ICEBIKE

Home of the Winter Cyclist

And Other Crazy People.

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Wind-Chill Chart

Fahrenheit	Centigrade
40	4
35	2
30	-1
25	-4
20	-7
15	-9
10	-12
5	-15
0	-18
-5	-21
-10	-23
-15	-26
-20	-29
-25	-32
-30	-34
-35	-37
-40	-40

New wind chill chart

Frostbite occurs in 15 minutes or less

Temperature (°F)

Wind (MPH)	30	25	20	15	10	5	0	-5	-10	-15	-10	-25
5	25	19	13	7	1	-5	-11	-16	-22	-28	-34	-40
10	21	15	9	3	-4	-10	-16	-22	-28	-35	-41	-47
15	19	13	6	0	-7	-13	-19	-26	-32	-39	-45	-51
20	17	11	4	-2	-9	-15	-22	-29	-35	-42	-48	-55
25	16	9	3	-4	-11	-17	-24	-31	-37	-44	-51	-58
30	15	8	1	-5	-12	-19	-26	-33	-39	-46	-53	-60
35	14	7	0	-7	-14	-21	-27	-34	-41	-48	-55	-62
40	13	6	-1	-8	-15	-22	-29	-36	-43	-50	-57	-64
45	12	5	-2	-9	-16	-23	-30	-37	-44	-51	-58	-65
50	12	4	-3	-10	-17	-24	-31	-38	-45	-52	-60	-67
55	11	4	-3	-11	-18	-25	-32	-39	-46	-54	-61	-68
60	10	3	-4	-11	-19	-26	-33	-40	-48	-55	-62	-69

Explanation

Note that bike speed into still air is the same as wind speed. Cyclists are often moving at 15mph even on very cold days. A quick glance at the chart indicates that you loose heat at a rate that seems much colder than the outside temperature.

While cycling in 40 degree still air, at 15 mph, it will feel like 23 degrees, or 9 degrees below freezing. Does this mean you could get frostbite at 40? No. But you will cool down at the same rate that you would if it really were 23 degrees, you will never get colder than it really is.

The wind-chill temperature is a measure of relative discomfort due to combined cold and wind. It was developed by Siple and Passel (1941)and is based on physiological studies of the rate of heat loss for various combinations of ambient temperature and

wind speed. The wind-chill temperature equals the actual air temperature when the wind speed is 4 mph or less. At higher wind speeds, the wind-chill temperature is lower than the air temperature and measures the increased cold stress and discomfort associated with wind.

The formula the U.S. National Weather Service uses to compute wind chill is:

T(wc) = 0.0817(3.71V**0.5 + 5.81 -0.25V)(T - 91.4) + 91.4

T(wc) is the wind chill, V is in the wind speed in statute miles per hour and T is the temperature in degrees Fahrenheit.

The formula to calculate a Celsius wind chill using V as the wind speed in kilometers per hour and T in degrees Celsius is:

T(wc) = 0.045(5.27V**0.5 + 10.45 - 0.28V) (T - 33) + 33

The effects of wind-chill depend strongly on the amount of clothing and other protection worn as well as on age, health, and body characteristics. Wind-chill temperatures near or below 0 F indicate that there is a risk of frostbite or other injury to exposed flesh. The risk of hypothermia from being inadequately clothed also depends on the wind-chill temperature.

ICEBIKERS always have wind-chill to deal with.
Even on Calm days!

Second Opinion:

There are some doubts about the accuracy and usefulness of the wind-chill chart. First, the table seems to suggest that standing out in a 20 mph wind on a 40 degree day would yield a temperature of about 10 degrees below freezing. Clearly that's not the case. You can't get frost bitten unless the temperature is at or below freezing. Wind chill only measures how fast exposed flesh will lose heat, not how cold (that temperature) that flesh will chill to.

Wind-chill reports tend to exaggerate the actual rate at which you feel cold. The reports end up being discounted by most people who have experience in cold weather because it does

not tend to agree with personal experience.

The US weather service is thinking about revising the wind chill chart, perhaps by adopting the Canadian standard (below). That standard is still not accepted by the public, because its very difficult to judge the feeling of a watt per square meter. Consequently, most weather reports simply convert the official measurement to something easier to understand - back to the old wind chill chart.

There are several good resources on wind chill.   USA Today (of all places) had a fairly good write up on this subject.

More Technical

Windchill equivalent temperature (in Celsius)

Wind speed (km/h)	Temperature (Celsius)							
	0	-5	-10	-15	-20	-25	-30	-35
10	-2	-7	-12	-17	-22	-27	-32	-38
20	-7	-13	-19	-25	-31	-37	-43	-50
30	-11	-17	-24	-31	-37	-44	-50	-57
40	-13	-20	-27	-34	-41	-48	-55	-62
50	-15	-22	-29	-36	-44	-51	-58	-66
60	-16	-23	-31	-38	-45	-53	-60	-68

Windchill factor (in Watts per square metre)

Wind speed (km/h)	Temperature (Celsius)							
	0	-5	-10	-15	-20	-25	-30	-35
10	933	1075	1216	1358	1499	1641	1782	2009
20	1092	1257	1423	1588	1753	1919	2084	2248
30	1189	1369	1549	1729	1909	2089	2269	2449
40	1253	1443	1633	1823	2013	2202	2393	2583
50	1298	1494	1691	1887	2084	2280	2477	2673
60	1327	1529	1730	1931	2132	2334	2535	2736

The explanation of wind-chill above are **subjective measures of relative discomfort**. As such they are at best a guide, and can often lead to the misconception that you can get frost-bitten

if the temperature is above freezing but the wind chill is below freezing.

Environment Canada publishes the chart at right as the preferred method of measuring wins chill. This chart expresses wind-chill as a rate of heat loss, something that can be measured precisely rather than a perception.

The link to the Environment Canada page concerning wind chill is here. There you will be able to down load a PDF format fact sheet on wind chill.