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LENZING Fibers > Home > TENCEL® > Fiberstory

July 24, 2008

## Tencel®-Fiberstory The New age fiber

### THE NEW AGE FIBER

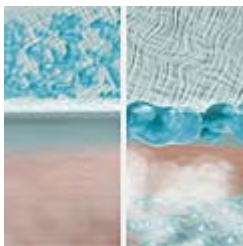
TENCEL® heralds the beginning of a new age in fiber technology. Completely natural, TENCEL® is Lenzing Fibers' brand name for lyocell. A major break-through was made with the development of the unique nanofibril structure of this fiber. TENCEL®, made from wood pulp cellulose, offers a unique combination of the most desirable properties of man made and natural fibers: soft as silk, strong as polyester, cool as linen, warm as wool and as absorbent as cotton. Quite simply a "break-through" fiber.

### TENCEL® - The "Break-Through-Fiber"

4000 B.C.	3000 B.C.	2600 B.C.	2000 B.C.	1939	NOW
WOOL	COTTON	SILK	LINEN	POLYESTER VISCOSE	TENCEL®

### THE DAWNING OF A NEW AGE

Water, most vital for life, is managed uniquely by TENCEL®'s properties. TENCEL® absorbs excess liquid and quickly releases it again into the atmosphere. The true nature of TENCEL® can be found in this perfect interaction. If that does not constitute the dawning of a new age, then what does?



Nanofibrils are the key to the performance possibilities of TENCEL®. The unique technology of nanofibrils allows the production of textiles, which, until now, could only be dreamed of. This is the first cellulose fiber to use this nano technology. Controlled and regular arrangement of nanofibrils in the TENCEL® fiber leads to new functional properties. The nanofibrils are hydrophilic and optimize absorption of moisture with excellent cooling properties.

TENCEL® Polyester

- A. Natural cooling
- B. Nanofibrils
- C. Outstanding moisture management
- D. Inhibits bacteria growth

## A Perfect Symbiosis

Moisture transport as a result of nano technology. In contrast to synthetic fibers, with reduced wicking properties, TENCEL® offers unique moisture transport. The completely new nano technology of TENCEL® supports this natural fiber property, guaranteeing optimum conditions for the skin. Synthetic fibers cannot absorb moisture into the inside of the fiber. The illustration shows that in contrast to cotton and Modal fibers, TENCEL® controls and regularly absorbs moisture. Also TENCEL® absorbs 50 % more moisture than cotton. By contrast polyester does not absorb moisture.



Cotton



TENCEL®

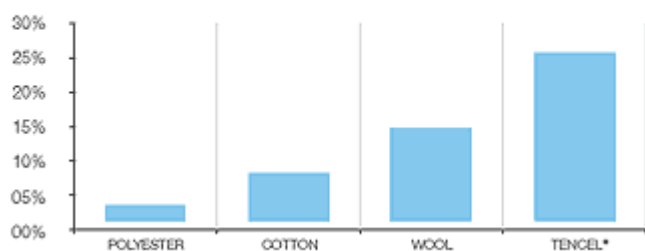


Polyester

The water is colored in blue

## A Comparison provides you with Reassurance

MOISTURE (VAPOR) MANAGEMENT WITH EXTREME AIR HUMIDITY



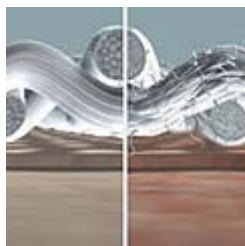
Moisture transport is determined by climate. Depending upon climate conditions, TENCEL® either absorbs or releases moisture. Compared to other fibers, TENCEL® features the highest moisture absorption-rate: with air humidity at 65 %, TENCEL® still has unused capacity to absorb moisture from the skin.

The graph shows the increase of moisture in a textile when the textile is moved from a relative humidity of 65% to a relative humidity of 100%. The moisture refers to the weight of the dry textile.

[Top](#)

## TENCEL® - THE SKIN SENSOR

The skin is the largest human respiratory organ. Human skin acts as a protective shell, regulates body temperature and maintains water balance. TENCEL® supports these body functions acting like a second skin.



## Perceptibly better

A subjective feeling of well-being depends considerably on moisture absorption and on surface structure of the fibers. Rougher fibers can lead to skin irritation. The extremely smooth surface of TENCEL® feels soft and pleasant to the skin. The reason for the fine surface of the fiber is low fiber stiffness.

