



BIRLA CELLULOSE - DRIVING TRANSPARENCY & TRUST

Birla Cellulose™ is among the leading producers of man-made cellulosic fibres (MMCFs) and is a trusted partner to 500+ brands and 3,000+ textile value-chain manufacturers. Birla Cellulose™ is committed to transparency regarding its product performance, manufacturing capabilities and processes, with the objective of supporting the adoption of MMCFs as an alternative to other natural and synthetic fibres.

We engage with stakeholders across the MMCF value chain—from responsible forest sourcing and pulp and fibre manufacturing through to downstream textile and apparel applications—to support continuous product and process improvement.

This document presents information and supporting credentials relating to claims concerning product sourcing, product performance and ESG-related initiatives of Birla Cellulose™.

Scope and limitations of claims

All performance claims and supporting information contained in this document relate exclusively to MMCFs manufactured by Birla Cellulose™ and are subject to the applicable conditions, specifications and methodologies stated or referenced herein. Such statements do not constitute claims regarding the performance, environmental impact or other attributes of any finished fabric, apparel or other end product incorporating Birla Cellulose™ fibres.

The performance and environmental impact of a finished fabric or garment may vary depending on, among other factors, fibre composition and blend, yarn and fabric specifications, manufacturing processes and technologies, finishing treatments, garment design and construction, care instructions, and conditions of use.

Accordingly, the performance and other attributes of the finished fabric or garment remain the responsibility of the relevant manufacturer, brand or other entity placing the finished product on the market.

INDEX

This document highlights the credentials supporting our claims on product sourcing, performance & ESG goals

1. Sourcing & ESG
2. Viscose Products
3. Modal Products
4. Lyocell Products

<https://www.livabybirlacellulose.com>

Disclaimer:

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Commitment to ESG

At Birla Cellulose, sustainability is the engine of value creation. By embedding it across strategy, operations, and governance, we unlock long-term benefits for people, planet, and performance. Each policy, partnership, and process is designed to translate intent into impact. Through this integrated approach, we are creating value that endures and multiplies across the ecosystem.

Our sustainability disclosures are developed with reference to the Global Reporting Initiative (GRI) Standards to enhance transparency, consistency, and accountability. By aligning key ESG initiatives with globally recognized frameworks, the Company provides stakeholders with meaningful insights into its performance, supports informed decision-making, and drives continuous improvement in responsible and sustainable operations.

A detailed view on our (Environmental, Social & Governance) performance can be accessed in our Sustainability report

Link: [2024-2025 Sustainability Report](#)

SOURCING

Birla Cellulose follows a strict 'Wood Sourcing Policy' and sources wood from sustainably managed forests following internationally renowned forestry standards and a 'Supplier Code of Conduct' for all its suppliers. Our practices are certified by various global bodies and form the backbone of our claims related to sourcing.

