “feel” of the fabric next to the skin. These characteristics are mainly determined by the fabric’s surface structure.

More Comfort for Sporting Enthusiasts

superior performance

In four out of the ten skin modeling tests, and in three out of the four sensorial tests, the Ingeo fiber/cotton and the fabrics consisting of 100% Ingeo fibers were found to be superior to the PET/cotton and the 100% DP resin treated cotton fabrics.

good performance

In the remaining skin modeling and sensorial tests, all fabrics performed equally well.

overall improved comfort

As the result of these tests, the Hohenstein Institute concluded that the wearers of the Ingeo fibers/cotton and the fabric consisting of 100% Ingeo fibers will perceive significantly improved physiological comfort versus PET/cotton and the 100% DP resin treated cotton Fabrics.

Thermophysiological Properties [Fig. 2-4]

test

To judge the physiological quality of the fabrics, the Water Vapor Permeability Index- i_{mt} , which is independent of the influence of fabric thickness, is chosen. i_{mt} is defined via the ratio of Thermal Resistance to Water Vapor Resistance and thus expresses the fabric's Relative Moisture Transport Properties. The physiological quality of a fabric is judged to be better, the higher the i_{mt} value.

result

The Ingeo fiber/cotton fabric shows superior Thermal Insulation and higher Water Vapor Resistance and, as a result, better Water Vapor Transport properties than that of the PET/cotton fabric. The fabric made from 100% Ingeo fiber shows equivalent Thermal Resistance and lower Water Vapor Resistance and, as a result better Water Vapor Transport properties than that of the 100% DP resin treated cotton fabric. These results indicate the superior comfort, under normal wear conditions, for the fabrics containing Ingeo fiber.

figure 2

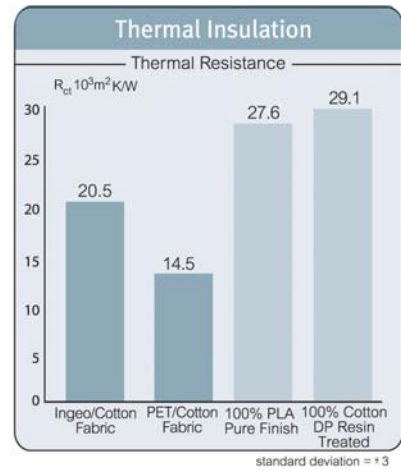


figure 3

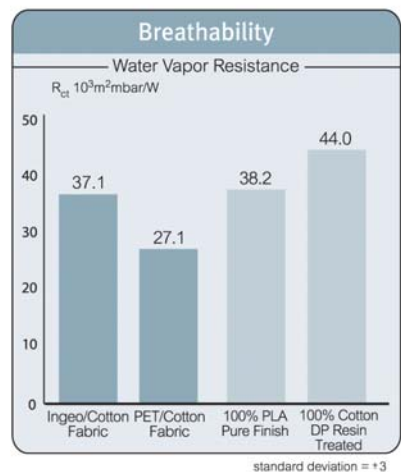
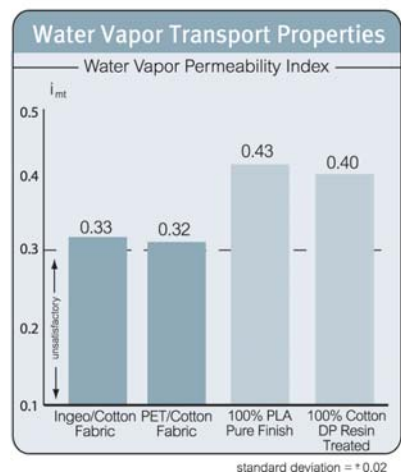


figure 4



Water Vapor Uptake [Fig. 5]

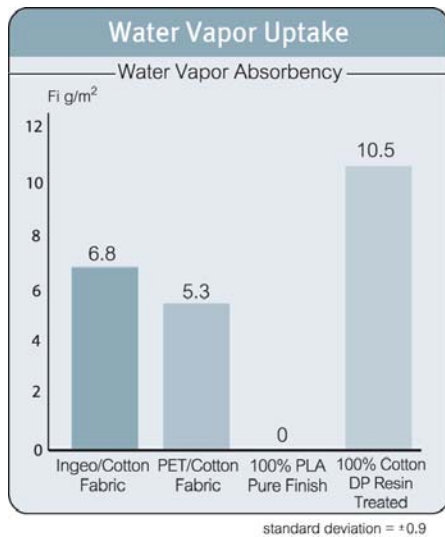
test

Measures the amount of water absorbed by the fabric.

