



Ingeo™ Apparel Product Guidelines

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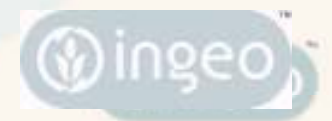
ingeo™



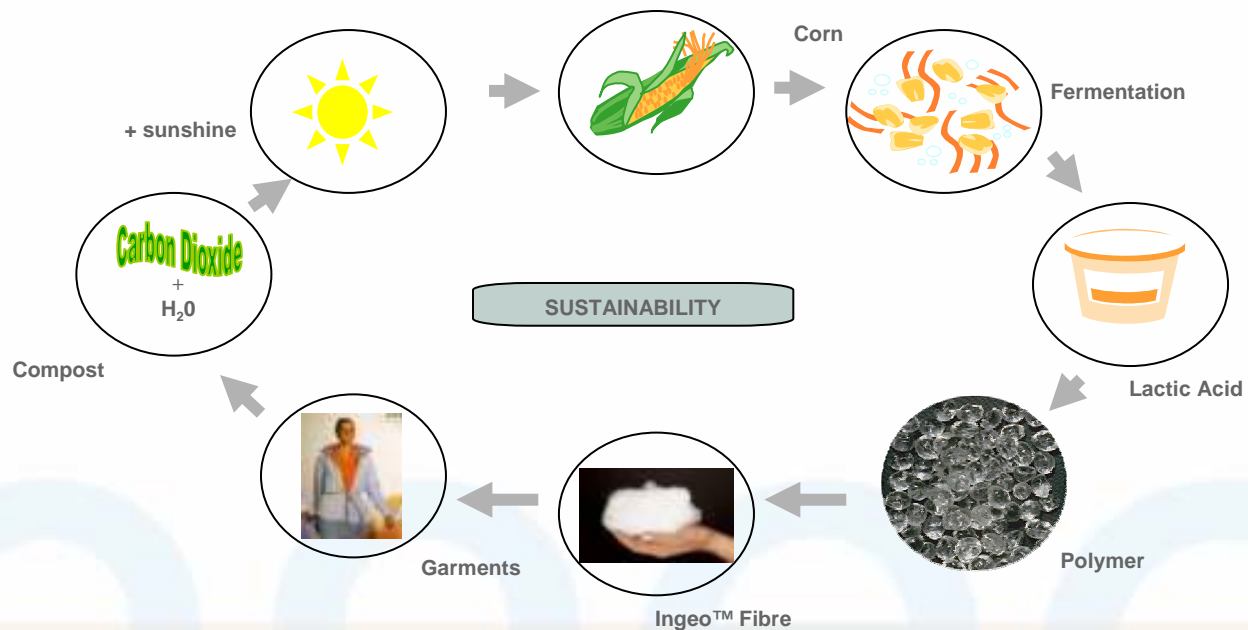


Apparel Product Guidelines

1. Introduction to Ingeo™ fibers



- The only synthetic fibre commercially available in bulk quantities, that is made entirely from annually renewable raw materials - not oil



Not only from nature - but also back to nature



From nature, and back to nature - plus performance:

- **Excellent wicking properties**
 - **Moisture management**
 - **Low odor retention**
 - **Does not support bacterial growth**
 - **Hypoallergenic**
 - **Rapid soil release**
 - **Quick drying**
 - **Excellent after wash appearance**
- ⇒ Comfort
- ⇒ Fresh
- ⇒ No skin irritation
- ⇒ Easy care

And all supported by detailed technical bulletins

..... selected technical bulletins

Subject	Bulletin number
Apparel	
Odour release	290904
Hohenstein Institute testing	260904
Washing and dry cleaning performance	50904
Fibre & fabric properties	180904
Home textiles	
Fibre fill compression testing	200904
Duvet / comforter performance	130904
Pillow performance	320904
Furnishing flammability characteristics	110104
Non woven	
Moisture transport in Ingeo™ fibre non woven fabrics	380904
Wipes regularity technical bulletin (toxicology)	390904
Wipes commercial production information	110804
Multi product	
Compostability	120904
Ingeo™ fibre fabric UV resistance	370904