CLAIMS	SOURCE DATA																
- Fibres are derived from nature - Fibres are 100% plant based - Fibres are 100% natural in origin - Fibres are made from wood pulp - Responsible sourcing / forestry	Sourcing from certified forests FSC® Certification codes <table> <tr> <th>CERTIFICATE CODE</th><th>SITE</th></tr> <tr> <td>BV-COC-144869/BV-CW-144869</td><td>Grasim Cellulosic Division, Vilayat</td></tr> <tr> <td>SGSHK-COC-470047, SGSHK-CW-470078</td><td>Thai Rayon Public Company Limited, Thailand</td></tr> <tr> <td>SGSHK-COC-011588, SGSHK-CW-011588</td><td>Birla Jingwei Fibres Co., Ltd. China</td></tr> <tr> <td>SGSHK-COC-007629, SGSHK-CW-007629</td><td>PT Indo Bharat Rayon, Indonesia</td></tr> <tr> <td>BV-COC-185984</td><td>Birla Cellulosic, Kharach</td></tr> <tr> <td>BV-COC-144869/BV-CW-144869</td><td>Staple Fibre Division, Nagda</td></tr> <tr> <td>FSC-C145993</td><td>Harihar Polyfibres & Grasilene Division</td></tr> </table> Full certificates can be viewed at https://www.livabybirlacellulose.com/business/certificates Section: FSC® Certificates	CERTIFICATE CODE	SITE	BV-COC-144869/BV-CW-144869	Grasim Cellulosic Division, Vilayat	SGSHK-COC-470047, SGSHK-CW-470078	Thai Rayon Public Company Limited, Thailand	SGSHK-COC-011588, SGSHK-CW-011588	Birla Jingwei Fibres Co., Ltd. China	SGSHK-COC-007629, SGSHK-CW-007629	PT Indo Bharat Rayon, Indonesia	BV-COC-185984	Birla Cellulosic, Kharach	BV-COC-144869/BV-CW-144869	Staple Fibre Division, Nagda	FSC-C145993	Harihar Polyfibres & Grasilene Division
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Birla Cellulose™ is committed to sustainability by using - efficient technologies to reduce environmental impact compared to conventional methods - manufacturing facilities that adhere to global benchmark norms	Manufacturing Facilities All Birla Cellulose™ fibre manufacturing sites are HIGG (3.0) FEM & OEKO-TEX® certified Full certificates can be viewed at https://www.livabybirlacellulose.com/business/certificates Section(s): Higg (3.0) FEM Certificates OEKO TEX Certificates Global Ratings - Rank #1 amongst MMCF manufacturers, by Canopy Hot Button report 2025, - Highest rating of "Dark Green Shirt" for 6th consecutive year (2019-2025) https://canopyplanet.org/tools-and-resources/hot-button-report																

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Birla Cellulose
Fibres from nature

CLAIMS	SOURCE DATA
- Liva Reviva™ are recycled / regenerated fibres - Birla Cellulose™ fibres contribute to circular economy	Recycled Claim Standard (2.0) Liva Reviva™ fibres from Birla Cellulose™ confirm to Recycled Claim Standard (2.0) Full certificates can be viewed at https://www.livabybirlacellulose.com/business/certificates Section: RCS Certificates
- Birla Cellulose™ fibres are compostable in home & industrial conditions. - Birla Cellulose™ fibres are biodegradable in water, soil & marine environment*	Biodegradability Certificate https://www.livabybirlacellulose.com/business/certificates Section: Biodegradability Certificate USDA Certificate Full certificates can be viewed at https://www.livabybirlacellulose.com/business/certificates Section: USDA Certificate

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VISCOSE FIBRES

The below support data covers performance (only) claims made on all viscose products made by Birla Cellulose™ including

- Greige viscose (Birla Viscose™ & Livaeco™ Viscose)
- Dope-dyed viscose (Spunshades™ & eco-enhanced Spunshades™)

