FIBRE52™

Reinventing Cotton

FIBRE52™'s Sustainable Breakthrough in Cellulose Processing

Hasan Shahariar, Ph.D.

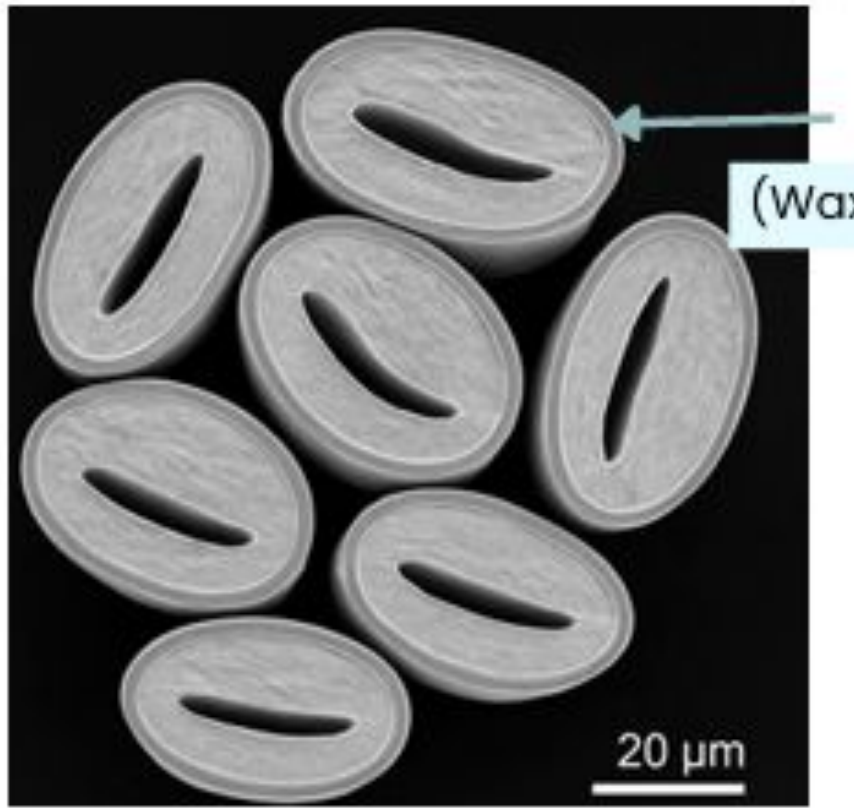
Director of Product Commercialization

The Natural Way to do More with Less Cotton

Cotton naturally comes with a wax layer — a shield that delivers softness, breathability, and resilience. Traditional bleach and dye processes strip this away, forcing mills to add synthetic softeners.

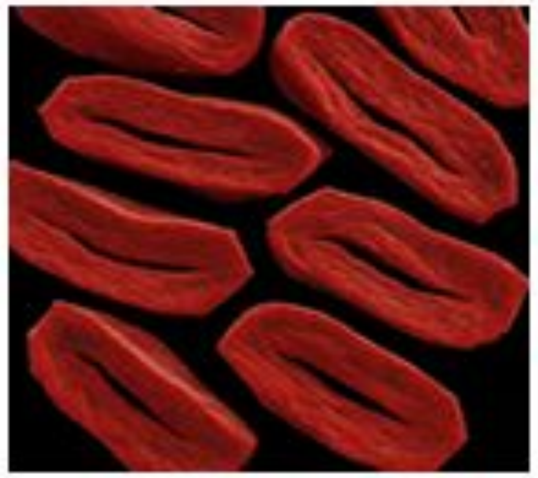
FIBRE52™ changes that. Our patented process for bleaching and dyeing preserves cotton's natural wax from start to finish, unlocking performance from within — not from added chemicals.

