



SAFE WORK



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WORKING IN THE COLD

Potential Hazard:

Working in cold temperatures can lead to cold related conditions such as frost bite and hypothermia. Several factors contribute to the risk of cold injury: temperature, wind speed, moisture (sweat or working near water), exposure duration, type of clothing, work/rest schedule, type of work performed, and other individual characteristics.

Frostbite is the actual freezing of tissue. Any exposed skin is vulnerable to frostbite when the air temperature is below zero or when wind speeds are high. Frostbite can lead to scarring, tissue damage, possible amputation and may cause permanent disability. Symptoms of frostbite vary from swelling of the skin accompanied by slight pain in mild cases to tissue damage without pain or with burning pain or prickling in severe cases. Frostbitten skin is subject to infection and therefore must not be treated lightly. Affected areas should be warmed slowly to normal temperatures. Medical attention should be received for severe cases.

Hypothermia occurs when the deep body or "core" temperature drops below 35°C. At this point the body loses its ability to prevent heat loss. The onset of hypothermia is a gradual process. Initially the victim has a sensation of cold, followed by pain. As exposure time or cold increase the sensation of pain is reduced and overall numbness develops. Additional symptoms include a decrease or absence of shivering, reduced memory and confusion, drowsiness, slurred speech, irritability, impaired coordination, dexterity and general muscular weakness. Hypothermia is a serious condition and can lead to coma and death if not treated quickly. Victims of mild hypothermia should be re-warmed in a warm bed or bath or with warming packs and blankets. Victims with severe hypothermia must receive immediate medical care from experienced medical personnel.

How to control the hazard:

To reduce the risk of frostbite and hypothermia, consider the following:

Clothing

It is the employer's responsibility to ensure that workers wear appropriate clothing. Clothing that matches heat loss to heat production is critical. Too much clothing can lead to sweating, and wet clothing causes greater heat loss and the chance of hypothermia. The solution is layered clothing with a windproof and waterproof outer shell. Table 2 (see reverse side) provides recommendations for protective clothing based on the wind chill (Table 1). These recommendations are based on the combination of temperature and wind speed, or wind chill. Since toes, fingers, ears and other parts of the face are at risk of frostbite, footwear, gloves/mittens and face protection must be selected to protect the worker and yet not make it impossible to perform the work

Warm-up Breaks

Workers who work for extended periods in cold environments should be provided with heated shelters and take regular warm-up periods. Warm-up breaks are required even when appropriate winter clothing is used. Table 3 (see reverse side) provides recommendations on the maximum amount of time workers should be allowed to work before taking a break to warm-up.

Individual Factors

Some individuals may be less able to withstand cold conditions than others. Factors such as age, physical health, acclimatization to cold (how used to cold conditions the person is), use of certain types of medication, etc. can all affect the amount of time that a person can work safely in cold temperatures. Be sure to take these factors into account.

Learn How to Recognize and Treat Symptoms of Cold Injury

See the sections on frostbite and hypothermia above.

(see over)

Workplace Safety and Health Division Contact Information:

Winnipeg: (204) 945-3446
Toll-Free: 1-866-888-8186 (Manitoba only)
24-Hour Emergency Line: (204) 945-0581

Publications/resources available at: www.safemanitoba.com



***TABLE 1 – Wind Chill Calculation Chart**

		Actual Temperature (°C)											
		5	0	-5	-10	-15	-20	-25	-30	-35	-40		
Wind Speed (in km/h)	5	4	-2	-7	-13	-19	-24	-30	-36	-41	-47		
	10	3	-3	-9	-15	-21	-27	-33	-39	-45	-51		
	15	2	-4	-11	-17	-23	-29	-35	-41	-48	-54		
	20	1	-5	-12	-18	-24	-30	-37	-43	-49	-56		
	25	1	-6	-12	-19	-25	-32	-38	-44	-51	-57		
	30	0	-6	-13	-20	-26	-33	-39	-46	-52	-59		
	35	0	-7	-14	-20	-27	-33	-40	-47	-53	-60		
	40	-1	-7	-14	-21	-27	-34	-41	-48	-54	-61		
	45	-1	-8	-15	-21	-28	-35	-42	-48	-55	-62		
	50	-1	-8	-15	-22	-29	-35	-42	-49	-56	-63		
	55	-2	-8	-15	-22	-29	-36	-43	-50	-57	-63		
60	-2	-9	-16	-23	-30	-36	-43	-50	-57	-64			
Risk Level		1		2		3		4		5		6	

