A small book about the cold. And about staying warm.

From Woolpower AB, who produces warm socks, base layers and mid layers from Ullfrotté Original, the company's proprietary terry loop knit, fine Merino wool material.

Made in Sweden since 1972.
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Keep warm.

We have all experienced being cold. No matter if you live, like we do, in cold Sweden or if you live further south, with the right knowledge and the right clothing you can keep warmer.

We at Woolpower AB in Östersund, Sweden, have a long and extensive experience with cold weather, cold winters and, most importantly, with how best to dress to stay warm when it’s cold.

We want to share our knowledge and our experiences about how the body works when it is cold, and the best ways to stay comfortably warm.

Warm Regards from us at Woolpower AB.
Winter and cold weather.

It is cold in Sweden. We Swedes have a long relationship with and a deep understanding of cold weather, since we live in such a cold climate. Most of the year the temperature outside is significantly lower than it is indoors. Sweden is a long, narrow country, 1570 km (976 miles) from top to bottom, with dramatic weather and climate variations.

The earth's temperature varies greatly. The average temperature on earth is 15 °C (59 °F). The lowest temperature ever recorded was −89.2 °C (−128.6 °F), seen at Russia’s Vostok Station in Antarctica in 1983. The equivalent record for Sweden, −52.6 °C (−62.7 °F), was noted in Vuoggatjålme in Lapland in 1966.

Winter, in meteorological terms, is the season when the average 24-hour temperature consistently stays below 0 °C (32 °F).

Wind chill. Wind increases the chilling effect of cold temperatures. Wind literally blows away the warm air layer closest to the body. The body then reacts by reheating the now-cold air closest to it. If this process is repeated too many times, the body becomes dangerously chilled.

At a temperature of −10 °C (14 °F) and winds of 8 m/s (18 mph), the wind chill on bare skin will equal a temperature of −27 °C (−17 °F) with no wind. The additional wind produced while snowmobiling, alpine skiing and other outdoor activities increases the wind chill effect.

Wind-chill table. In the table below you can see the wind-chill effect at different wind speeds and temperatures.

<table>
<thead>
<tr>
<th>Wind speed (m/s)</th>
<th>Air temperature (°C)</th>
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<tbody>
<tr>
<td>0</td>
<td>0</td>
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<tr>
<td>2</td>
<td>−1</td>
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<tr>
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<td>25</td>
<td>−20</td>
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... The effect of the cold on humans has been a hot topic throughout the history of mankind. Hippocrates reasoned that a cold climate would make people cold and lethargic. Both Aristotle and Vitruvius claimed just the opposite, that the chill encloses the “inner fluids” of the body, thus causing people in cold climates to be exceptionally hot and energetic.
The body in cold weather.

27 °C (80 °F) is ideal. Man is a tropical animal who has adapted over thousands of years to be comfortable without clothing at 27 °C (80 °F). At this temperature, the body works optimally, and maintains a steady internal temperature of 37 °C (98.6 °F).

In order for our bodies to work properly, we need to provide energy in the form of food and water. This enables our hearts to pump, our muscles to work, and our brains to function. Approximately 70% of that energy is needed to maintain a constant core temperature.

Body heat is created by burning food, such as fat, carbohydrates and protein. Heat is produced mainly in the muscles, and increases the more work the muscles do. In a cold environment, the body needs external help to maintain its temperature. We have to add extra energy by drinking and eating more, we need to dress right, and we need to keep active in order to avoid getting cold.

At rest, our bodies’ normal heat production is roughly 80 to 100 Watts – the equivalent output of a normal light bulb. During intense physical work, the body can put out 1000 Watts.

When the body gets cold it tries to create heat by shivering. The body can increase its own heat production 4-5 times by shivering. The body also decreases blood flow to the hands and feet in order to prioritize heat to the heart, brain and other vital organs, which is why you first feel cold in your hands and feet even though the rest of your body feels warm.

To perspire is a normal reaction when the body is too hot and needs to cool down the skin. The skin cools because the moisture – sweat – evaporates. This functions very well in a hot climate, but in cold weather, when you are wearing lots of clothes, heavy sweating can prove disastrous when the moisture will actually make you colder.

0.5 to 1 liter of fluid evaporates from the skin every day. During hard work, the evaporation can reach several liters per hour.