Cotton Fiber Microstructure

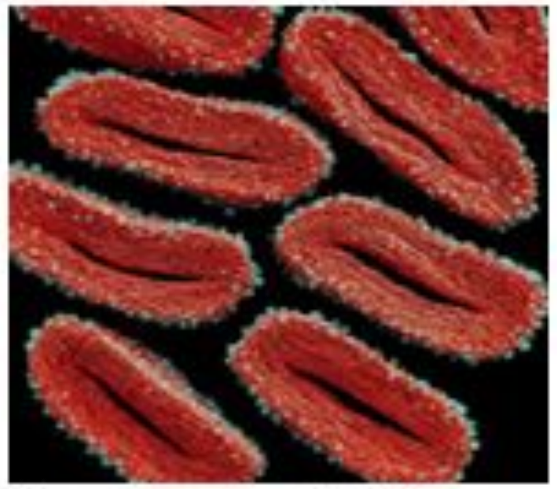


TRADITIONAL BLEACH & DYE PROCESS

PFD Strips Wax, Damages Fiber



Dyeing Makes Rough Fabric



Synthetic Softener Added

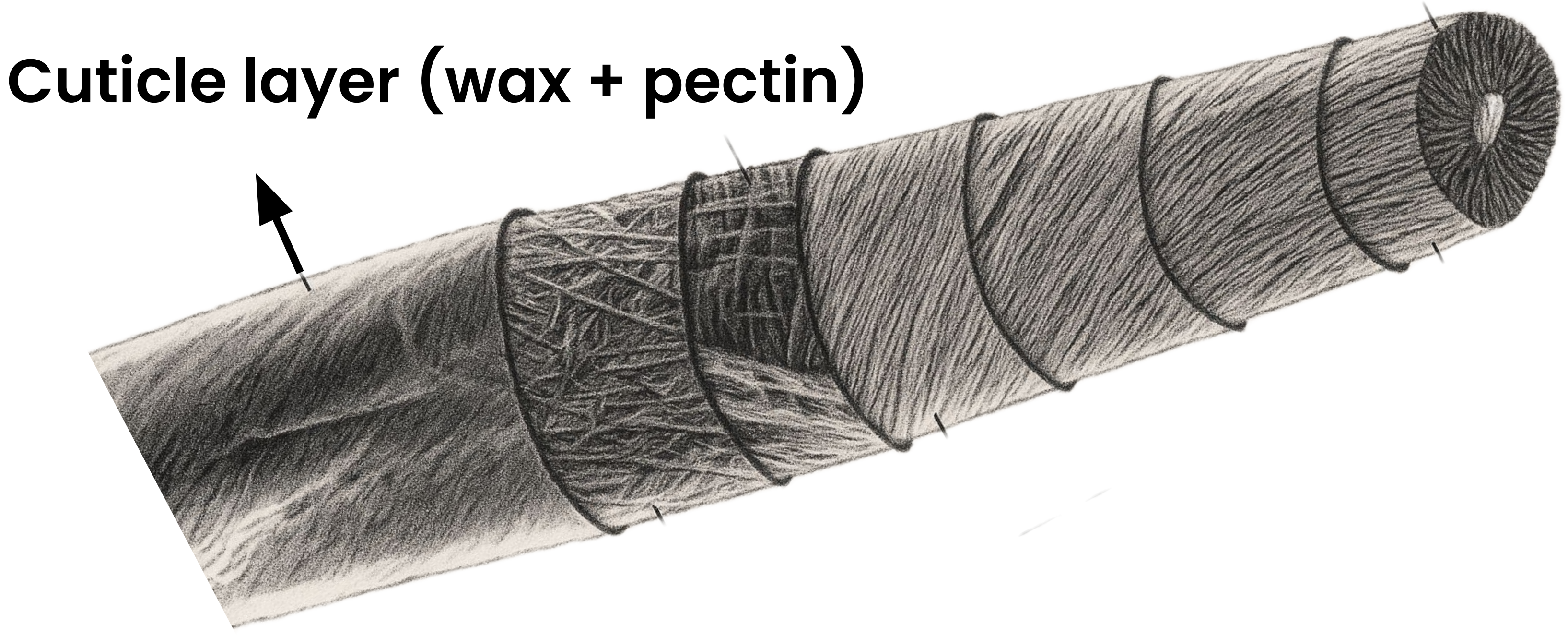
FIBRE52™ PATENTED PFD & DYE PROCESS

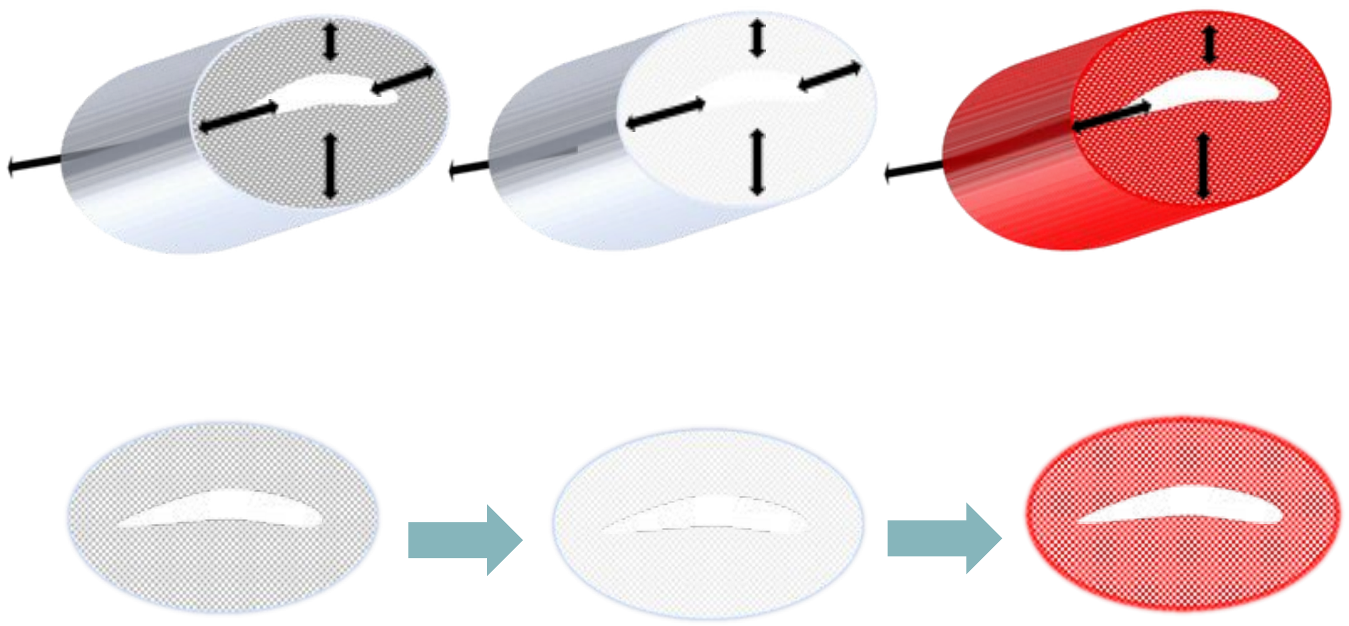
PFD Retains Wax, Cleans Fabric

Uniform Dyeing, Naturally Soft Fabric

FIBRE52™ vs. Conventional Prepare for Dye Process

Pre-treatment and Dyeing of Cotton with Wax On, Not Off





Bleach & dye with cuticle layer intact

- Patent: Retain Cuticle Layer
    - Natural Softness
    - Better Strength
    - Improved Dye Uptake
- Bleach & Scour Together
- **All Shades**, Including Whites

Preparing a Perfect Canvas

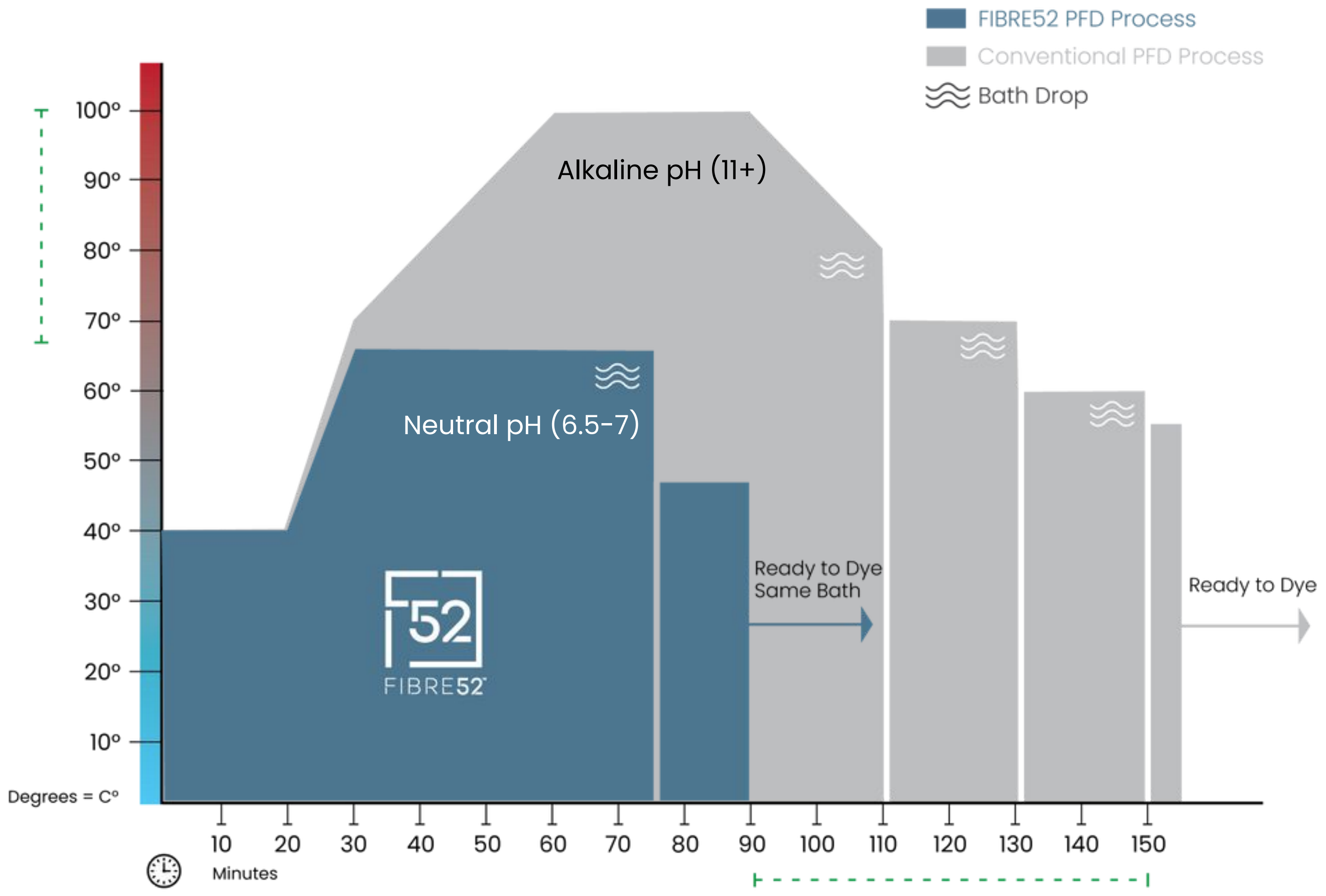
- Drop-in Solution
- Works with Existing Machinery
- Bio-friendly Products at 65-75°C
- Neutral pH
- OEKO-TEX Eco Passport
- ZDHC 3.1

OEKO TEX®

Ø ZDHC Certified

The Solution

FIBRE52™ is a patented, bio-friendly process that revolutionizes cotton and cellulose preparation, bleaching, and dyeing.