result

The superior comfort performance of the fabric containing Ingeo fiber is evident in the increased Water Vapor Absorbency of the Ingeo fiber/cotton fabric as compared to the PET/cotton fabric and by the lack of absorbency in the fabric consisting of 100% Ingeo fiber as compared to the high absorbency of the 100% DP resin treated cotton fabric. This test, which is based on the weight gain of the fabric when exposed to water vapor, and substantiates the ability of the fabric containing Ingeo fiber to transport moisture without absorbing the moisture into the fabric.

figure 5



Buffering Capacity: Liquid Sweat [Fig. 6-9]

test

Determines the ability of a fabric to buffer against sweat pulses, which occur quite frequently during practical use of fabrics and clothing. The buffering capacity of liquid sweat monitors performance when the wearer is sweating so heavily that there is liquid sweat on the skin. The resulting wear comfort of active sportswear depends considerably on this buffering capacity.

result

Overall the fabric faced with Ingeo fiber is equivalent in performance to the “treated” polyester faced fabric. In contrast, the fabric consisting of 100% Ingeo fiber is superior to the 100% DP resin treated cotton fabric in Moisture Permeability and Sweat Transport. All four fabrics are rated as very good in their ability to remove moisture from the skin and therefore maintain comfort during extreme exercise.

figure 6

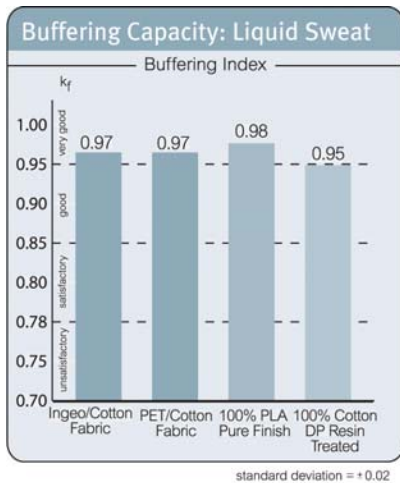


figure 7

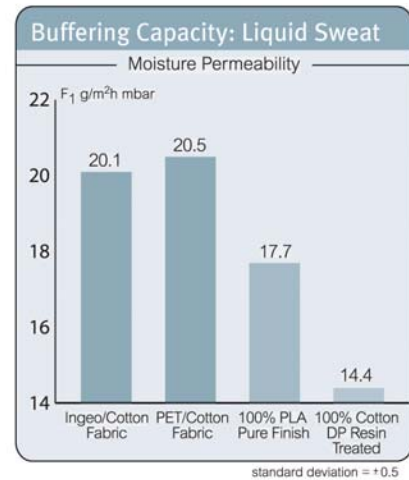


figure 8

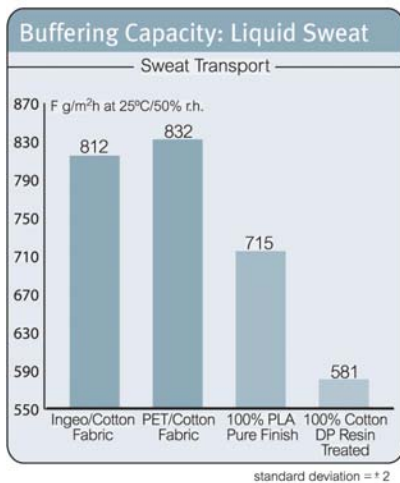
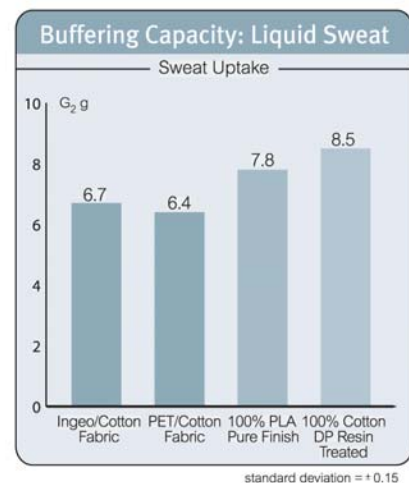


figure 9



Insulating Power of the Fabric [Fig. 10-11]

test

In assessing the wear comfort of fabrics worn next to the skin, it is essential they maintain their insulating power when wet or moist due to heavy sweating of the wearer. Fabrics that lose much of this insulation over a long period of time cause the wearer to experience “postexercise chill” and feel uncomfortably cold after strenuous activity.