***TABLE 2 – Clothing and Work Period Recommendations Based on Wind Chill**

Risk Level (Wind Chill)	Risk of Frostbite	Health Concern	What to Do
1 (0 to -9)	Low	- Slight increase in discomfort.	- Dress warmly, with the outside temperature in mind.
2 (-10 to -27)	Low	- Greater discomfort - Risk of hypothermia if outside for long periods without adequate protection.	- Dress in layers of warm clothing, with an outer layer that is wind-resistant. - Wear a hat, mittens, and scarf. - Keep active.
3 (-28 to -39)	Increasing risk: exposed skin can freeze in 10 to 30 minutes	- Check face and extremities (fingers, toes, ears and nose) for numbness or whiteness (frostbite). - Risk of hypothermia if outside for long periods without adequate protection.	- Dress in layers of warm clothing, with an outer layer that is wind resistant. - Cover exposed skin: wear a hat, mittens and a scarf, neck tube or face mask. - Keep active.
4 (-40 to -47)	High risk: exposed skin can freeze in 5 to 10 minutes	- Check face and extremities (fingers, toes, ears and nose) for numbness or whiteness (frost bite) - Risk of hypothermia if outside for long periods without adequate protection.	- Dress in layers of warm clothing, with an outer layer that is wind resistant. - Cover all exposed skin: wear a hat, mittens and a scarf, neck tube or face mask. - Keep active.
5 (-48 to -54)	High risk: exposed skin can freeze in 2 to 5 minutes	- Check face and extremities (fingers, toes, ears and nose) for numbness or whiteness (frost bite) - Serious risk of hypothermia if outside for long periods.	- Be careful. Dress very warmly in layers of clothing, with an outer layer that is wind resistant. - Cover all exposed skin: wear a hat, mittens and a scarf, neck tube or face mask. - Restrict outdoor work as much as possible. - Keep active.
6 (-55 and Colder)	High risk: exposed skin can freeze in less than 2 minutes	- Danger! Outdoor conditions are extremely hazardous. Severe risk of frostbite and hypothermia.	- Do not work outdoors.

*Source: Environment Canada

****Table 3 - Work/Warm-up Schedule for Four Hour Shifts and Moderate to Heavy Work Activity**

Air Temperature °C (Sunny Skies)	No Noticeable Wind		8 km/h Wind		16 km/h Wind		24 km/h Wind		32 km/h Wind	
	Max. Work Period	No of Breaks	Max. Work Period	No of Breaks	Max. Work Period	No of Breaks	Max. Work Period	No of Breaks	Max. Work Period	No of Breaks
-26 to -28	Normal	1	Normal	1	75 mins.	2	55 mins.	3	40 mins.	4
-29 to -31	Normal	1	75 mins.	2	55 mins.	3	40 mins.	4	30 mins.	5
-32 to -34	75 mins.	2	55 mins.	3	40 mins.	4	30 mins.	5	<i>Non – Emergency work should cease in the shaded region.</i>	
-35 to -37	55 mins.	3	40 mins.	4	30 mins.	5				
-38 to -39	40 mins.	4	30 mins.	5						
-40 to -42	30 mins.	5								
-43 and below										

This schedule applies to workers wearing dry clothing doing moderate-to-heavy work with breaks of 10 minutes in a warm location to allow workers to warm up. For light-to-moderate work (little physical movement), apply the schedule one step lower. For example, at -35 °C with no noticeable wind, a worker at a job with little physical movement should have a maximum work period of 40 minutes with 4 breaks in a 4-hour shift instead of 55 minute work periods and 3 breaks. After 4 hours, workers should be given an extended break in a warm place. ****Adapted from Saskatchewan Ministry of Advanced Education, Employment and Labour**

Reference to legal requirements under workplace safety and health legislation:

- General Workplace Requirements: Manitoba Regulation 217/2006 Part 4

Additional workplace safety and health information available at: www.safemanitoba.com

- ACGIH publication, *Threshold Limit Value for Chemical Substances and Physical Agents and Biological Indices*