CLAIMS	SOURCE DATA																									
- Viscose fibres have a soft feel - Fabrics made with viscose are comparatively softer vs cotton & polyester	Viscose fibres have a higher hand value as measured vs cotton fibres, indicating a softer hand feel Source: Hand values for Viscose fabrics (3.9) vs cotton fabrics (3.4) vs polyester fabrics (3.3) <i>Comparative Study of Fabric comfort properties of different man-made cellulose fibres 2022</i> Nagpure, Rituraj; Patel, Mitesh; Chakrabati, Abir; Bhaumik, Somes: <table><tr><th>Sample</th><th>T1</th><th>T2</th><th>T3</th><th>T4</th><th>T5</th></tr><tr><th>Material</th><th>(100% cotton)</th><th>(100% viscose)</th><th>(100% modal)</th><th>(100% Excel)</th><th>(100% polyester)</th></tr><tr><th>Low-Stress Mechanical Properties</th><th>Warp + Weft Average</th><th>Warp + Weft Average</th><th>Warp + Weft Average</th><th>Warp + Weft Average</th><th>Warp + Weft Average</th></tr><tr><td>Total hand value</td><td>THV</td><td>3.4</td><td>3.9</td><td>3.9</td><td>4.4</td><td>3.3</td></tr></table> Test Methodology - Kawabata Evaluation system of Fabrics (KES - FB) Detailed report - https://www.livabybirlacellulose.com/livacms/uploads/policies_reports_files/policies_reports-01.pdf	Sample	T1	T2	T3	T4	T5	Material	(100% cotton)	(100% viscose)	(100% modal)	(100% Excel)	(100% polyester)	Low-Stress Mechanical Properties	Warp + Weft Average	Warp + Weft Average	Warp + Weft Average	Warp + Weft Average	Warp + Weft Average	Total hand value	THV	3.4	3.9	3.9	4.4	3.3
Sample	T1	T2	T3	T4	T5																					
Material	(100% cotton)	(100% viscose)	(100% modal)	(100% Excel)	(100% polyester)																					
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Total hand value	THV	3.4	3.9	3.9	4.4	3.3																				
Viscose fibres are skin friendly	Based on “Analysis of the status of skin friendly textile” Lizhu Hu et al 2021 J. Phys.: Conf. Ser. 1790 012082 Article - https://iopscience.iop.org/article/10.1088/1742-6596/1790/1/012082																									
Viscose fibres have good moisture absorption properties	Viscose fibres have a better moisture absorption levels as measured vs cotton fibres, indicating a softer hand feel Source: Moisture absorption values for Viscose fibres (0.6274) vs cotton fibres (0.5791) <table><tr><th>Sample</th><th>T1</th><th>T2</th><th>T3</th><th>T4</th></tr><tr><th>Material</th><th>(100% cotton)</th><th>(100% viscose)</th><th>(100% modal)</th><th>(100% Excel)</th></tr><tr><th>Low-Stress Mechanical Properties</th><th>Warp + Weft Average</th><th>Warp + Weft Average</th><th>Warp + Weft Average</th><th>Warp + Weft Average</th></tr><tr><td>Moisture Management testing - OMMC (Overall Moisture Management Capability)</td><td>0.5791</td><td>0.6274</td><td>0.6298</td><td>0.6881</td></tr></table> NAGPURE, RITURAJ; Patel, Mitesh; Chakrabarti, Abir; Bhaumik, Somes: <i>Comparative Study of Fabric comfort properties of different man-made cellulose fibres (2022)</i> Test Methodology - Moisture Management capability evaluated by AATCC TM 195 using Moisture Management Tester (MMT) M-290 SDL Atlas Detailed report https://www.livabybirlacellulose.com/livacms/uploads/policies_reports_files/policies_reports-01.pdf	Sample	T1	T2	T3	T4	Material	(100% cotton)	(100% viscose)	(100% modal)	(100% Excel)	Low-Stress Mechanical Properties	Warp + Weft Average	Warp + Weft Average	Warp + Weft Average	Warp + Weft Average	Moisture Management testing - OMMC (Overall Moisture Management Capability)	0.5791	0.6274	0.6298	0.6881					
Sample	T1	T2	T3	T4																						
Material	(100% cotton)	(100% viscose)	(100% modal)	(100% Excel)																						
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Moisture Management testing - OMMC (Overall Moisture Management Capability)	0.5791	0.6274	0.6298	0.6881																						
Viscose fibres are breathable in nature	Viscose fibres have a better air permeability as measured with cotton fibres indicating a breathability Source: Air permeability values for Viscose fibres (1654) vs cotton fibres (1156) NAGPURE, RITURAJ; Patel, Mitesh; Chakrabarti, Abir; Bhaumik, Somes:																									

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Birla Cellulose
Fibres from nature

