

# insulated outerwear specifications

Technical Bulletin 270904

## Purpose

The NatureWorks insulated outerwear certification program will provide the highest standards of performance in warmth, comfort and durability to the consumer. The specifications will maintain, and identify to consumers, that manufacturers will meet those standards.

## Requirements

Before any product can be certified, manufacturers must sign a licensing agreement to meet manufacturing guidelines and product standards. While the specifications are designed against the highest standards for consumer and manufacturer attributes, NatureWorks cannot anticipate all combinations of styles and fabric selection. The final responsibility to assure acceptable end use performance lies with the garment manufacturer. By accepting certification, the insulated outerwear manufacturer agrees to:

- Check fabric for percolation (fiber leakage) control
- Confirm quilt size and pattern will yield required wash durability
- Maintain minimum specified filling weights in primary areas, such as in body and sleeves of the garment

### 1. fiber blend

The certified outerwear must be filled with 100% Ingeo™ fibers specially designed for insulated outerwear.

### 2. filling weight requirements

A minimum filling weight must be maintained to provide adequate warmth and uniformity throughout the garment without cold spots. In addition, a sufficient number of fibers are required to prevent excessive fiber movement and resulting clumps in laundering or dry cleaning. Minimum weight for outerwear is 100 g/m<sup>2</sup>, or 3 oz/yd<sup>2</sup>, excluding resin weight if used.

Insulated Outerwear Filling Weight Requirements								
Description	United States				Europe			
	Minimum Weight	Weight Tolerance			Weight Target	Weight Tolerance		
Ft <sup>2</sup>		Yd <sup>2</sup>	30 lin. Yds.	0.1 m <sup>2</sup>		M <sup>2</sup>	30 lin.m	
Insulated Outerwear	3 oz/yd <sup>2</sup>	±10%	±7.5%	±5%	150 g/m <sup>2</sup>	±10%	±7.5%	±5%

### 3. PLA batting types for use in insulated outerwear

Unbonded card/garnett or air-lay battings

Thermal bonded PLA batting with PLA binder fibers not to exceed 20% of the total batting weight

Acrylic resin bonded PLA batting with maximum of 20% resin of the total batting weight

Combination of binder fiber and acrylic resin with maximum combined weights not to exceed 30% of the total batting weight

The binder fiber should be uniformly distributed throughout the batting. If used, resin must be applied evenly on the surfaces of the batting. The advantages of the bonded batting, with either binder fiber or resin or both, are increased batting durability and improved fiber percolation control. Binder fiber and/or resin must be cured adequately.

One minute at 130° C is required to bond with binder fibers. Acrylic resin must be compatible with PLA and can be cured not higher than 130° C temperature with acceptable wash durability. Bonding and curing temperatures higher than 130° C can affect the PLA fiber which melts at 165° C. Bonded battings must not be compressed throughout the entire process to maximize batting thickness for optimum insulation value.

4. batting appearance

There should be no obvious defects in the batting such as holes, heavy cross-lapper marks and clumps of fibers. All fibers in the batting should be well opened without neps, rat tails or rolling rope. Batting should not be contaminated with foreign materials or other fibers that are not specified. No excessive compression on batting should be used to reduce the thickness, which will reduce the warmth value (CLO or Tog value) of the batting. Vacuum packing of batting is not recommended.

5. nonwoven interlinings

If nonwoven interlining is used, the basis weight shall not exceed 20 g/m<sup>2</sup> (0.6 oz/yd<sup>2</sup>). Higher basis weight can reduce the softness and drapability of the garment. The benefits of using interlinings include:

- Improved stability to unbonded batting
- Reduced fiber percolation (fiber leakage) if used next to shell fabric. Selection of a high quality, low air permeability fabric is the best way to prevent fiber percolation
- Reduced deterioration of multilayer battings in use and laundering when interlinings are used between batting layers

6. shell fabrics

Shell fabrics can be made of spun or filament yarns and shall be of adequate construction and porosity to control fiber percolation or leakage in garment as produced and after three agitator wash and tumble dry cycles. Suggested fabric thread count is 31/cm<sup>2</sup> (FXW) or 210/in<sup>2</sup> (FXW), with air permeability no more than 25 l/m<sup>2</sup>/sec or 5 ft<sup>3</sup>/ft<sup>2</sup>/min (at pressure of 1.3 cm or 0.5 inch water).

7. recommended quilting patterns

The quilting pattern used shall not exceed an area which is adequate to control shifting and separation of the batting after three agitator washing and tumble dry cycles. Suggested maximum quilting sizes are:

Recommended Stitch Patterns		
	Batting Type	
Stitch Pattern	Unbonded	Bonded
Straight Line Rows	20 cm or 8 inches	30 cm or 12 inches
Box or Diamond	650 cm <sup>2</sup> or 100 in <sup>2</sup>	970 cm <sup>2</sup> or 150 in <sup>2</sup>

8. laundering instructions

Outerwear can be laundered in agitator washing machine. Use a mild detergent (no bleach) at moderate setting and low temperature. Set at low temperature for tumble dry. For large size outerwear, it is recommended to use front loading washing machine. Dry cleaning is also acceptable.

Any deviation from the specifications is subject to written approval from NatureWorks.

## Product Disclaimer

### safety and handling considerations

Material Safety Data Sheets (MSDS) for Ingeo fibers are available from NatureWorks. MSDS sheets are provided to help customers satisfy their own handling, safety, and disposal needs and those that may be required by locally applicable health and safety regulations, such as MAK (Germany), OSHA (U.S.A.), etc. MSDS sheets are updated regularly; therefore, please request and review the most current MSDS sheets before handling or using any product.

### handling

Ingeo fibers have a very low degree of toxicity and under normal conditions of use should pose no unusual problems from incidental ingestion. Eye contact with fibers should be avoided to prevent mechanical irritation to the eyes. At temperatures exceeding the polymer melt temperature (typically 170° C), polymer can release fumes which may contain fragments of the polymer, creating a potential to irritate eyes and mucous membranes. Good general ventilation is required in such conditions to maintain an adequate work environment below established PEL (Personal Exposure Limit).

### disposal

DO NOT DUMP INTO ANY SEWERS, ON THE GROUND, OR INTO ANY BODY OF WATER. For unused or uncontaminated material, the preferred options include recycling into the process or sending to a composting facility if available; otherwise, send to an incinerator or other thermal destruction device. Disposal method must be in compliance with federal, state/provincial, and local laws and regulations.

### environmental concerns

Generally speaking, lost fibers are not a problem in the environment except under unusual circumstances—when they enter the marine environment. They are benign in terms of their physical environmental impact, but if ingested by waterfowl or aquatic life, they may mechanically cause adverse effects. Spills should be minimized, and they should be cleaned up when they happen. Plastics should not be discarded into the ocean or any other body of water.

### product stewardship

NatureWorks LLC has a fundamental duty to all that make and use our products and for the environment in which we live. This duty is the basis for our Product Stewardship philosophy, by which we assess the health and environmental information on our products and their intended use, then take appropriate steps to protect the environment and health of our employees and the public. If you would like more assistance with the health and safety of our products please contact your NatureWorks representative.

### Ingeo Worldwide Offices

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



[www.ingeofibers.com](http://www.ingeofibers.com)

### Contact

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

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15305 Minnetonka Blvd., Minnetonka MN 55345  
GSFIB027090305V2

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