	Conventional	FIBRE52™
Temperature (°C)	95-110	**65-75**
Caustic Soda Use	Yes	**✔ Eliminated**
pH Level	Alkaline	**✔ Neutral**
Burst Strength	-	**✔ Increased**
Weight Retention	✗	**✔ Increased**
Natural Softness	✗	**✔ Preserved**
Softener Use	Required	**Optional**

2 U.S. patents approved. EPC, China, India, Japan pending.

52 Mill Benefits

Up To **50%**

Cost Neutral

Achieves All Shades

Safer for Employees

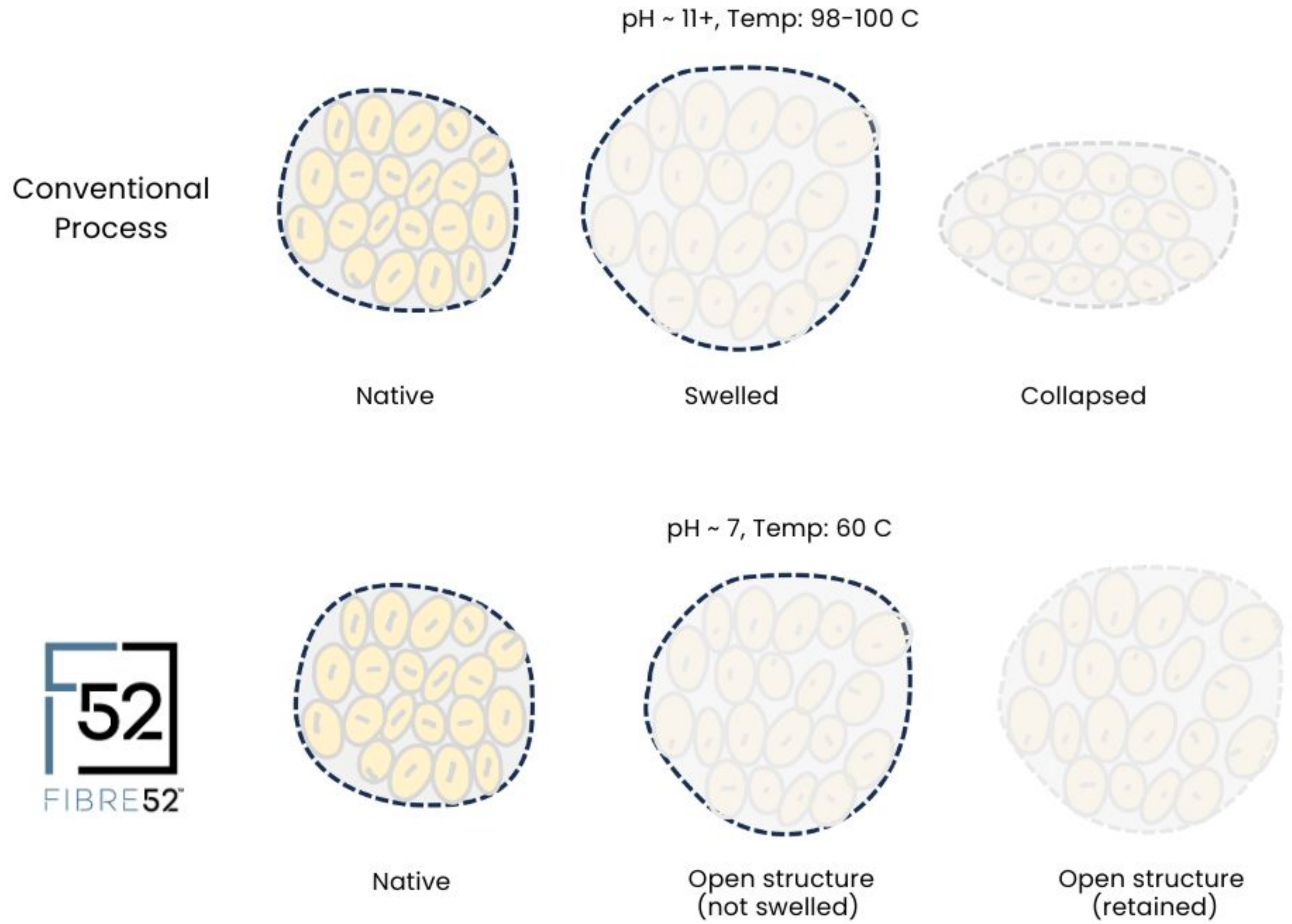
Increased Productivity

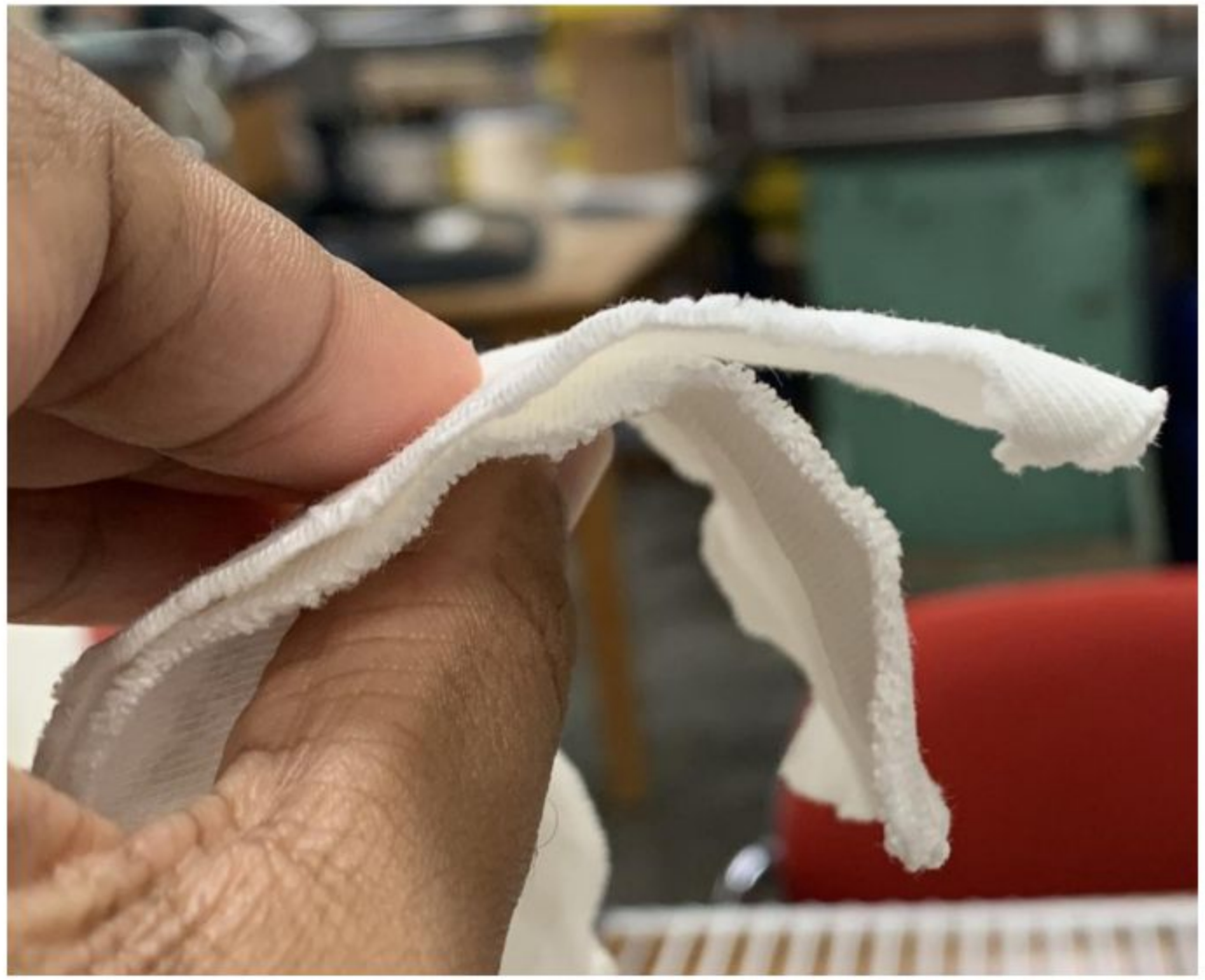
Lower ETP Costs

Improved Dye Uptake

Purchase Less Cotton

Natural Softness Without Synthetic Softerners

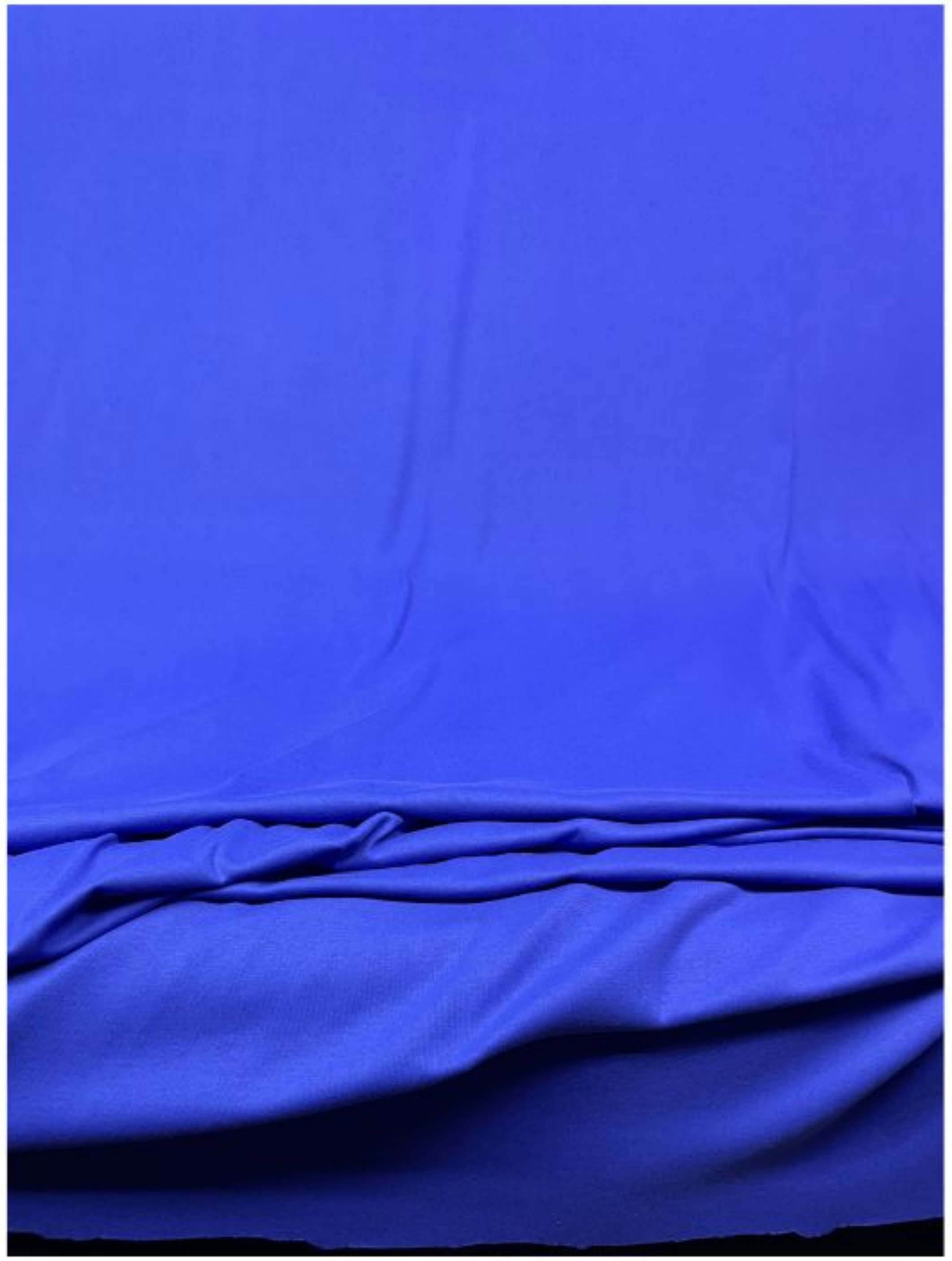




FIBRE52

End Fabric

- Improved Quality
- Soft Hand Feel
- Increased Burst Strength
- Ability for More Recycled Cotton
- Color Fastness



Commercial Production in Bangladesh

Fabrica Knit Composite - Dhaka

Light Colors

11% | 29% | 25% | 29%

Dark Colors

22% | 32% | 33% | 32%

2,151 kg total

Making a Difference

Faisalabad, Pakistan

1080 kg, 100% Cotton, Single Jersey, 200 GSM, White Color, LR: 1:7

	Conventional	FIBRE52™	Savings
Time	3 hr, 30 min	2 hr, 35 min	**55 min**
Water (L)	35	21	**40%**
Gas (m3)	0.325	0.177	**44%**
CO2 Emissions (kg)	0.676	0.368	**45%**

ECHOTEX

Dhaka, Bangladesh

167 kg, 80% BCI + 20% Recycled Cotton, Single Jersey, 160 GSM, Black Color, LR: 1:6

	Conventional	FIBRE52™	Savings
Time	6 hr, 59 min	6 hr, 27 min	**32 min**
Water (L)	52.8	46.8	**11%**
Gas (m3)	0.26	0.18	**31%**
CO2 Emissions (kg)	1.40	1.09	**22%**