	Fibres from nature					
	Sample	T1	T2	T3	T4	T5
	Material	(100% cotton)	(100% viscose)	(100% modal)	(100% Excel)	(100% polyester)
	Low-Stress Mechanical Properties	Warp + Weft Average	Warp + Weft Average	Warp + Weft Average	Warp + Weft Average	Warp + Weft Average
	Air Permeability(l/M ² /s)	1156	1654	1459	1536	1044
	Test Methodology – Air Permeability evaluated by ISO – 9237 using Air Permeability Tester M021A SDL Atlas					
	Detailed report - https://www.livabybirlacellulose.com/livacms/uploads/policies_reports_files/policies_reports-01.pdf					
Viscose fibres & fabrics have cooling properties	Viscose fibres & fabrics have a better cooling performance vs cotton or polyester					
	Source: Q _{max} values for Viscose fabrics (1269.4) vs cotton fabrics (1263.3) vs polyester fabrics (1161.1) NAGPURE, RITURAJ; Patel, Mitesh; Chakrabarti, Abir; Bhaumik, Somes:					
	Sample	T1	T2	T3	T4	T5
	Material	(100% cotton)	(100% viscose)	(100% modal)	(100% Excel)	(100% polyester)
	Low-Stress Mechanical Properties	Warp + Weft Average	Warp + Weft Average	Warp + Weft Average	Warp + Weft Average	Warp + Weft Average
	Q _{max} (W/M ²)	1236.3	1269.4	1270.2	1275.2	1161.1
	Test Methodology – Kawabata Evaluation system of Fabrics (KES – FB)					
	Detailed report - https://www.livabybirlacellulose.com/livacms/uploads/policies_reports_files/policies_reports-01.pdf					
Viscose fibres & fabrics offer better comfort Better fall & drape	Viscose fibres & fabrics have a					
	- lower linearity of tensile property (LT) vs cotton indicating wearing comfort (<i>LT value for viscose (0.358) lower than cotton (0.375)</i>) - higher tensile resilience (recovery after tensile deformation – <i>RT value for viscose (56.66) higher than cotton (49.14)</i>)					
	Source: NAGPURE, RITURAJ; Patel, Mitesh; Chakrabarti, Abir; Bhaumik, Somes:					
	Sample	T1	T2	T3	T4	T5
	Material	(100% cotton)	(100% viscose)	(100% modal)	(100% Excel)	(100% polyester)
	Low-Stress Mechanical Properties	Warp + Weft Average	Warp + Weft Average	Warp + Weft Average	Warp + Weft Average	Warp + Weft Average
	Tensile test	LT	0.375	0.358	0.364	0.371
	Tensile test	RT	49.14	56.66	57.48	61.1
	Test Methodology – Kawabata Evaluation system of Fabrics (KES – FB)					
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MODAL FIBRES:

The below support data covers performance (only) claims made on all modal products made by Birla Cellulose™ including

- All variants of Modal (Birla Modal & Livaeco™ modal)
- All variant(s) of Micro-Modal (Birla Micro-Modal & Livaeco™ Micro-modal)