Hypothermia, the state when an organism’s temperature drops below that required for normal metabolism and bodily functions, starts occurring at 35 °C (95 °F), just a couple of degrees off of the body’s normal temperature.
Clothing as an insulator.

**Clothes don’t provide heat.** But they do allow you to retain the warmth that you produce. Think about how you dress: small details make a big difference when the weather is harsh and your energy level is dropping.

Clothes should insulate and support the body’s temperature balance. At the same time that our clothing should help to retain heat that the body produces, it should also transport excess moisture and heat that the body does not need.

**Dress in layers.** An efficient way of dressing in a cold climate is to use layers. This provides a versatile and flexible system that not only protects against cold, wind and wetness, but is also easy to ventilate or modify if you get too hot. The layering principle is divided into four main layers.

**Layer 1.** A heat-insulating and moisture transporting base layer next to the skin. It is imperative to wick moisture away from the skin, since water conducts heat 25 times more efficiently than air. A base layer in synthetic fibers or wool is superior to cotton, which absorbs moisture and dries poorly.

**Layer 2.** A mid-layer that adds extra insulation, and thus retains body heat. The purpose of the second layer is to create an insulating layer of air. In cold weather or if the activity level is low, a thicker layer is needed. The more air in the clothes, the better the insulation.

**Layer 3.** A wind and water repellent shell that protects against external cooling and retains the warmth created between layers 1 and 3. Modern shell garments release some moisture through their material. During high activity levels, the garments should allow ventilation at the neck, the cuff or at other dedicated openings to increase the release of warm, moist air.

**Layer 4.** Windproof, high loft down or synthetic-filled garments that are easy to put on over the shell layer. These should be worn during break times or when making camp. Keep this layer easily accessible so that the important breaks do not become shivering adventures.

...Women are often colder than men. This is because, in general, men have greater muscle mass, which gives them better blood circulation and creates more body heat.
Keep the warmth in – let the moisture out.

The purpose of clothing is to retain the heat that the body produces. The body produces heat all the time, for better or for worse. This is a natural process, and it happens in five ways:

**CONVECTION:** Air is heated when it is in contact with the skin. Warm air, which is lighter than cold air, rises up and away from the body. Wind or wind chill increases convection.

*HOT TIP:* Use windproof shell garments. Use a hood and balaclava to protect your face and head. Take breaks out of the wind. Dress appropriately for higher wind conditions.

**RADIATION:** Heat in the form of infrared radiation is released as waves directly from the skin to surrounding colder surfaces.

*HOT TIP:* Insulate with warming materials that trap air and retain heat nearest the body.

**CONDUCTION:** Heat is conducted by material that is in contact with the skin. Metals or cold water conduct heat very rapidly.

*HOT TIP:* Use a “sit pad” and put insulating soles in your boots or shoes to help prevent heat conduction. Do not wear jewelry, watches or any other metals in direct contact with your skin.

**EVAPORATION:** Body heat is transferred with perspiration on the surface of the skin, and moves away from the body. Wet skin loses heat many times faster than dry skin.

*HOT TIP:* Keep dry. Avoid getting sweaty by adapting your clothes to the degree of your physical activities. Use a moisture wicking base layer that absorbs and transports moisture away from the skin.

**RESPIRATION:** Energy is lost when cold air is inhaled and heated in the respiratory passages before reaching your lungs.

*HOT TIP:* Breathing through your nose helps protect your lungs, since the air has more time to warm up before entering the lungs themselves.
Warm feet.

**Use your head.** The layering principle not only applies to the body in general, but also to the feet, hands and head. A head without a hat works like a chimney, funneling a large amount of the body’s heat away. If your feet are cold – put on a hat.

**Cold feet.** When a body gets cold, blood flow to arms, legs and feet is reduced in order to maintain both the heat level in and the blood flow to the head and vital organs.

Many problems with the feet are related to a lack of ventilation. Shoes made with excessively impermeable materials, and socks with high synthetic fiber content prevent the foot’s perspiration from evaporating. The foot first gets damp, and then cold. A foot produces about 6 cl (2 oz) of water every day. During vigorous activities this quantity is multiplied. Change your socks often.

Winter shoes and boots should be large enough so that you can add an extra sock to absorb the moisture and keep your feet warm. But avoid feeling cramped and don’t tighten your boots too much, as blood circulation may be hindered and your feet will get cold quickly.
Wool – nature’s own technical material.