Potential Yearly Impact

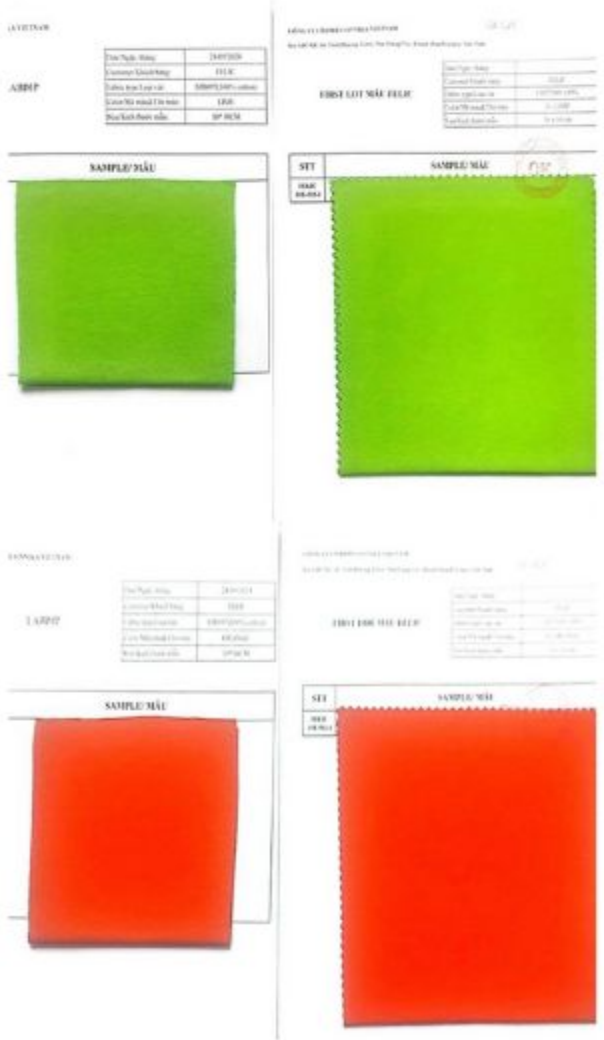
*Per 200k metric tons of fabric dyeing with FIBRE52™ technology

61M ↓Kilograms of CO2 Emission

2.8B ↓Liters of Water

29M ↓M3 of Gas

Consistent Repeatability



- Color Fastness Results
  - Commercial Laundry
  - Water
  - Perspiration
  - Rubbing
  - Light
- Dimensional Stability

No Caustic: Effluent Impact

	Conventional Process	FIBRE52™	Savings
pH	11.5- 12.0	6.5-7.1	
TDS	3000-3500	1500-2000	~ 40%
BOD	1000-1200	600-800	~ 25%
COD	8000-10,000	6000-7000	~ 20%
Water Hardness	140-150	110-120	~ 15%

The Difference is Clear!

Process Applications

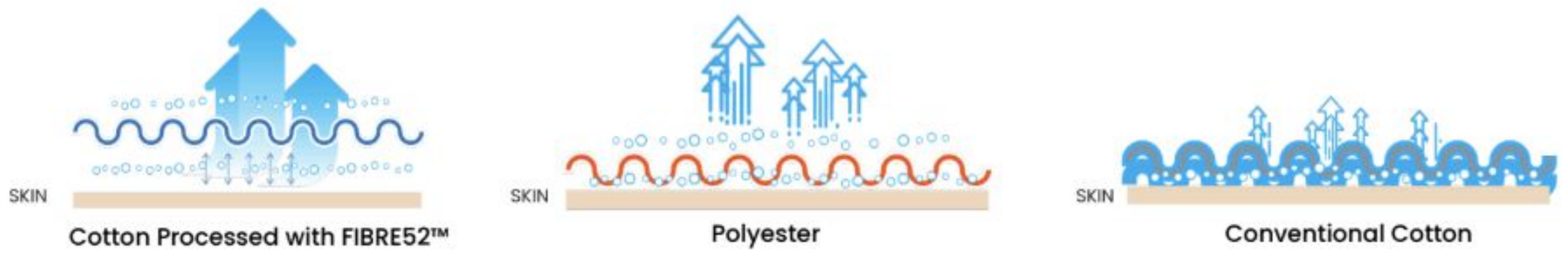
- Commercially Applicable:
  - Exhaust Process
  - Package Dyeing (Yarn)
  - Cold Pad Batch (CPB)
- In Development:
  - Continuous
  - Denim
- Ideal for Man-Made Cellulosics & Recycled Blends
- Extended Reuse Cycles

FIBRE52™ PureWhite

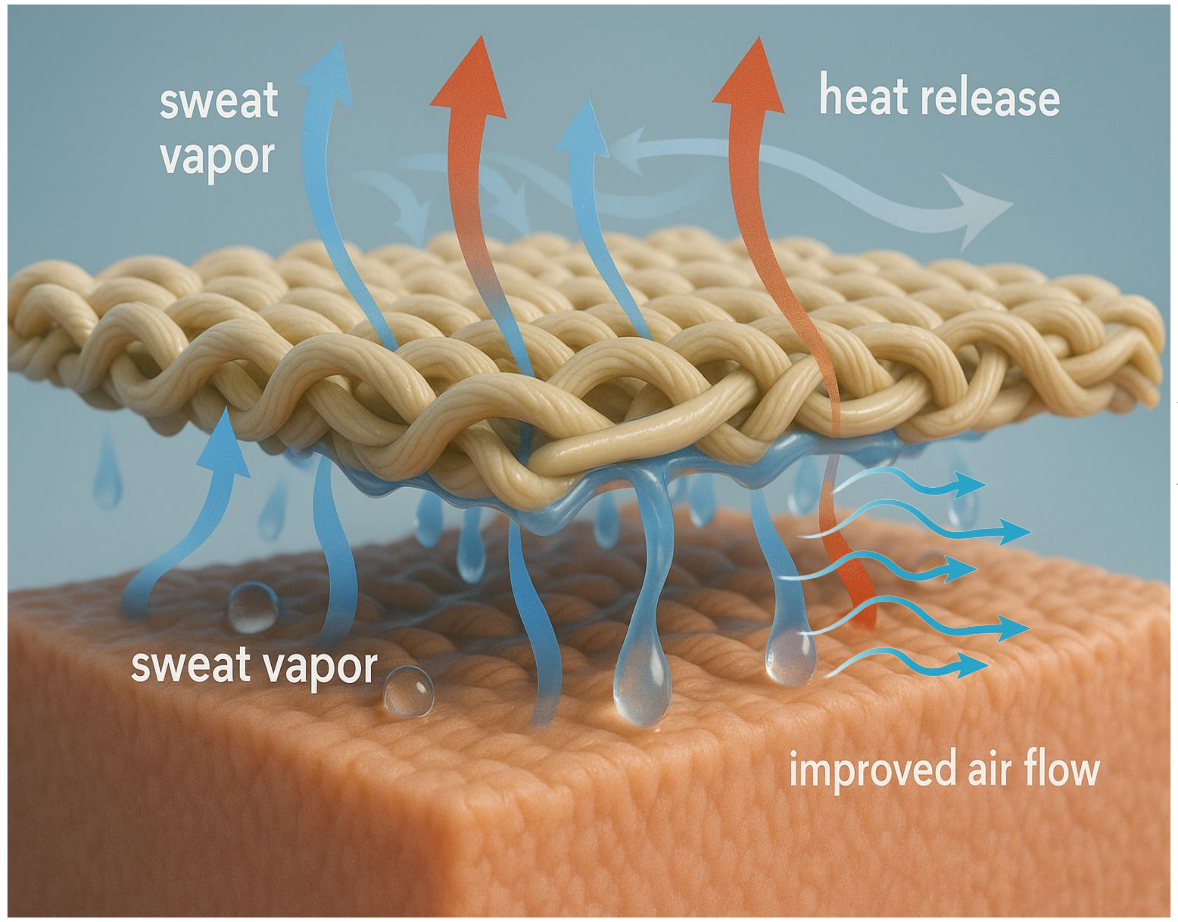
70+ CIE Whiteness Level Attainable While Only Using 75°C

