COTTON: ENGINEERED TO INSULATE

Cotton fabrics can be uniquely engineered to increase loft and trap air, significantly improving the overall insulating capacity of cotton. Designed for active and outdoor markets, insulating cotton fabrics naturally protect against wind and provide thermal regulation while maintaining comfort. Coupled with topical finishes, coatings or laminated layers, these fabrics can be further enhanced to offer complete moisture management and water-repellent protection, keeping you dry and warm.
Consumers’ expectations for performance in activewear extend beyond moisture management and odor resistance. Thermal regulation tops the list of properties that consumers are now demanding to enhance their performance. Cotton fabrics can be naturally-engineered or technologically-enhanced to offer all of these properties and more to consumers for their active and outdoor apparel.
Two unique fabric constructions can be engineered to offer consumers insulating properties of thermal and wind resistance in cotton.

**Single knit jacquard blister**
**Double knit spacer**

**MAXIMUM WARMTH**
INCREASED LOFT CREATES WARM MICROCLIMATE

**SUPERIOR COMFORT**
SOFT HAND AND STRETCH

**EASY CARE**
MACHINE WASHABLE AND WASHES CLEAN

**UNIQUELY CONSTRUCTED**
ENGINEERED WITHOUT FUNCTIONAL FINISHING

**ADVANCED PERFORMANCE**
ENHANCED THROUGH FUNCTIONAL FINISHING TO OFFER ADDITIONAL PROTECTION
WHAT MAKES COTTON INSULATING?

Wind RESISTANCE

Air permeability is defined as the amount of air that flows through a fabric, and is a good indicator of a fabric's wind resistance. When a fabric is air permeable in cold conditions, the warm air is exchanged for cold air, lowering the temperature inside the clothing. The lower the value, the less air will penetrate the garment, keeping you warmer.

Thermal RESISTANCE

Thermal resistance is the resistance to heat transfer, keeping the heat within the microclimate between the fabric and the base layer or skin. Thermal resistance (RCF value) can be measured by the sweating guarded hotplate. The higher the RCF, the more resistant to heat transfer and the more insulating.
The technical construction of the single knit jacquard blister creates performance attributes that are beneficial in cold and windy conditions. The technical structure consists of a flat and tightly knitted outer surface and an insulated interior with rippled peaks and valleys.

**Wind Resistance**

The tightly constructed outer layer reduces the amount of air that can permeate the fabric, creating a high resistance to wind.

**Thermal Resistance**

The large amount of surface area created by the numerous folds and grooves trap air and give high resistance to heat transfer.
Significantly less air is able to penetrate the tightly knit outer layer of the jacquard blister compared to competitive fleece outerwear in the market, providing insulation and wind resistance.

The lower the CFM value, the less air will penetrate the garment, keeping you warmer.
Folds and grooves in the fabric construction prevent heat transfer and deliver superior thermal resistance, keeping you warmer in cold conditions compared to competitive fleece in the market.
SINGLE KNIT

SK-1983-3
compact ruffle knit
96% cotton/4% spandex
17.8 oz/yd²

SK-1983-4
wavy ruffle knit
96% cotton/4% spandex
24.7 oz/yd²

SK-1983-2
compact ruffle knit
96% cotton/4% spandex
24.3 oz/yd²

SK-1983-5
wavy ruffle knit
96% cotton/4% spandex
16.6 oz/yd²

SK-1983-4P
discharged wavy ruffle knit
96% cotton/4% spandex
16.3 oz/yd²
Double knit spacer fabrics, made from cotton, nylon and spandex, are intended for mid and outer layer garments. Two lightweight fabrics are produced by plating cotton and spandex to create a dense, stretch fabric. These two fabrics are tacked together by monofilament nylon creating a soft, sponge-like, insulating fabric for the activewear market.

Wind RESISTANCE
The tightly constructed cotton/spandex outer layer serves as a barrier to wind and other elements. The inner most layer of this fabric is the same construction that helps shield the elements and keep in the warmth.

Thermal RESISTANCE
The monofilament that tacks together the outer and inner fabrics serves as an insulating layer creating a warm microclimate that reduces heat transfer and maintains body temperature.
Double Knit Spacer
Air permeability (cfm)

The two layers of the spacer fabric insulate the body and maintain warmth in extreme conditions by providing up to five times more wind resistance than synthetic fleece.

- Leading Brand Technical Fleece: 207 cfm
  - 100% polyester
  - 7.0 oz/yd²

- Leading Brand Technical Fleece: 70 cfm
  - 64% cotton/36% polyester
  - 9.1 oz/yd²

- Double knit spacer: 83 cfm
  - 63% cotton/23% nylon/14% spandex
  - 8.2 oz/yd²

- Double knit spacer: 36 cfm
  - 74% cotton/16% nylon/10% spandex
  - 10.7 oz/yd²

The lower the CFM value, the less air will penetrate the garment, keeping you warmer.
Double Knit Spacer
Thermal Resistance (RCF)

The unique fabric construction creates and protects the microclimate around your body, delivering thermal resistance and warmth.

<table>
<thead>
<tr>
<th>Material</th>
<th>Thermal Resistance (RCF)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leading Brand Technical Fleece</td>
<td>0.064</td>
</tr>
<tr>
<td>100% polyester 7.0 oz/yd²</td>
<td></td>
</tr>
<tr>
<td>Leading Brand Technical Fleece</td>
<td>0.056</td>
</tr>
<tr>
<td>64% cotton/36% polyester 9.1 oz/yd²</td>
<td></td>
</tr>
<tr>
<td>Double knit spacer</td>
<td>0.050</td>
</tr>
<tr>
<td>63% cotton/23% nylon/14% spandex 8.2 oz/yd²</td>
<td></td>
</tr>
<tr>
<td>Double knit spacer</td>
<td>0.051</td>
</tr>
<tr>
<td>74% cotton/16% nylon/10% spandex 10.7 oz/yd²</td>
<td></td>
</tr>
</tbody>
</table>

The higher the RCF, the more resistant to heat transfer and the more insulating.
DOUBLE KNIT SPACER

DK 2728-13
74% cotton/16% nylon/10% spandex
10.7 oz/yd²

DK 2728-12
67% cotton/21% cylon/12% spandex
9.9 oz/yd²

DK 2728-16W
63% cotton/23% nylon/14% spandex
9.5 oz/yd²

DK 2728-16A
63% cotton/23% nylon/14% spandex
8.2 oz/yd²

DK 2747-1PS
80% cotton/12% polyester/8% spandex
10 oz/yd²
Insulating cotton fabrics naturally deliver maximum warmth and comfort during outdoor activities. These unique constructions for mid and outer layer garments offer maximum flexibility in layering and protection against cold conditions.

Single knit jacquard blisters and double knit spacer fabrics can be further enhanced to deliver superior moisture management and water repellency with the addition of Cotton Incorporated performance technologies.

To request samples of insulating fabrics or other engineered constructions, please contact your Cotton Incorporated Executive Account Manager.