Wool is nature’s own technical material, and so far no one has succeeded in producing a synthetic fiber with the unique characteristics of wool.

**Wool usually comes from sheep.** Other types of wool used include camel wool, mohair from the Angora goat, alpaca wool from the Alpaca, cashmere from the Cashmere goat and angora from the Angora rabbit.

For 2.5 million years there have been sheep in Europe and Asia. Before the Ice Age, sheep were as big as oxen. Sheep were tamed by man around 9000 BC in Southeast Asia, and they were the first domestic animals to provide their keepers with food and clothing. Wool is considered our oldest textile material and has been used to make clothes for 10000 years. Wool has been an important commodity, and has signified prosperity and power well into the 19th century.

**Merino sheep.** Today there are about a billion sheep all around the world, divided into more than 200 breeds. The largest producing regions are in Australia, New Zealand and South America, and the most common breeds are Lincoln and Merino. Merino sheep produce exceptionally fine and crimpy wool.

Merino sheep have their origins in North Africa, and probably came to Spain at the end of the 12th century. The trade in this soft and fine wool was significant for Spain, a country which controlled the wool market for centuries, and which for a long time banned the export of Merino sheep. The breed was named Merino in the 15th century after the royal sheep inspectors ‘los Merinos’.

**Optimal insulation.** The wool fiber’s crimped structure traps large quantities of air and provides good heat insulation. Air between the fibers reduces the heat conduction within the material, and therefore has an insulating effect against both heat and cold.

Merino wool can have up to 40 crimps per centimeter, which provides a high degree of insulation. The crimps in the fibers also mean that there are fewer contact points between the material and the skin, another benefit when it comes to trapping air.

**Wool warms even when moist.** During increased activity level or temperature, the body generates perspiration to cool down, thereby raising the moisture level. Wool is hygroscopic, or able to absorb moisture from the air, and so can absorb moisture vapor from the body.
Wool can absorb both between the fibers and inside of them, so it feels dry against the skin even when moist. Wool fibers can absorb up to 30% of their dry weight without feeling damp.

Wool also creates warmth when moist. When moisture is absorbed, it is an exothermic process – so-called “absorption heat. Heat energy is released when water molecules and the fiber’s molecule groups, which have the opposite polarity, collide. The force of the collision is so intense that heat is created. The process continues until the fiber is saturated with water molecules.

**Wool wicks away moisture.** When humidity is higher inside the wool garment than outside, the wool works hard to absorb the moisture and transport it through the material until a balance is reached. Since moisture is transported to the outside of the garment, heat insulation increases and you stay dry.

**Wool is easy to care for and self-cleaning.** Wool is self-cleaning and does not smell. The creatine in the wool naturally breaks down bad smelling bacteria from the skin.

The core of the wool fiber consists of two types of cells that absorb different quantities of moisture. As a result, one type swells more than the other and they move in constant friction. This gives the wool fiber a mechanical, self-cleaning effect.

Moisture on the surface of a textile promotes the growth of bacteria, but the outside of the wool fiber stays relatively dry. The surface of the fiber is water repellent, which prevents bacteria growth and its consequent bad smell.

Wool garments do not need frequent washing, but rather can be aired out in humid weather with good results. The water vapor passing through the garment will remove soil particles and odors.

**Treated wool can be machine washed.** The surface of the wool fiber is covered with small scales and as a result wool clothes can felt when washed. The scales can be eliminated with treatment and the wool material is then machine washable.

**The fineness of the wool fiber is defined in microns.** The number of microns, i.e., the measurement of the wool fiber in thousandths of a millimeter, is used to indicate quality. Fine wool is between 17 and 23 microns. When wool is perceived as itchy, the reason is that there are coarse fibers in the wool, which do not yield to the skin but rather stick in. The finer the fibers, the softer the feel of the textiles. Coarse fibers in excess of 28 microns may itch.
Ullfrotté Original – the Material.

Ullfrotté Original is the material developed by Woolpower AB in Östersund in the early 1970’s in collaboration with the Swedish military, scientists, doctors and survival experts. The textile is highly wear resistant and consists of fine Merino wool, polyamide/polyester and air. Ullfrotté Original is 80% air.