CLAIMS	SOURCE DATA																												
Modal fibres have a soft feel	Modal fibres have a higher hand value as measured vs cotton fibres, indicating a softer hand feel Source: Hand values for Modal fabrics (3.9) vs cotton fabrics (3.4) vs polyester fabrics (3.3) <i>Comparative Study of Fabric comfort properties of different man-made cellulose fibres 2022</i> Nagpure, Rituraj; Patel, Mitesh; Chakrabati, Abir; Bhaumik, Somes: <table><tr><th>Sample</th><th></th><th>T1</th><th>T2</th><th>T3</th><th>T4</th><th>T5</th></tr><tr><th>Material</th><th></th><th>(100% cotton)</th><th>(100% viscose)</th><th>(100% modal)</th><th>(100% Excel)</th><th>(100% polyester)</th></tr><tr><th>Low-Stress Mechanical Properties</th><th></th><th>Warp + Weft Average</th><th>Warp + Weft Average</th><th>Warp + Weft Average</th><th>Warp + Weft Average</th><th>Warp + Weft Average</th></tr><tr><td>Total hand value</td><td>THV</td><td>3.4</td><td>3.9</td><td>3.9</td><td>4.4</td><td>3.3</td></tr></table> Test Methodology - Kawabata Evaluation system of Fabrics (KES - FB) Detailed report - https://www.livabybirlacellulose.com/livacms/uploads/policies_reports_files/policies_reports-01.pdf	Sample		T1	T2	T3	T4	T5	Material		(100% cotton)	(100% viscose)	(100% modal)	(100% Excel)	(100% polyester)	Low-Stress Mechanical Properties		Warp + Weft Average	Warp + Weft Average	Warp + Weft Average	Warp + Weft Average	Warp + Weft Average	Total hand value	THV	3.4	3.9	3.9	4.4	3.3
Sample		T1	T2	T3	T4	T5																							
Material		(100% cotton)	(100% viscose)	(100% modal)	(100% Excel)	(100% polyester)																							
Low-Stress Mechanical Properties		Warp + Weft Average	Warp + Weft Average	Warp + Weft Average	Warp + Weft Average	Warp + Weft Average																							
Total hand value	THV	3.4	3.9	3.9	4.4	3.3																							
Modal fibres have good moisture absorption properties	Modal fibres have a better moisture absorption levels as measured vs cotton fibres, indicating a softer hand feel Source: Moisture absorption values for Modal fibres (0.6298) vs cotton fibres (0.5791) <table><tr><th>Sample</th><th>T1</th><th>T2</th><th>T3</th><th>T4</th></tr><tr><th>Material</th><th>(100% cotton)</th><th>(100% viscose)</th><th>(100% modal)</th><th>(100% Excel)</th></tr><tr><th>Low-Stress Mechanical Properties</th><th>Warp + Weft Average</th><th>Warp + Weft Average</th><th>Warp + Weft Average</th><th>Warp + Weft Average</th></tr><tr><td>Moisture Management testing - OMMC (Overall Moisture Management Capability)</td><td>0.5791</td><td>0.6274</td><td>0.6298</td><td>0.6881</td></tr></table> NAGPURE, RITURAJ; Patel, Mitesh; Chakrabarti, Abir; Bhaumik, Somes: <i>Comparative Study of Fabric comfort properties of different man-made cellulose fibres (2022)</i> Test Methodology - Moisture Management capability evaluated by AATCC TM 195 using Moisture Management Tester (MMT) M-290 SDL Atlas Detailed report https://www.livabybirlacellulose.com/livacms/uploads/policies_reports_files/policies_reports-01.pdf	Sample	T1	T2	T3	T4	Material	(100% cotton)	(100% viscose)	(100% modal)	(100% Excel)	Low-Stress Mechanical Properties	Warp + Weft Average	Warp + Weft Average	Warp + Weft Average	Warp + Weft Average	Moisture Management testing - OMMC (Overall Moisture Management Capability)	0.5791	0.6274	0.6298	0.6881								
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Material	(100% cotton)	(100% viscose)	(100% modal)	(100% Excel)																									
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Moisture Management testing - OMMC (Overall Moisture Management Capability)	0.5791	0.6274	0.6298	0.6881																									
Modal fibres are breathable in nature	Modal fibres have a better air permeability as measured with cotton fibres indicating a breathability Source: Air permeability values for Modal fibres (1459) vs cotton fibres (1156) NAGPURE, RITURAJ; Patel, Mitesh; Chakrabarti, Abir; Bhaumik, Somes:																												

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Birla Cellulose
Fibres from nature

Sample	T1	T2	T3	T4	T5
Material	(100% cotton)	(100% viscose)	(100% modal)	(100% Excel)	(100% polyester)
Low-Stress Mechanical Properties	Warp + Weft Average	Warp + Weft Average	Warp + Weft Average	Warp + Weft Average	Warp + Weft Average
Air Permeability(I/M ² /s)	1156	1654	1459	1536	1044

Test Methodology - Air Permeability evaluated by ISO - 9237 using Air Permeability Tester M021A SDL Atlas

Detailed report - https://www.livabybirlacellulose.com/livacms/uploads/policies_reports_files/policies_reports-01.pdf

Modal fibres & fabrics have cooling properties

Modal fibres & fabrics have a better cooling performance vs cotton or polyester

Source:

Q_{max} values for Modal fabrics (1270.2) vs cotton fabrics (1263.3) vs polyester fabrics (1161.1)

NAGPURE, RITURAJ; Patel, Mitesh; Chakrabarti, Abir; Bhaumik, Somes:

Sample	T1	T2	T3	T4	T5
Material	(100% cotton)	(100% viscose)	(100% modal)	(100% Excel)	(100% polyester)
Low-Stress Mechanical Properties	Warp + Weft Average	Warp + Weft Average	Warp + Weft Average	Warp + Weft Average	Warp + Weft Average
Q _{max} (W/M ²)	1236.3	1269.4	1270.2	1275.2	1161.1

Test Methodology - Kawabata Evaluation system of Fabrics (KES - FB)

Detailed report - https://www.livabybirlacellulose.com/livacms/uploads/policies_reports_files/policies_reports-01.pdf

Modal fibres & fabrics offer better comfort
Better fall & drape

Modal fibres & fabrics have a

- lower linearity of tensile property (LT) vs cotton indicating wearing comfort (*LT value for modal (0.364) lower than cotton (0.375)*)
- higher tensile resilience (recovery after tensile deformation - *RT value for modal (57.48) higher than cotton (49.14)*)

Source:

NAGPURE, RITURAJ; Patel, Mitesh; Chakrabarti, Abir; Bhaumik, Somes:

Sample		T1	T2	T3	T4	T5
Material		(100% cotton)	(100% viscose)	(100% modal)	(100% Excel)	(100% polyester)
Low-Stress Mechanical Properties		Warp + Weft Average	Warp + Weft Average	Warp + Weft Average	Warp + Weft Average	Warp + Weft Average
Tensile test	LT	0.375	0.358	0.364	0.371	0.378
Tensile test	RT	49.14	56.66	57.48	61.1	66.61

Test Methodology - Kawabata Evaluation system of Fabrics (KES - FB)

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LYOCELL FIBRES

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- All variants of Lyocell (Birla Excel™ & Livaeco™ Lyocell)