result

Within the precision of the test, the fabric with the Ingeo fiber/cotton and the PET/cotton are equivalent. For these two fabrics the drying time is well below 37 minutes, indicating that no postexercise chill during rest periods after strenuous activity is to be expected. However, in comparing the fabric made from 100% Ingeo fiber with the 100% DP resin treated cotton fabric it is evident that the fabric containing 100% Ingeo fiber is significantly superior in Thermal Resistance and Drying Time to the 100% DP resin treated cotton fabric.

figure 10

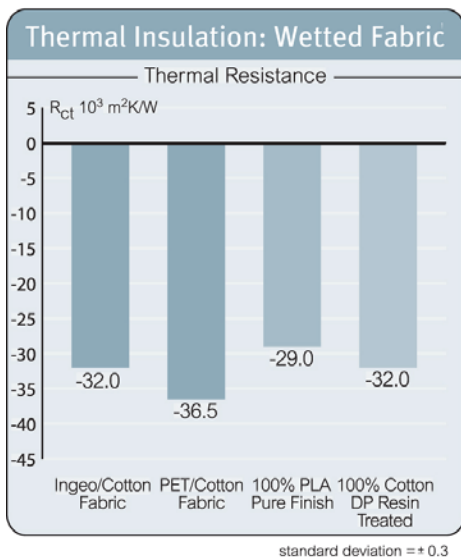
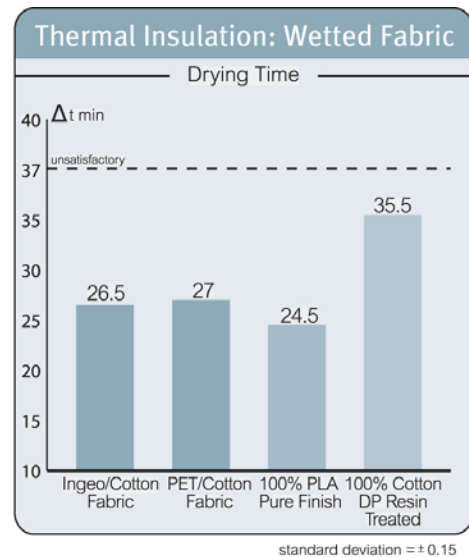


figure 11



Sensorial Comfort Characteristics [Fig. 12-15]

test

The sensorial comfort characteristics of a fabric are determined by measurements of:

The Wet Cling Index, which is determined by the intensity with which the fabric clings to sweat-wetted skin.

The Surface Index, which is determined by the contact points between the fabric and the skin.

The stiffness or drape of the fabric.

The Sorption Index, which is determined by the speed the fabric will absorb liquid sweat.

result

None of the four fabrics tested will cling uncomfortably to sweat-wetted skin. All four fabrics are equivalent and deemed comfortable in drape. The Ingeo fiber/cotton fabric, the fabric containing 100% Ingeo fiber, and the 100% DP resin treated cotton fabric are superior in their Surface Index values and are in the sensorial comfortable region.

The Ingeo fiber/cotton fabric and the fabric containing 100% Ingeo fiber have significantly faster absorption rate than the PET/cotton and the 100% DP resin treated cotton fabrics as indicated by the Sorption Index iB.