The material is knit so that one side is smooth, and the other has terry loops. The lofty terry loops, in combination with the crimp in the wool fibers, creates a knitwear capable of trapping a lot of air. Up to 80% of the material actually consists of air, which means that the material has an excellent capacity to trap body heat. The more air you can keep still around the body, the more heat you can retain.

Air does not to any large extent transport heat away from the body, but textiles do. Ullfrotté Original’s lofty knit has few contact points with the body, which reduces the number of points where body heat can be wicked away.

The permeable Ullfrotté Original material easily lets moisture escape from the body. As you become hot and you perspire, vapor pressure builds up inside your clothes. The moisture molecules strive to get outside where the air is colder and the pressure lower. If the material is loose and the fibers have the right properties, they will help transport moisture away from the body.

The soft terry knit surface of Ullfrotté Original can easily be worn on warm skin to maximize body heat retention, while simultaneously helping to wick perspiration away from the skin. Ullfrotté Original retains body heat, even when wet.

Merino wool from Argentinean Patagonia. Merino wool is known as a very fine, soft and crimpy wool and is perfect for garments worn next to the skin. The wool used in Ullfrotté Original is 22 microns, meaning that the thickness of the wool fibers is 22 thousandths of a millimeter. This results in comfortable wool that is also strong.

The material is hardwearing. Wool is a material with excellent properties but its wear resistance is not optimal. In order to add maximum wear resistance to the material, the wool has been mixed with one third synthetic fibers. The majority of the Merino wool is closest to the body while the polyester is placed on the outside for the greatest wear resistance.
**Hardly any seams.** Ullfrotté Original is knitted on specially designed machines where everything from the size of the terry loops to the density of the stitch is carefully tested. Each garment part is knitted on circular knitting machines and comes out in tubular shape, completely free of seams that can both abrade and break.

**Washing.** Wool is to some extent self-cleaning and does not retain odor even after long periods of use. This means that you will not have to clean your garments made of Ullfrotté Original that often.

Ullfrotté Original garments can be machine washed at 60 °C (140 °F) and tumble-dried at medium heat. Humid conditions promote bacteria growth and certain soil bacteria will not die until the clothes are washed at 60 °C (140 °F).

When washing wool garments you can use either a mild soap-based detergent or none at all. The garments should be tumble-dried or dried flat for best results. The garments will contract a little, but are form fitting and will adjust themselves to your body quite comfortably.

**Wool is hard to ignite** and only catches fire at very high temperature. Wool is based on protein, which in itself is a fire deterrent, and its vapor trapping properties also contribute to its flame resistance. Once wool catches fire, the flame is not fed, but the fibers are charred and the fire dies.

Since Ullfrotté Original consists mainly of wool, it is not a very flammable material, in contrast to purely synthetic products. This is why Ullfrotté Original is used not only by outdoor enthusiasts, but also by professionals like firemen, welders and smiths to add protection against heat and burn injuries.

**A special FR collection is available,** made from a special blend of Ullfrotté Original material to provide extra flame protection. Aramid fibers have been added to the wool yarn, further emphasizing the ability to resist heat and fire. These products are marked FR (Flame Resistant) and are CE certified in accordance with standards for this type of protective clothing.

**Ullfrotté Original is certified by Öko-Tex.** Öko-Tex is an international human-ecology label that shows that the garments contain no toxic or harmful substances.
A Swedish corporation.

Woolpower AB was founded in Östersund in 1969 to produce nylon stockings. In the early 1970s, Ullfrotté Original was developed in collaboration with the Swedish military. The first Ullfrotté garments were produced in 1972.

Woolpower AB is fully committed to the production of warm base layers, socks and insulating garments. The company employs about 50 people and the entire production, from yarn to the finished garments, takes place in Östersund, in the mountainous region of Sweden.

Approximately 70% of the sales are exported to about 30 countries around the world. Among the customers are sports- and outdoor enthusiasts, various country’s defense and police forces and other professionals who do not enjoy being cold.

Woolpower AB is owned by Gränsfors Bruks Moderbolag, a family-owned firm consisting of a group of small manufacturing companies. The products manufactured include crowbars, axes and protective clothes for forestry workers.
Made in Sweden.

100% made in Sweden. All Woolpower products are manufactured by Woolpower AB in Östersund, from yarn to the finished product. Ever since the start of production in 1972, the entire manufacturing process has taken place in Östersund. The wool used in the garments is fine Merino wool from Merino sheep in Argentinean Patagonia. The wool is spun and dyed at a spinning mill in Germany.