Claims	Source Data																												
Birla Excel (Lyocell) fibres have a soft feel	Birla Excel (Lyocell) have a higher hand value as measured vs cotton fibres, indicating a softer hand feel Source: Hand values for Birla Excel (Lyocell) fibres (4.4) vs cotton fibres (3.4) <i>Comparative Study of Fabric comfort properties of different man-made cellulose fibres 2022</i> Nagpure, Rituraj; Patel, Mitesh; Chakrabati, Abir; Bhaumik, Somes: <table><tr><th colspan="2">Sample</th><th>T1</th><th>T2</th><th>T3</th><th>T4</th><th>T5</th></tr><tr><th colspan="2">Material</th><th>(100% cotton)</th><th>(100% viscose)</th><th>(100% modal)</th><th>(100% Excel)</th><th>(100% polyester)</th></tr><tr><th colspan="2">Low-Stress Mechanical Properties</th><th>Warp + Weft Average</th><th>Warp + Weft Average</th><th>Warp + Weft Average</th><th>Warp + Weft Average</th><th>Warp + Weft Average</th></tr><tr><td>Total hand value</td><td>THV</td><td>3.4</td><td>3.9</td><td>3.9</td><td>4.4</td><td>3.3</td></tr></table> Test Methodology - Kawabata Evaluation system of Fabrics (KES - FB) Detailed report - https://www.livabybirlacellulose.com/livacms/uploads/policies_reports_files/policies_reports-01.pdf	Sample		T1	T2	T3	T4	T5	Material		(100% cotton)	(100% viscose)	(100% modal)	(100% Excel)	(100% polyester)	Low-Stress Mechanical Properties		Warp + Weft Average	Warp + Weft Average	Warp + Weft Average	Warp + Weft Average	Warp + Weft Average	Total hand value	THV	3.4	3.9	3.9	4.4	3.3
Sample		T1	T2	T3	T4	T5																							
Material		(100% cotton)	(100% viscose)	(100% modal)	(100% Excel)	(100% polyester)																							
Low-Stress Mechanical Properties		Warp + Weft Average	Warp + Weft Average	Warp + Weft Average	Warp + Weft Average	Warp + Weft Average																							
Total hand value	THV	3.4	3.9	3.9	4.4	3.3																							
Birla Excel (Lyocell) fibres have good moisture absorption properties	Birla Excel (Lyocell) fibres have a better moisture absorption levels as measured vs cotton fibres, indicating a softer hand feel Source: Moisture absorption values for Birla Excel (Lyocell) fibres (0.6881) vs cotton fibres (0.5791) <i>Comparative Study of Fabric comfort properties of different man-made cellulose fibres (2022)</i> Nagpure, Rituraj; Patel, Mitesh; Chakrabati, Abir; Bhaumik, Somes: <table><tr><th>Sample</th><th>T1</th><th>T2</th><th>T3</th><th>T4</th></tr><tr><th>Material</th><th>(100% cotton)</th><th>(100% viscose)</th><th>(100% modal)</th><th>(100% Excel)</th></tr><tr><th>Low-Stress Mechanical Properties</th><th>Warp + Weft Average</th><th>Warp + Weft Average</th><th>Warp + Weft Average</th><th>Warp + Weft Average</th></tr><tr><td>Moisture Management testing - OMMC (Overall Moisture Management Capability)</td><td>0.5791</td><td>0.6274</td><td>0.6298</td><td>0.6881</td></tr></table> Test Methodology - Moisture Management capability evaluated by AATCC TM 195 using Moisture Management Tester (MMT) M-290 SDL Atlas Detailed report - https://www.livabybirlacellulose.com/livacms/uploads/policies_reports_files/policies_reports-01.pdf	Sample	T1	T2	T3	T4	Material	(100% cotton)	(100% viscose)	(100% modal)	(100% Excel)	Low-Stress Mechanical Properties	Warp + Weft Average	Warp + Weft Average	Warp + Weft Average	Warp + Weft Average	Moisture Management testing - OMMC (Overall Moisture Management Capability)	0.5791	0.6274	0.6298	0.6881								
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Birla Excel (Lyocell) fibres are breathable in nature	Birla Excel (Lyocell) fibres have a better air permeability as measured with cotton fibres indicating a breathability Source: Air permeability values for Birla Excel (Lyocell) fibres (1536) vs cotton fibres (1156) <i>Comparative Study of Fabric comfort properties of different man-made cellulose fibres (2022)</i> <table><tr><th>Sample</th><th>T1</th><th>T2</th><th>T3</th><th>T4</th><th>T5</th></tr><tr><th>Material</th><th>(100% cotton)</th><th>(100% viscose)</th><th>(100% modal)</th><th>(100% Excel)</th><th>(100% polyester)</th></tr><tr><th>Low-Stress Mechanical Properties</th><th>Warp + Weft Average</th><th>Warp + Weft Average</th><th>Warp + Weft Average</th><th>Warp + Weft Average</th><th>Warp + Weft Average</th></tr><tr><td>Air Permeability(l/M²/s)</td><td>1156</td><td>1654</td><td>1459</td><td>1536</td><td>1044</td></tr></table>	Sample	T1	T2	T3	T4	T5	Material	(100% cotton)	(100% viscose)	(100% modal)	(100% Excel)	(100% polyester)	Low-Stress Mechanical Properties	Warp + Weft Average	Warp + Weft Average	Warp + Weft Average	Warp + Weft Average	Warp + Weft Average	Air Permeability(l/M ² /s)	1156	1654	1459	1536	1044				
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Birla Cellulose
Fibres from nature

