Moisture Management in Thermal Fabrics

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Importance of Thermal Fabrics

Thermal fabrics are used for both work and sporting wear and an ineffective thermal fabric can lead to serious injury or harm to the wearer. From authors first-hand experience in working with Snowsports, it seems to be no agreed-upon way to best care for thermal products. Snowsports garments lacked proper care instructions except for mentioning to keep washing of thermals to a minimum, even though people prefer to wash them after each use. Consequently, frequent washing might reduce the effectiveness against colds, resulting in injury. Additionally, at the time of purchase, the language about the garment’s level of thermal resistance is typically very vague.

Overall Moisture Management Capacity

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<td>OMMC</td>
<td>0.2</td>
<td>0.4</td>
<td>0.6</td>
<td>0.8</td>
<td>&gt;0.8</td>
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<td>Results</td>
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<td>❑ Both washed and unwashed wool fabrics represented good overall moisture management capacity (OMMC), results were ranging between 0.4-0.6.</td>
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<td>❑ The polyester represented better OMMC (fair to poor) than the cotton fabrics (poor).</td>
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<td>❑ For all fabrics, the unwashed represented better OMMC. It is because after the wash the yarns come close to each other and the porosity of fabric typically reduced.</td>
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Conclusion and Implication

While cotton saw the least amount of moisture management loss after the 10 washes, wool has the actual best moisture management proving the primary hypothesis. The result indicated that when making a purchase decision, selecting wool would be a good decision.

Further Research

The thermal clothing sector of the fashion industry is massive but also shows a high price from consumers. As winters become more extreme from climate change, thermals will likely only become more of a growth industry. Further research is warranted for the empirical scale of thermal effectiveness measuring length and maximum temperature of efficacy. Currently on websites and packaging language about the efficacy and ideal temperature range is very vague, makes purchasing the correct level of thermal insulation difficult for consumers.

Thermal Fabric Market

When purchasing a thermal product people are looking for the best way to keep themselves warm, comfortable and safe in freezing and below freezing temperatures and while warmth is very important in these people forget about the importance of being dry. The quickest way to frostbite is getting wet in freezing temperatures. Ski Wear and Thermal clothing has a worldwide market share of USD 1.2 billion in 2020 and is expected to grow to 1.4 billion by 2026.

Top manufacturers for Thermal Products

1. Komar Brands (US)
2. Subzero Technology (UK)
3. Gildan Activewear (Canada)
4. L.L Bean (US)
5. Rothco (Ireland)

Hypotheses

It is expected that wool will have the best results due to its natural thermal insulation and wicking properties. Wool depicts natural resistance to wrinkles and inner moisture allows for flame resistance. Wool also mixes well with spandex/Lycra® fibers which are commonly found in thermal wear, allowing a garment to have the greatest longevity and stretchability.

Measuring Moisture Management in Thermals

There were differences in construction, the cotton and wool were both stitched, while the polyester was a twill. Once the samples were washed under a normal warm water setting 10 times and tumbled dried once complete. The initial observations were a slight change of hand after laundering and therefore softened the fabrics. Next, moisture management tests were conducted to both washed and unwashed samples.

Results

- Moisture Management (AATCC 195)
- Colorfastness to laundering (AATCC 61)
- Stretchability.