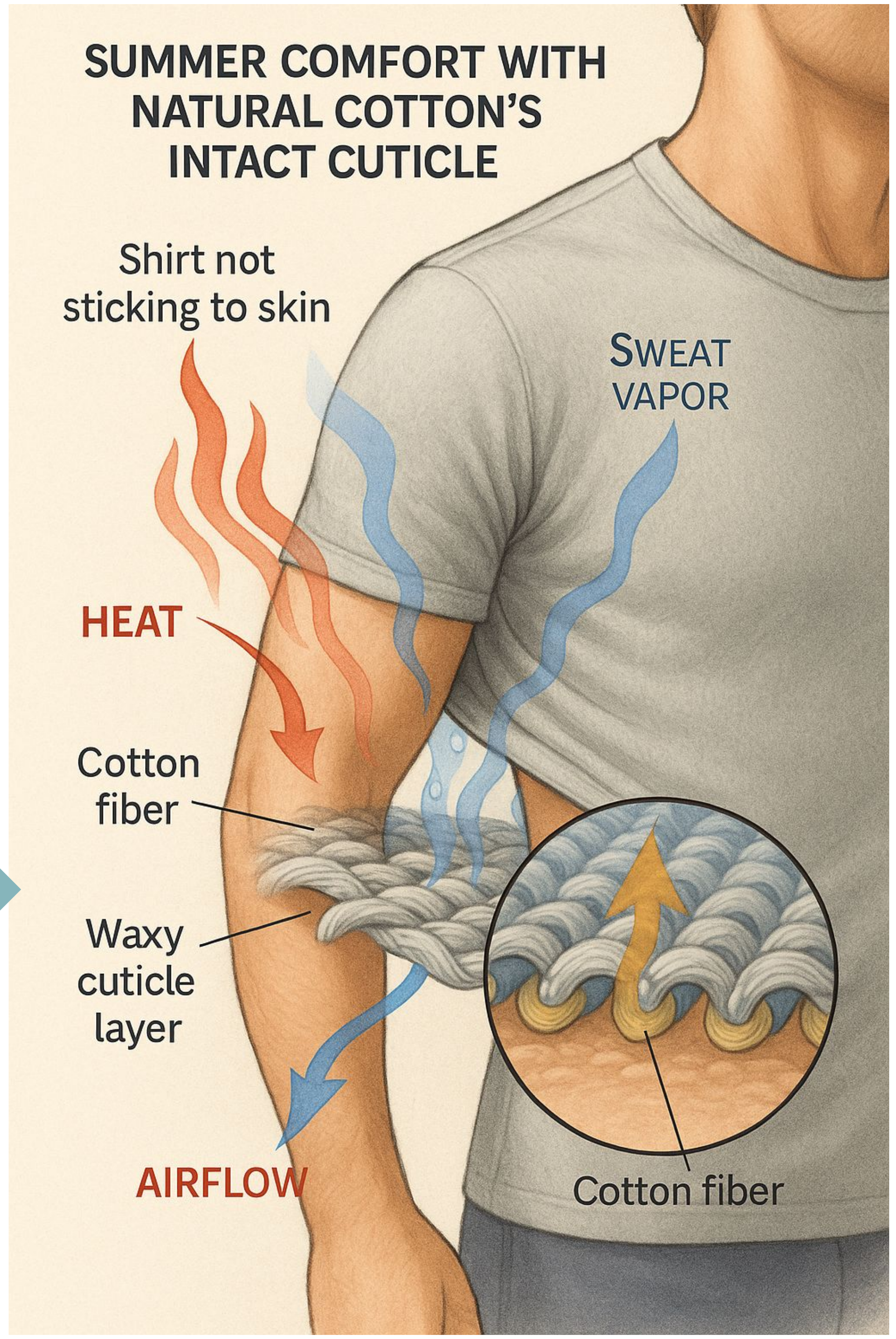
Performance Functionality of FIBRE52™ Cotton Fabric

Redefining Comfort with Cotton



- ❑ Not Clinging to skin
- ❑ Tunable hydrophobicity with natural wax retention
- ❑ Absorb & transport moisture through the fabric
- ❑ Improved air flow & permeability
- ❑ Constant rate of cooling and moisture evaporation





Fibre52's process significantly improves resistance to hydrostatic pressure.

Specimen Prep:	SPECIMEN 1	SPECIMEN 2	SPECIMEN 3
DROPLET 1	N/A mbar	N/A mbar	N/A mbar
DROPLET 2	N/A mbar	N/A mbar	N/A mbar
DROPLET 3	N/A mbar	N/A mbar	N/A mbar
AVERAGE	#DIV/0! mbar		
Test Stopped Due to:	Soaked Instantly	Soaked Instantly	Soaked Instantly

Specimen Prep:	SPECIMEN 1	SPECIMEN 2	SPECIMEN 3
DROPLET 1	10.7 mbar	10.2 mbar	10.3 mbar
DROPLET 2	11.1 mbar	10.6 mbar	10.6 mbar
DROPLET 3	11.2 mbar	11.0 mbar	10.9 mbar
AVERAGE	11.0 mbar		
Test Stopped Due to:	3 Drops Observed	3 Drops Observed	3 Drops Observed

Not Clinging to skin

Moisture Vapor Transmission Rate

SAMPLE ID - REPLICATE	WEIGHT 1 (grams)	WEIGHT 2 (grams)	W1 – W2 (grams)	WVT (g/h x m x m)
CONVENTIONAL DYED COTTON FABRIC	139.56	135.14	4.42	34.87
	138.78	134.24	4.54	35.82
	139.18	134.67	4.51	35.58
AVERAGE			4.49	35.43
FIBRE52 DYED COTTON FABRIC	139.40	134.97	4.43	34.95
	141.23	136.69	4.54	35.82
	139.31	134.75	4.56	35.98
AVERAGE			4.51	35.58

Although, Fibre52 dyed cotton fabric is naturally hydrophobic, the fabric is permeable to water (or moisture) vapor like the conventional dyed cotton fabric.

22c at 50 % RH

PROCESS	MOISTURE ABSORPTION % (1 HR)	MOISTURE ABSOR % (24 HR)
FIBRE52	5.8 %	6.0 %
CONVENTIONAL	6.1 %	6.3 %

Fibre52 dyed cotton fabric has almos similar moisture regain percentage as hydrophilic cotton.

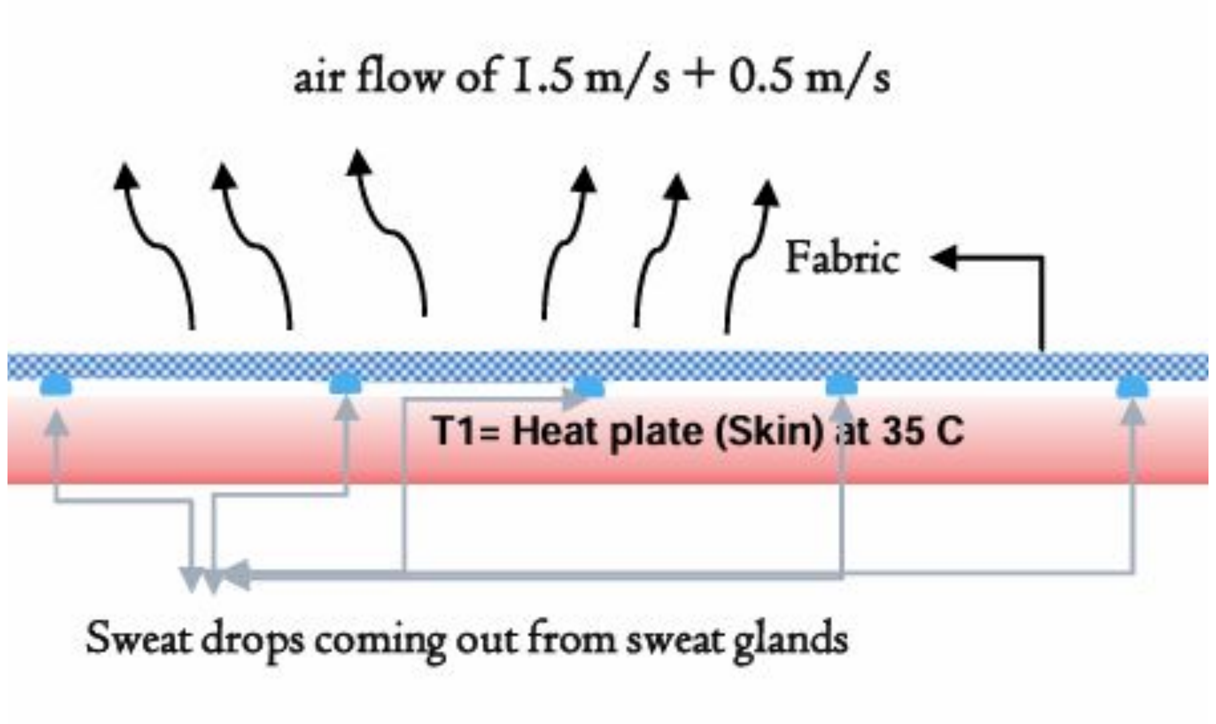
- **Fibre52 treated fabric repeal the water/sweat but absorb & transport sweat moisture through the fabric**