	Nagpure, Rituraj; Patel, Mitesh; Chakrabati, Abir; Bhaumik, Soma: Test Methodology - Air Permeability evaluated by ISO - 9237 using Air Permeability Tester M021A SDL Atlas Detailed report - https://www.livabybirlacellulose.com/livacms/uploads/policies_reports_files/policies_reports-01.pdf																																			
Lyocell fibres & fabrics offer better comfort Better fall & drape	Lyocell fibres & fabrics have a - lower linearity of tensile property (LT) vs cotton indicating wearing comfort (LT value for Lyocell (0.371) lower than cotton (0.375)) - higher tensile resilience (recovery after tensile deformation - RT value for lyocell (61.1) higher than cotton (49.14)) Source: NAGPURE, RITURAJ; Patel, Mitesh; Chakrabarti, Abir; Bhaumik, Soma: <table><tr><th colspan="2">Sample</th><th>T1</th><th>T2</th><th>T3</th><th>T4</th><th>T5</th></tr><tr><th colspan="2">Material</th><th>(100% cotton)</th><th>(100% viscose)</th><th>(100% modal)</th><th>(100% Excel)</th><th>(100% polyester)</th></tr><tr><th colspan="2">Low-Stress Mechanical Properties</th><th>Warp + Weft Average</th><th>Warp + Weft Average</th><th>Warp + Weft Average</th><th>Warp + Weft Average</th><th>Warp + Weft Average</th></tr><tr><td>Tensile test</td><td>LT</td><td>0.375</td><td>0.358</td><td>0.364</td><td>0.371</td><td>0.378</td></tr><tr><td>Tensile test</td><td>RT</td><td>49.14</td><td>56.66</td><td>57.48</td><td>61.1</td><td>66.61</td></tr></table> Test Methodology - Kawabata Evaluation system of Fabrics (KES - FB) Detailed report - https://www.livabybirlacellulose.com/livacms/uploads/policies_reports_files/policies_reports-01.pdf	Sample		T1	T2	T3	T4	T5	Material		(100% cotton)	(100% viscose)	(100% modal)	(100% Excel)	(100% polyester)	Low-Stress Mechanical Properties		Warp + Weft Average	Warp + Weft Average	Warp + Weft Average	Warp + Weft Average	Warp + Weft Average	Tensile test	LT	0.375	0.358	0.364	0.371	0.378	Tensile test	RT	49.14	56.66	57.48	61.1	66.61
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Lyocell fibres are the stronger vs viscose / modal fibres Lyocell is the strongest cellulosic fibre compared to viscose & modal fibres	Demonstrated tenacity of fibres <table><tr><th>Fibre</th><th>Tenacity</th><th>Test</th></tr><tr><td>Viscose</td><td>2.7 - 2.8 gpd</td><td>BISFA, tested at GCD Vilayat, Jan 2024,</td></tr><tr><td>Modal</td><td>3.8 - 4.0 gpd</td><td>BISFA, tested at BC Kharach, 2024</td></tr><tr><td>Excel</td><td>4.2 - 4.5 gpd</td><td>BISFA, tested at GCD Vilayat, Jan 2024</td></tr></table> Report Links: Lyocell Product Specifications Modal Product Specifications Viscose Product Specifications	Fibre	Tenacity	Test	Viscose	2.7 - 2.8 gpd	BISFA, tested at GCD Vilayat, Jan 2024,	Modal	3.8 - 4.0 gpd	BISFA, tested at BC Kharach, 2024	Excel	4.2 - 4.5 gpd	BISFA, tested at GCD Vilayat, Jan 2024																							
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Lyocell Fibres has upto 2X times moisture regain of Cotton	Lyocell fibres regain moisture better when compared to cotton fibres <table><tr><th>Fibre</th><th>Moisture regain</th></tr><tr><td>Cotton</td><td>7-8.5%</td></tr><tr><td>Lyocell</td><td>9-13%</td></tr></table> Report Links: Lyocell Product Specifications Textile calculations: Standard Moisture Regain and Moisture Content of Fibres (textilecalculations.com)	Fibre	Moisture regain	Cotton	7-8.5%	Lyocell	9-13%																													
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RECYCLED FIBRES

The below support data covers performance (only) claims made on all RECYCLED fibres made by Birla Cellulose™ including

- All variants of Liva Reviva™ (Mechanically Recycled, Chemically Recycled) \

CLAIMS	SOURCE DATA
• Liva Reviva™ are recycled / regenerated fibres • Liva Reviva™ fibres contribute to circular economy	Recycled Claim Standard (2.0) Liva Reviva™ fibres from Birla Cellulose™ confirm to Recycled Claim Standard (2.0) Full certificates can be viewed at https://www.livabybirlacellulose.com/business/certificates Section: RCS Certificates

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