These and more available on www.ingeofibers.com



Apparel Product Guidelines

2. Garment making





Ingeo™ fibre garment making

- **Considerations:**
 - **Low melt point, so pay attention to areas of high heat generation, e.g. cutting / stitching / pressing**
- **Some guidelines:**
 - **Laying** ⇒ machines - automatic, or semi automatic machines preferred
 - ⇒ fabric layers - max 80 with paper insert every 10 layers
 - **Cutting** ⇒ ensure sharp blades, max knife speed 3500rpm
 - **Stitching** ⇒ needles - fine size, ball point
 - ⇒ thread tension - minimum possible
 - ⇒ sewing speed - may need reducing

Individual trials on specific fabrics and seams recommended before commencing production

Ingeo™ fibre garment making

guidelines for garment manufacturing from fabrics containing Ingeo fiber

Sewing assemblies
High levels of friction at the needle point may cause sufficient heat to produce permanent fused needle holes. This could be a particular problem with relation to resewing faults/rework.



Needle selection
To be reduced to the minimum dimensions can lead to further of needle penetration.

Needle selection
This will help to reduce fraying and prevent fiber being of threads. Incomplete stitches however further fabricating points of sewing of the seams produced by fabric in the garment.

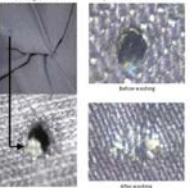
Maximum stitch length
Each individual fabric and seam type should be assessed in order to produce a defined sewing specification, with attention paid to stitch type, length and number of stitches incorporated into the seam. The following general rules should, however, be applied:

The front size needle should be used:
Knit fabric - 9/10 system / last point
Woven fabric - 10/12

guidelines for garment manufacturing from fabrics containing Ingeo fiber

Pressing
Ironing is UNACCEPTABLE as they may melt the Ingeo fiber causing the permanently fused hole in the seam.

Temperature and leader pins are recommended on the use of pressuring iron on automated equipment.



Fusing
Low heat point adhesives are required on fusible interlinings e.g., power dot from Vliesel.

Knit fabric - pressure of air to 20 p.s.i. for 10 seconds with a fusing temperature of 120°C, for 10 seconds with a fusing temperature of 120°C, and glue line of 100°C, has been successful and safe.

Woven fabric - pressure of air to 10 p.s.i. for 10 seconds with a fusing temperature of 120°C, and glue line of 100°C has been successful on woven fabric. (Knit fabric and woven fabric)

Each individual fabric and garment type should be assessed for its own requirements.

guidelines for garment manufacturing from fabrics containing Ingeo™ fiber

Technical Bulletin 11104

General

When producing garments from fabrics containing Ingeo™ fibre, the manufacturing specification will generally reflect that for a fabric of similar construction/weight containing traditional fiber types. However there are certain key operations where the melting point of Ingeo fiber (170°C) needs to be taken into account.

In order to provide recommendations for these stages, specific research has been carried out. This was done by Jeonologia S.L., Valencia, Spain, a company that specializes in research in garment making and finishing.

The primary fabrics assessed were a 100% Ingeo fiber U/40Ne 2 egg knitted interlock and a cotton rich Ingeo fiber blend woven denim. This gave examples at each end of the spectrum from the point of view of fiber composition, fabric construction, fabric weight and garment construction methods. Fiber composition is considered to be the most important criteria and therefore issues raised may be less significant where the Ingeo fiber content is less than 100%.

This information is contained within the following guidelines. These guidelines are not exhaustive and will be added to as experiences increase.

Preparation/cutting

laying up:

Equipment: Automatic or semi automatic equipment is recommended.

Fabric Direction: One way, not lapped for knits. Lapped acceptable for wovens where fabric design etc. permits.

Maximum Height: Knit fabric – 80 piles, with tissue every 50 piles; Woven fabric – 160 piles
N.B. A fabric relaxation time of approximately 8 hours should be allowed for knitted fabrics.

marker fixing:

All methods are suitable, but if using staples these should be placed in waste areas and not on panel pieces.

cutting:

As for similarly constructed fabrics of other fiber composition.

Speeds should be controlled however, to avoid high degrees of friction which could cause fusing of edges. Maximum speed recommended for automatic cutting is 3500RPM.