TENCEL® Cotton

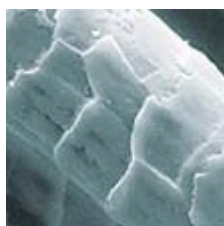
- A. Smooth fiber structure
- B. Temperature control
- C. Irritation free
- D. Suitable for sensitive skin

## TENCEL® for sensual Smoothness

Smoothness across the board. A comparison of the fiber surfaces makes the difference patently obvious. TENCEL® fiber has a smoother and more supple surface than wool or cotton. Wool tends to have a scaly surface, while cotton is irregular and rough.



Cotton



Wool



TENCEL®

## Reassuring Results for Sensitive Skin

TENCEL® is a godsend for anyone with sensitive skin. The combination of a smooth fiber surface and excellent moisture absorption creates a positive environment for healthy skin, making TENCEL® ideal for anyone with sensitive skin.

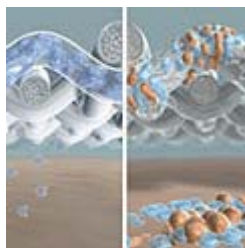
According to recent dermatological studies, wearing clothing made of TENCEL® significantly improves comfort and promotes a feeling of well being.\* (Dermatological study of the textile compatibility of TENCEL®, 2004, Univ.-Prof. Dr. T.L. Diepgen, Heidelberg, Germany) Also, TENCEL® is chemical free, an important factor for sensitive skin and another asset in comparison to other fibers of a natural origin.

[Top](#)

## COMPLETELY NATURAL HYGIENE

When it comes to hygiene and the growth of bacteria, the inherent and natural properties of

TENCEL® deliver a variety of benefits for sensitive skin.



TENCEL® does not give bacteria a chance to grow. Bacterial growth is prevented in a completely natural way. The perfect moisture management of the fiber is the key. When moisture is produced it is directly absorbed from the skin and transported to the inside of the fiber. Thus no water film is produced on the skin where bacteria could grow.

TENCEL® Synthetic **A. Bacterial growth reduction**

**B. Moisture vapor transport**

**C. Chemical free**

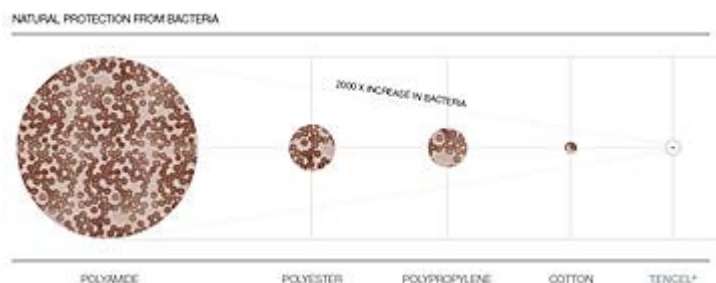
**D. Irritation free**

## Eliminates Environment for Bacterial Growth

When it comes to water absorption capacity, TENCEL® is definitely superior to other fibers. Bacterial growth was observed in various fibers, and TENCEL®, with its rapid absorption of moisture and high absorption capacity proved most effective in inhibiting growth.

## With no Chemical Additives whatsoever

The result demonstrates that TENCEL® is the most naturally hygienic fiber. TENCEL® prevents the growth of bacteria naturally without the addition of chemical additives. With synthetic fibers on the other hand, the growth of bacteria increases 2000 fold in comparison to TENCEL®.



[Top](#)

## MULTI DIMENSIONAL TENCEL®

TENCEL® knows no limits. TENCEL® can be manipulated in a creative manner to produce a diversity of fabric aesthetics. Manipulating or controlling fibrillation produces a wide variety of fabrications, from suede-like or peach touch surfaces to a clean, smooth silky touch. Depending on the form of processing employed, very fine hairs form on the surface of the fiber to a greater or lesser extent.

TENCEL® with Multitouch. Looks ranging from rugged denim in casual wear to silky peachskin surfaces are all possible in TENCEL® by manipulating the fibrils -



decised

fibrillated "Peach  
Skin-Effect"

very fine hairs found on the outer fibers. As with silk, this fibrillation is responsible for the pleasant and soft hand of TENCEL® fabrics. \* A non-fibrillating form of TENCEL® is also available (TENCEL® LF and TENCEL® A 100)

#### A. Variety of looks

#### B. Controllable fibrillation

#### C. Numerous processing variants

#### D. High tenacity

## Endless Possibilities

TENCEL® has an extensive fiber portfolio which include filling and micro fiber variants. TENCEL® FILL is the answer to the search for a natural filling material for bedding. The excellent moisture management guarantees a pleasant and dry climate as you sleep. Moreover, TENCEL® regulates the temperature when sleeping.