figure 12

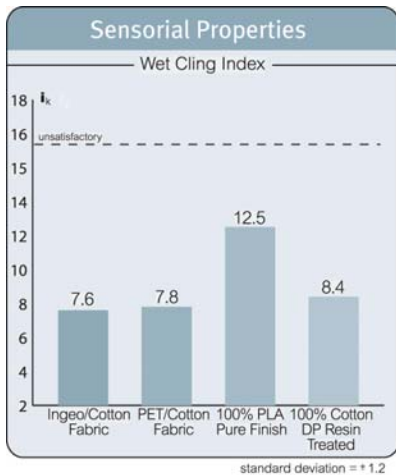


figure 13

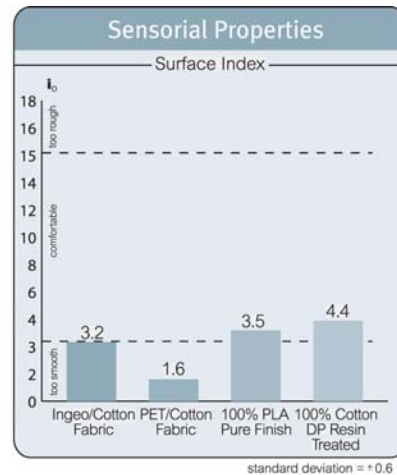


figure 14

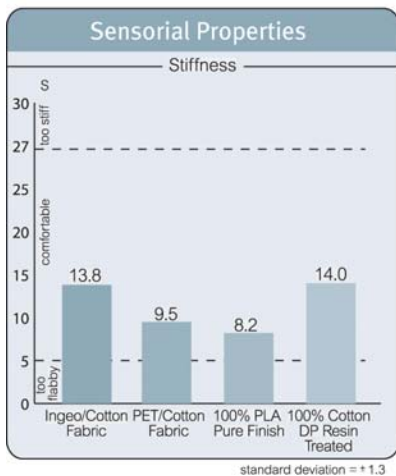
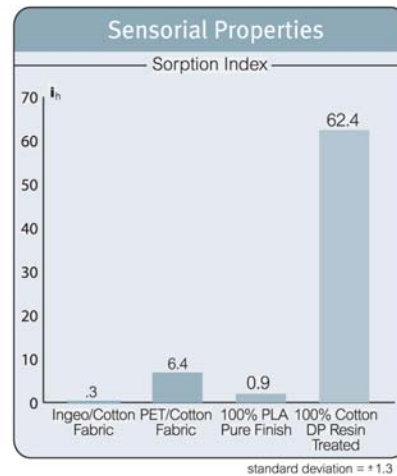


figure 15



Wear Comfort [Fig. 16]

test

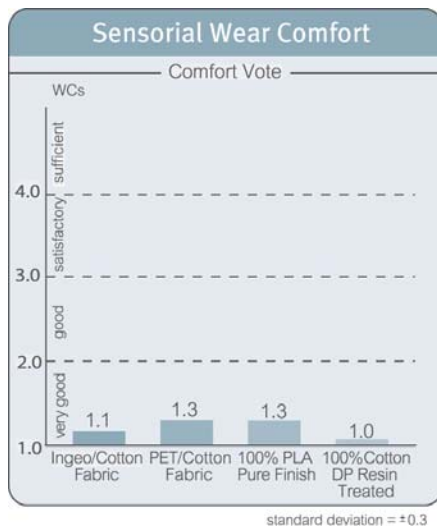
Determines the wear comfort based on a vote.

result

For Sensorial Wear Comfort all four fabrics are rated as “very good.”

However, in terms of Total Wear Comfort, (Figure 1), which is the combination of thermophysiological and fabric sensorial properties, the Ingeo fiber/cotton fabric and the fabric consisting of 100% Ingeo Fiber were ranked significantly above the PET/cotton and the 100% DP resin treated cotton fabrics respectively.

figure 16



Note: Figures 1-16 are based on test reports No.ZO.4.3805, May 24, 2000, Comparison of Physiological Comfort of Polyester (PET)/Cotton and Ingeo fiber/Cotton fabrics, and No.02.4.4384, March 27, 2002, Comparison of Physiological Comfort of 100% Ingeo fiber containing fabric and 100% DP resin treated cotton fabric, by Forschungsinstitut Hohenstein.

Ingeo Worldwide Offices

Amsterdam, Hong Kong, London,
Milan, Minneapolis, New York and Tokyo



www.ingeofibers.com

Contact

1 800 66 IN GEO (USA only)
+1 989 633 1746 (Worldwide)

Ingeo and the EcoPLA design are trademarks of NatureWorks LLC © 2005
15305 Minnetonka Blvd., Minnetonka MN 55345
GSFIB026090305V2

No freedom from any patent of NatureWorks LLC or others is to be inferred. Because use conditions and applicable laws may differ from one location to another and may change with time, NatureWorks customers are responsible for determining whether the products and information in this document are appropriate for the customer's use and for ensuring that the customer's workplace and disposal practices are in compliance with applicable laws and regulations. NatureWorks assumes no obligation or liability for the information in this document. NO WARRANTIES ARE GIVEN: ALL IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE ARE EXPRESSLY EXCLUDED.