It is essential that the blades are kept sharp at all times for the same reason.

guidelines for garment manufacturing from fabrics containing Ingeo fiber

cutting process

appropriate to the fabric and

cutting process	max. speed (RPM)	max. length (cm)
laser	10000	100
waterjet	10000	100
ultrasonic	10000	100
mechanical	3500	100
thermal	10000	100
waterjet	10000	100

can be used as a guide to speeds when flat sewing

and effort will be more able cutting. This can be achieved if the face part of the needle point need to extend sewing

effect of this principle of affecting needs more manual machine used in to have any reduction





guidelines for garment manufacturing from fabrics containing Ingeo fiber

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Further points of reference

Jeonologia S.L. - www.jeonologia.com
Shaw Textile - www.shawtextile.com
Schweitz wendler - schweitz.com
Lee Laid of Leicester (denim coating finishing) - www.lee.co.uk
Coca Textiles, Longborough, England - www.cocafabrics.com

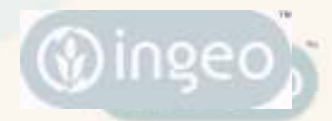
Technical bulletin - garment manufacturing guidelines (available on www.ingeofibers.com)












Apparel Product Guidelines

3. Suggested Care Claims










Ingeo™ fibre Apparel - Suggested Care Claims

USA : Jersey Products

	Machine Wash Cold, Normal Cycle, 30°C / 85°F
	- or -
	Hand Wash Cold, 30°C / 85°F
	- or -
	Dry clean
	Non-Chlorine Bleach When Needed
	Tumble Dry, Permanent Press, Medium Heat
	Do Not Iron
	- or -
	Iron, Low Heat (110°C / 230°F)








Ingeo™ fibre Apparel - Suggested Care Claims

USA : Knitwear

	Machine Wash Cold, Gentle Cycle, 30°C / 85°F
	- or -
	Hand Wash Cold, 30°C / 85°F
	- or -
	Dry clean
	Non-Chlorine Bleach When Needed
	Tumble Dry, Permanent Press, Medium Heat
	Do Not Iron
	- or -
	Iron, Low Heat (110°C / 230°F)








Ingeo™ fibre Apparel - Suggested Care Claims

EU : Jersey Products

	Machine Wash, Normal Cycle, 40°C
	- or -
	Hand Wash
	- or -
	Dry clean
	Do Not Use Chlorine Bleach
	Tumble Dry
	Do Not Iron
	- or -
	Cool Iron (110°C)

Ingeo™ fibre Apparel - Suggested Care Claims

EU : Knitwear

	Machine Wash, Gentle Cycle, 40°C
	- or -
	Hand Wash
	- or -
	Dry clean
	Do Not Use Chlorine Bleach
	Tumble Dry
	Do Not Iron
	- or -
	Cool Iron (110°C)

Ingeo™ fibre Apparel - Suggested Care Claims

China

	最高水温：40 C，机械运转：常规，甩干或拧干：常规
	- 或 -
	手洗，最高水温：40 C，洗涤时间：短
	- 或 -
	常规干洗
	不可氯漂
	转笼翻转干燥
	不可熨烫
	- 或 -
	熨斗底皮最高温度：110 C

Ingeo™ fibre labeling - blend policy

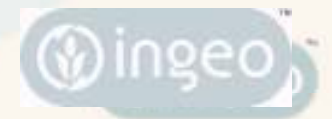
- Fibre content requirements for carrying the Ingeo™ fibre brand reflect our stance on sustainability:
 - 100% Ingeo™ fibre
 - OR/
 - Blends with maximum 67% natural or cellulosic man made fibre
 - Synthetic fibres **only** when used to introduce stretch properties:
 - Maximum 10% elastane
 - Maximum 25% others
- Exceptions only by NatureWorks LLC approval





Apparel Product Guidelines

4. Guideline Specifications





Guideline Specifications and Test Methods

Property	Test Method	Specification
Wash shrinkage - jersey - knitwear	AATCC 135-01, IV Aiii AATCC 135-01, IV Aii	+/- 6% +/- 8%
Pilling	ASTM D3512	3-4
Burst Strength	ASTM D3787	65lb-f
Light Fastness	AATCC 16E, 20 hr	4
Washing Fastness - change - stain	AATCC 61 I A, 40°C	3 3-4
Rubbing Fastness - wet - dry	AATCC 8	3-4 3-4



More information at www.ingefibers.com



humanity, nature and technology in balance





IMPORTANT NOTE:

The information provided in this document is given in good faith based on the best knowledge of current technology.

The information provided can only be taken as a start point for trials to establish production routes for Ingeo™ fibre products.

Cargill Dow cannot be held responsible for any claims arising from the information contained within this document, howsoever caused.

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