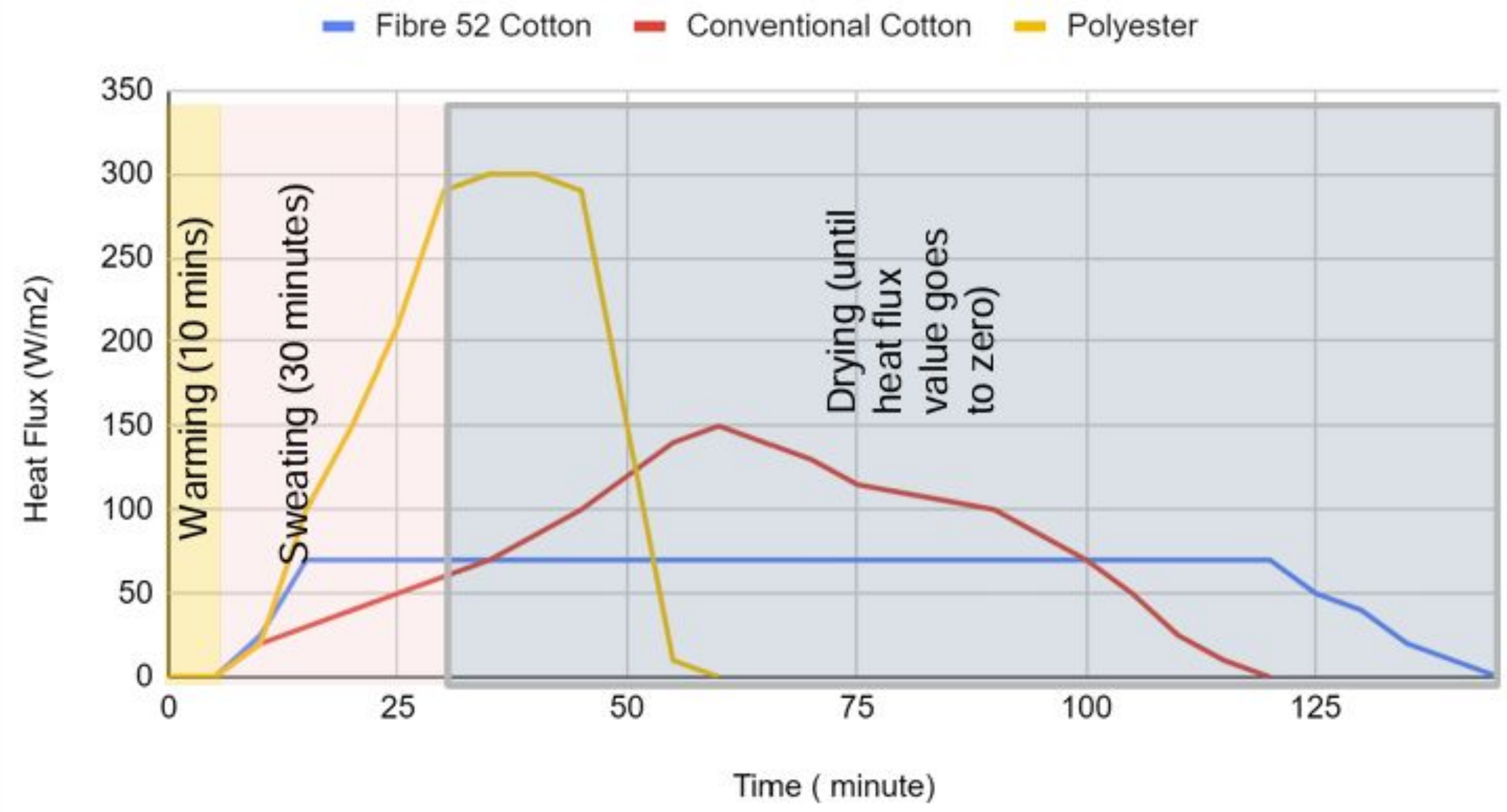
Fibre52’s Thermal and Evaporative Behavior

Property	Test Method / Standard	Fibre52 Result	Conventional Cotton (Typical)	Interpretation
Thermal Resistance (Rct)	ISO 11092 (Sweating Guarded Hot Plate)	0.097 m²·K/W	0.08–0.11 m²·K/W	Balanced insulation – allows heat release without overcooling
Evaporative Resistance (RetA)	ISO 11092	0.020 Pa·m²/W	6–12 Pa·m²/W	Exceptionally low — excellent vapor permeability, moisture easily escapes
Total Heat Loss (Qt)	ISO 11092	635 W/m²	500–600 W/m²	High energy release, fabric stays cooler and drier under stress
Thermal Insulation (It)	ISO 11092 (Clo Units)	0.63 clo	0.5–0.7 clo	Ideal for warm to moderate climates
Moisture Vapor Transmission Rate (MVTR)	ASTM E96 (Water Method)	850 g/m²·24 h	840–860 g/m²·24 h	High and consistent – efficient vapor diffusion
Fabric Weight	ASTM D3776	4.32 oz/yd²	Similar	Lightweight knit suitable for daily wear
Thickness	ISO 5084	0.48 mm	0.46–0.49 mm	Stable structure – no fiber collapse from processing

