

## **The Bare Facts about Wind Chill**

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Most Albertans have experienced the stinging bite of wind chill. It might close our schools, make us rethink that ski trip, delay construction and cause us to bundle up. But what is wind chill and why is it so dangerous?

Windy, winter days seem much colder than calm ones even when those days are the same temperature. This effect is called wind chill factor. Wind chill speeds up the rate that your body loses heat.

Everyone has a thin thermal layer, known as the boundary layer, surrounding their body, acting as an insulator. When it is windy, your body tends to feel cooler as the wind blows away this insulating layer. If you stand in front of a fan on a hot day, you feel cooler, even though the room temperature hasn't changed. The same happens when it is cold outside - the wind makes your body feel cooler as it loses heat and the surface of your skin becomes closer to that of the temperature of the air.

Wind chill compares the temperature of how your skin would feel on a calm day. If the temperature outside is  $-20^{\circ}\text{C}$  and the wind chill is measured at  $-30$ , this means exposed skin will feel as cold as it would on a day with no wind chill with the temperature at  $-30^{\circ}\text{C}$ . Our body also uses energy to try and warm up the boundary layer, making us feel even colder.

This is why it is even more important to dress appropriately when cold temperatures are accompanied by wind chill. It is easier for your body to keep your boundary layer warm when it has the help of properly insulated boots and clothing and the majority of exposed skin is covered.

Environment Canada estimates that the average person's skin begins to freeze at a wind chill of  $-25$ , and freezes in minutes at  $-35$ .

The wind chill index represents how your skin feels, so it is not actually a measurement of real temperature and is expressed without the degree sign, but with reference to the Celsius scale. In the US, wind chill is expressed with the Fahrenheit scale.

In recent years, Canadian scientists have been instrumental in how we measure wind chill. It wasn't until the late 1930s that two Antarctic explorers came up with complex formulas and calculations to determine a way of measuring wind chill. Recognizing the importance in relaying the wind chill index to the general public living in colder areas, these original measurement methods were adopted by the US National Weather Service.

In 2001, Canadian and American scientists worked together to come up with a more consistent and accurate way to measure and understand wind chill. The new wind chill index is expressed in units of temperature, something that all of us can easier relate to.

Prior, it was measured in less common units, expressed in a three or four digit number of kilocalories/hour per square metre or Watts per square metre, making the index hard to understand and relate to for the average person.

Even after the adoption of this improved index, there is still debate as to the method of calculation. Some scientists disagree as to whether the index should be based on whole body cooling (naked or clothed), or if it should be based on localized cooling of exposed skin.

While the debate may continue amongst scientists, few of us would disagree that the new wind chill index is easier to understand. The impact of this understanding helps us plan our winter activities, determine if our children go out for recess and how many layers to don when we go outside.

If you are interested in the equations used to calculate wind chill, check out [http://www.msc-smc.ec.gc.ca/education/windchill/science\\_equations\\_e.cfm](http://www.msc-smc.ec.gc.ca/education/windchill/science_equations_e.cfm) found on Environment Canada's website.

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