All the machines are specially designed. Circular knitting machines are used to make the sleeves, the legs and the body. The advantage of this technology is that it allows garments made to be worn next to the skin to have minimal seams, resulting in a form-fitting and very comfortable fit. For the best possible fit and comfort, each garment part and size is knitted on individual knitting machines of different needle-bed diameters.

After producing the garment pieces, the material is washed and tumble-dried, not in order to clean it, but rather to shrink and stabilize the material. Washing is done in water only without the use of detergents.

After washing and drying, the material is shaped on metal frames and tenters using heat and steam. This ensures that the garments will be smooth and have the right shape. The shaped pieces are then cut so that all the garment parts will match.

Each seamstress signs her garments. The cut pieces are sewn together and each garment is sewn by a single seamstress. The seamstress checks and is responsible for each garment she makes and finishes by adding her personal label.

Random checks are made regularly to verify that the garments follow the size and quality standards. The Woolpower production facility in Östersund has earned both ISO 9001 and ISO 14001 certifications for quality and environmental management, respectively.
The Woolpower Collection.

All Woolpower garments are part of a system. Woolpower AB has developed a comprehensive collection of garments for the entire body, all of which can be combined differently depending on the temperature and form of activity.

The material, Ullfrotté Original, is produced in varying thickness for different functions and benefits. The thickness of the material is measured in grams per square meter and comes in 200, 400, 600 and 800 g/m².

Garments in five colors. Woolpower garments are available in five colors, although some garments are produced in only a selection of these colors.

A special Woolpower Color Collection with select color combinations on certain garments are also introduced each season. In addition, Woolpower KIDS has other color combinations.

<table>
<thead>
<tr>
<th>SIZE GUIDE (cm / inches)</th>
<th>XXS</th>
<th>XS</th>
<th>S</th>
<th>M</th>
<th>L</th>
<th>XL</th>
<th>XXL</th>
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</thead>
<tbody>
<tr>
<td>Chest (cm)</td>
<td>76-82</td>
<td>82-90</td>
<td>90-98</td>
<td>98-106</td>
<td>106-114</td>
<td>114-122</td>
<td>122-130</td>
<td>130-138</td>
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<tr>
<td>Waist (cm)</td>
<td>58-66</td>
<td>66-74</td>
<td>74-82</td>
<td>82-90</td>
<td>90-100</td>
<td>100-110</td>
<td>110-120</td>
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<td>Hips (cm)</td>
<td>82-90</td>
<td>90-98</td>
<td>98-106</td>
<td>106-114</td>
<td>114-122</td>
<td>122-130</td>
<td>130-138</td>
<td>138-146</td>
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<tr>
<td>Inseam (cm)</td>
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<td>70-78</td>
<td>72-80</td>
<td>74-82</td>
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<td>78-86</td>
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<td>35-39”</td>
<td>39-42”</td>
<td>42-45”</td>
<td>45-48”</td>
<td>48-51”</td>
<td>51-54”</td>
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<tr>
<td>Waist (inches)</td>
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<td>26-29”</td>
<td>29-32”</td>
<td>32-35”</td>
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<td>Inseam (inches)</td>
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<td>29-32”</td>
<td>30-33”</td>
<td>31-34”</td>
<td>31-35”</td>
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Socks.

The terry-loop knit material provides excellent insulation, and warms even when it is moist, something that is especially important for your feet. The socks absorb and then transport moisture away from the skin without losing their heat-retaining ability. Woolpower socks are available in five different thicknesses: A thin liner weight, 200, 400, 600 and 800 g/m². The socks can be combined in different ways depending on temperature and activity.

LINERS
The liner is a thin sock to be worn closest to the foot. It absorbs moisture from the foot and transports it to the next layer while at the same time preventing blisters. The liner sock can be used in combination with a thicker sock when it is cold, or as a thin sock for any occasion. It is simply a regular, comfortable sock.

SHOE LINER 8401
LINER CLASSIC 8411
LINER KNEE-HIGH 8481

200 G/M²
Our thinnest terry-loop knit socks are designed to be worn next to the skin in order to insulate. These can be combined with thicker socks, as well. The material will keep the feet comfortably warm while simultaneously transporting moisture. These socks work well in the summer.