Constant Comfort Cotton

Test: Dynamic heat release through fabric



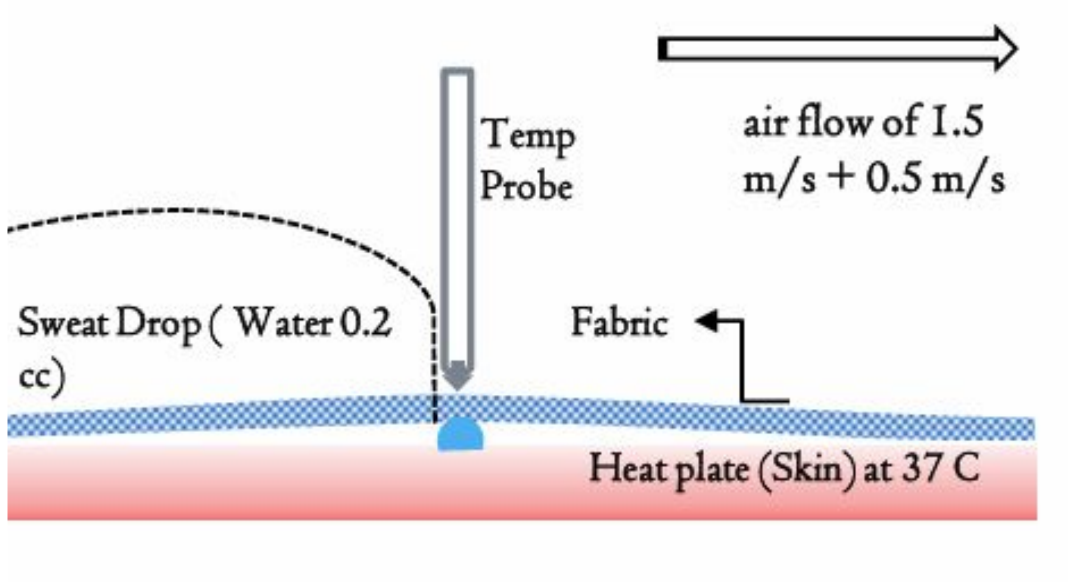


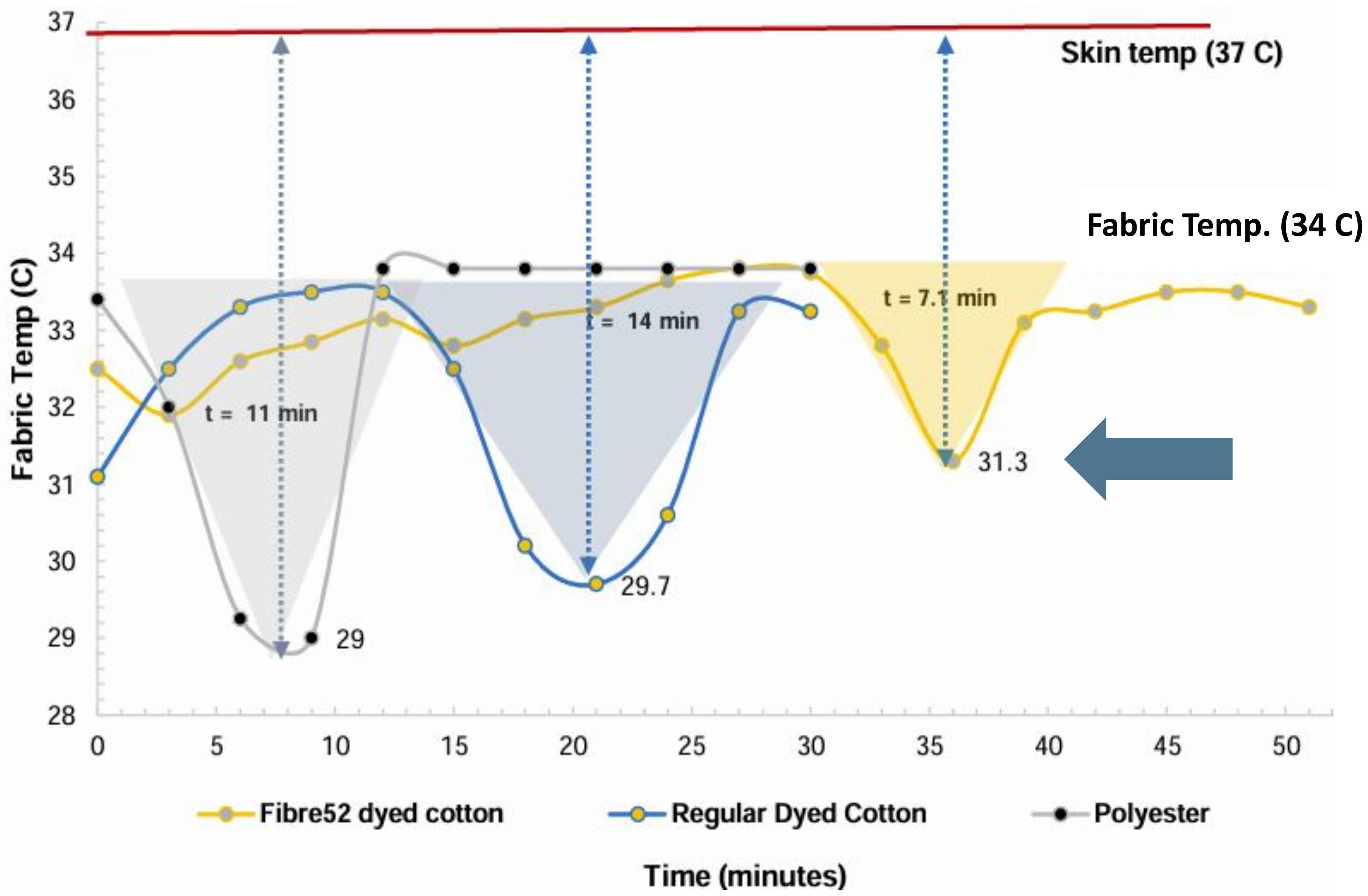
- Fibre52 treated fabric can dry with constant rate of drying

Drying Rate of Fabrics (AATCC 201)

Condition Simulating

- Strenuous working out
- Ambient Temp 25 C
- Relative Humidity (65%)
- High Perspiration
- One big sweat drop





- Lowest temp. gradient between skin-temp and fabric temp
- No chilling effect

- Fibre52 treated fabric assures thermal comfort

Interpretation of Comfort Behavior

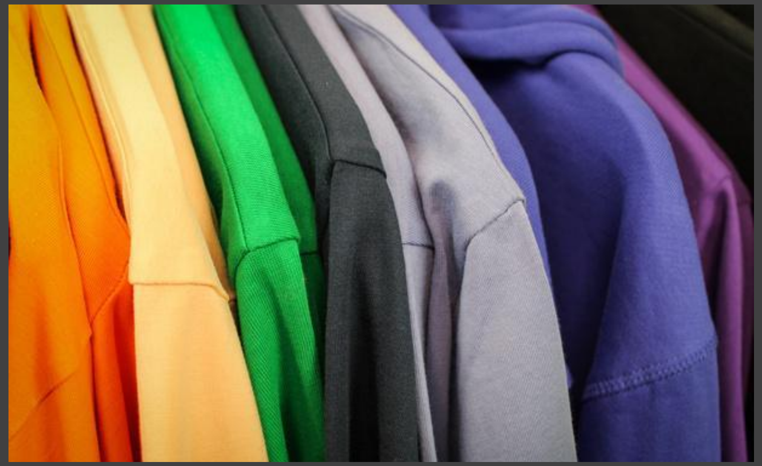
- **Hydrophobic but Breathable:** The preserved natural wax on cotton fibers repels liquid perspiration while keeping vapor channels open, enabling sweat vapor and body heat to escape.

- **No-Cling Effect:** The wax layer reduces surface tension and friction, maintaining a micro-air gap between skin and fabric. This prevents sticking during perspiration and enhances airflow.

- **Balanced Thermal Profile:** With Rct ≈ 0.10 $m^2 \cdot K/W$ and Ret ≈ 0.02 $Pa \cdot m^2/W$, Fibre52 sits in the optimal comfort zone — breathable, thermally balanced, and quick-drying.

- **Efficient Heat & Moisture Transport:** High Qt and MVTR values confirm the fabric dissipates heat and evaporates moisture efficiently, maintaining a stable skin microclimate and delaying sweat buildup.







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Fibre52.com

support@fibre52.com