TENCEL® MICRO, a very fine and smooth fiber type, completes the portfolio. The silky feel of TENCEL® MICRO is a guarantee of outstanding comfort.

## Variety Rules

TENCEL® offers a variety of styling possibilities. Fabrics with natural elongation and recovery properties can be created using innovative techniques without having to use elastomeric fibers.

The high tenacity of TENCEL® in both a wet and dry state increases the dimensional stability of the end product. Even a small percentage of TENCEL® in the yarn or fabric makes textiles particularly durable.



[Top](#)

## PROGRESS IS ONE OF NATURE'S SPECIALITIES

The future belongs to TENCEL®. The production of TENCEL® is revolutionary. The production process is based on a solvent spinning process. It represents the greatest achievement in cellulose fiber technology. The closed loop circuit recycling the solvent is what makes this process revolutionary. The solvent is recovered up to 99.5 % and the emissions, which remain,

are decomposed in adapted biological purification plants. The manufacturing process was awarded the “European Award for the Environment” by the European Union.



- A. Environmentally friendly process
- B. Closed circuit production
- C. No emissions
- D. Numerous awards

## 100 % Organic

The basis is a natural raw material. TENCEL® is extracted from wood pulp and is 100 % biodegradable. The wood used comes from tree farms that practice sustainability. Wearing TENCEL® makes you feel good.



## TENCEL® Awards

### Production



TENCEL® has received numerous awards for its environmentally friendly manufacturing process.

### Raw material

Wood is a replenishable raw material. For TENCEL® only wood from tree farms which practice sustainability is used.

### Textile application



The TENCEL® fiber can be used in a wide range of applications and contains no toxic substances. This purity makes it suitable for baby's wear as well as adults.

[Top](#)

## INNOVATION FROM START TO FINISH

Sheer brilliance. The know how of specialists from Lenzing is available to the entire textile chain. Experts from Lenzing oversee fiber from the yarn to the end product. Our extensive Lenzing fiber and textile laboratory and commercial equipment is in place to support the industry and develop customized solutions for our customers.



Success through innovation. The TENCEL® trade name stands for innovation. The research team at Lenzing constantly discovers new and natural fiber properties and innovative applications in the clothing and home textile sector. The potential of the fiber is far from being exhausted.

- A. Service from the yarn to the end product**
- B. Quality testing**
- C. Global merchandising**
- D. Swing ticket program**

## Discerning Demands

Lenzing supports its customers with a range of different marketing activities. In particular the Swing Tickets Service guarantees communication directly with the end consumer. After examining the fabric quality, quality seals are made available to garment manufacturers for their products.

## Active around the Globe

Lenzing is prominent at international textile fairs. Global innovations and technical advances for TENCEL® are regularly presented by Lenzing professionals. The Lenzing Show booth serves as a communication platform for informational exchange within the textile chain. As an additional service, experts from Lenzing also conduct seminars on the latest trends in colors and fabrics. There is always a good reason to visit the Lenzing booth.

## The right Location

Lenzing supports its customers with an integrated marketing approach including trade advertising, co-op advertising, public relations, and special events. A global merchandising team, knowledgeable in the supply chain, assists both brands and retailers in securing Lenzing products. In this respect, the Sourcing Centers in New York, Shanghai and Hong Kong offer valuable support with their comprehensive resources.



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[Top](#)

## TENCEL® - THE UNIVERSAL FIBER

Titer/dtex (cut length/mm)	Standard	1.3 (38)	
		1.4 (38)	
		1.7 (38/51)	
		2.2 (50)	
	MICRO	0.9 (34)	
		0.9 (34) LF	
	LF	1.3 (38)	
		2.2 (50)	
		0.9 (34)	
	A 100	1.4 (38)	
		3.0 (75 B/98B)	
	FILL	2.3 (15)	
		6.7 (22/32)	
		6.7 (60)	
	Strength	cN/tex	37
Elongation	%	13	
Strength in wet state	cN/tex	30	
Elongation in the wet state	%	15	
BISFA Modul	cN/tex/5%	10	

Based on 1.3 dtex TENCEL® (38)

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[Top](#)