SOCKS 200 8412
SOCKS KNEE-HIGH 200 8482

400 G/M²
A thicker sock that offers more insulation when worn over a liner sock. It absorbs and transports moisture that comes from the liner. It also works well as a base layer sock when double socks are not needed.

SOCKS 400 8414
SOCKS LOGO 400 8424
SOCKS KNEE-HIGH 400 8484

600-800 G/M²
A thicker sock that offers substantially more insulation when worn over a liner sock. It is especially effective in lower temperatures, and it makes a comfortable sock indoors or in your tent when you have cold feet.

SOCKS 600 8416
SOCKS KNEE-HIGH 600 8486
SOCKS BRUSHED 600 8456
SOCKS 800 8418
Next to skin 200 g/m²

The thinner undergarments are designed to be worn directly against the skin as a moisture wicking base layer. They work best when worn closest to the body, since the material keeps the body warm, while at the same time helping to transport perspiration. The thinnest undergarments are ideal at temperatures ranging from +10 °C (50 °F) down to -20 °C (-4 °F), depending on activity.

The Merino wool/polyamide fabric has a smooth outer surface and terry loops on the inside.

60% Merino wool, 25% Polyester, 13% Polyamide, 2% Elastan.

**TEE 200**
7102

**CREWNECK 200**
7112
Circular knit long-sleeved shirt with no lengthwise seams. Extended back to prevent gaps. Sewn-in sleeve cuffs.

**ZIP CREWNECK 200**
7122
ZIP TURTLENECK 200
7222

LONG JOHNS 200 (WITH OR WITHOUT FLY)
6342 / 7342
Circular knit pant with no lengthwise seams. Sewn-in rear gusset for maximum comfort. Sewn-in cuffs and elastic.

ONE PIECE SUIT 200
7382
One piece suit with crew neck. Circular knit with no lengthwise seams in body and arms. Two-way zipper. Sewn-in sleeve cuffs
Mid Layer 400-600 g/m²

These thicker garments are used as intermediate layers to increase heat insulation between the base layer and the wind and water resistant outer layer. The mid-layer garments are usually used at lower temperatures and lower activity levels.

400: 70% Merino wool, 28% Polyamide, 2% Elastane
600: 70% Merino wool, 30% Polyamide

ZIP TURTLENECK 400
7224
Long-sleeved mock turtleneck shirt with short zipper for ventilation. Circular knit with no lengthwise seams. Extended back to prevent gaps.

FULL ZIP JACKET 400
7234
Full front zip jacket with high, double-thickness collar and cuffs with thumb holes. Extended back to prevent gaps. Knitted Woolpower logo on neck (except on green garments)

VEST 400
7244
Full front zip vest with high, double-thickness collar. Straight lower hem. Knitted Woolpower logo on neck (except on green garments) and Woolpower embroidered logo on chest.
**LONG JOHNS 400 (WITH OR WITHOUT FLY)**
6344 / 7344
Circular knit pant with no lengthwise seams. Sewn-in rear gusset for maximum comfort. Sewn-in cuffs and elastic.

**ONE PIECE SUIT 400**
7384
One piece suit with high, double-thickness collar. Circular knit with no lengthwise seams in body. Two-way zipper. Knitted Woolpower logo on neck

**FULL ZIP JACKET 600**
7236
Extra insulating full front zip jacket with high, double-thickness collar and cuffs with thumb holes. Extended back to prevent gaps. Knitted Woolpower logo on neck (except on green garments)
Accessories.

In order to maintain the body’s heat balance it is important to keep hands and head warm.

200: 60% Merino wool, 25% Polyester, 15% Polyamide
400: 70% Merino wool, 30% Polyamide

**BELLY WARMER 400**
9512
Belly warmer for pregnant women. Elastic upper edge and no lengthwise seams.

**CAP 400**
9624
Hat with double layered terry knit Ullfrotté Original for optimal insulation.

**HELMET CAP 400**
9644
Snug fitting helmet liner for extra warmth.

**BALACLAVA 200**
9652
Balaclava with opening for eyes and nose as well as good protection for throat and neck.

**BALACLAVA 400**
9654
Balaclava with opening for eyes and nose. Extended neck.

**MITTENS 400**
9754
Mitten with double layered terry knit Ullfrotté Original for optimal insulation. Excellent liner in a shell mitten.
Woolpower FR.

Some Woolpower mid-layer garments are produced with Aramid fibers added to the wool, further augmenting the capacity to withstand heat and flames. The flame resistant products are marked FR (Flame Resistant) and are CE marked.

These products comply with the European norms for personal protection equipment in cold work: EN 532 for protection against cold (thermal lining) and EN 531 for protection against heat and flame.

Mid Layers: 70% Merino wool, 16% Polyamide, 12% Aramid, 2% Elastane
Socks and Balaclava: 70% Merino wool, 18% Polyamide, 12% Aramid

FR ZIP TURTLENECK 400 7264
FR FULL ZIP JACKET 400 7274
FR LONG JOHNS 400 7364
FR LONG JOHNS WITH FLY 400 6364
FR ONE PIECE SUIT 400 7394
FR SOCKS 400 8464
FR SOCKS 600 8466
FR SOCKS KNEE-HIGH 600 8496
FR BALACLAVA 400 9664
Woolpower KIDS.

Woolpower garments are available for children in sizes 98–140 centilong (ca 3-10 years). The KIDS collection is available in an expanded number of color combinations.

200: 60% Merino Wool, 25% Polyester, 13% Polyamide, 2% Elastane. 400: 70% Merino Wool, 28% Polyamide, 2% Elastane.

Children often combine high activity levels with quiet play, so they put high demands on their clothing. Their clothes should be comfortable to wear, stretchy, wear resistant and easy to put on and take off.

**KIDS CREWNECK 200**

3112
Circular knit long-sleeved shirt with no lengthwise seams. Extended back to prevent gaps. Sewn-in sleeve cuffs.

**KIDS LONG JOHNS 200**

3342
Circular knit pant with no lengthwise seams. Sewn-in rear gusset for maximum comfort. Sewn-in cuffs and elastic.

**KIDS VEST 400**

3244
Full front zip vest with high, double-thickness collar. Straight lower hem. Embroidered Woolpower Lamb logo on chest.

**KIDS MOCK TURTLENECK 200**

3632
Mock-turtleneck gaiter makes a fine complement to the crew neck shirt for comfortable warmth around the neck and throat. Extends to chest and back.

**KIDS BALACLAVA 200**

3652
Balaclava with opening for eyes and nose. Extended neck.

**KIDS SOCKS**
Three variations of socks to be combined as needed.

**KIDS SOCKS 200** 8412
**KIDS SOCKS LOGO 400** 8424
**KIDS SOCKS BRUSHED** 8456
## SIZE GUIDE KIDS

<table>
<thead>
<tr>
<th></th>
<th>3-4 years</th>
<th>5-6</th>
<th>7-8</th>
<th>9-10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Centilong</td>
<td>98/104</td>
<td>110/116</td>
<td>122/128</td>
<td>134/140</td>
</tr>
<tr>
<td>Inches</td>
<td>38–41”</td>
<td>43–46”</td>
<td>48–51”</td>
<td>53–56”</td>
</tr>
</tbody>
</table>
Tests and Reviews.

Woolpower has been tested in various situations with excellent results. Here are some examples:

Test at cold work sites / SINTEF – Norway 1996
Institute Textile de France - France 1997
Norwegian Marines – SINTEF – Norway 1998
American Forestry Workers / SINTEF – USA 1998
TNO Institute of Industrial Technology – Holland 1999
Work protection Germany - Germany 2000
Arbetslivsinstitutet, Insulation test (CLO) – Sweden 2000
W.L. Gore for GORE-TEX®-shoes – Great Britain 2001
IFP Research AB, Material analysis – Sweden 2001
Labor Scientific Institute Ekaterinenburg – Siberia 2002
Thelma, Rescue suites Westfjord – Norway 2004
Material analysis TVO – Holland 2004
Research station Svalbard – Norway 2005
Material analysis in conjunction with military order, Textile & leather lab. – Sweden 2006
Material analysis Swerea IVF – Sweden 2009

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Fotografer:
Mimbild, Gösta Fries, Anna Boetto, Johanna Moberg and Jörgen Reimer.

Production:
A small book about the cold. And about staying warm.

From Woolpower AB, who produces warm socks, base layers and mid layers from Ullfrotté Original, the company’s proprietary terry loop knit, fine Merino wool material. Made in Sweden since 1972.