

EXPOSURE TO THE COLD

November 6, 2013

FORWARD
TOGETHER



WHAT IS COLD STRESS

Cold stress is the transfer of body heat out to a colder environment

When you are exposed to a cold environment, most of your body's energy is used to keep your internal temperature warm

A cold environment forces the body to work harder to maintain its temperature



DID YOU KNOW..??



At -55 °C the skin will freeze in less than two minutes of being exposed

Cold stress is usually the result of being improperly prepared for changes in weather conditions and a lack of knowledge about exposure to the cold

It is important to remember that cold stress isn't just a result of working in extreme weather conditions

FACTORS THAT INFLUENCE HEAT LOSS

There are several factors that can influence how we gain and lose heat



- Air temperature
- Wind speed
- Humidity / moisture
- Direct contact with cold surfaces
- Physical activity
- Work / rest cycle

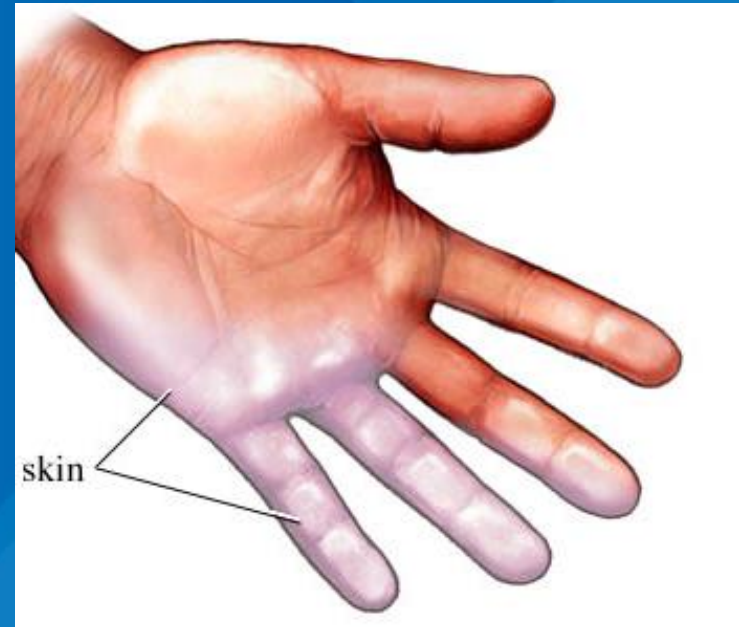


COLD INJURIES

- Exposure to the cold can be hazardous or even life-threatening
- Your body's extremities, such as the ears, nose, fingers and toes, lose heat the fastest
 - The more skin that is exposed to the air, the faster the body will lose heat because a greater surface area is exposed
 - Once the skin senses cold, the blood travels back to the body core to protect the major organs
- The three most common injuries that result from exposure to the cold are:
 - Frost nip
 - Frost bite
 - Hypothermia

FROST NIP

- Mildest form of an injury from exposure to the cold
- Occurs when only the top layer of skin freezes from exposure to the cold
 - Ear lobes, nose, cheeks, fingers or toes
- Skin appears to be white or yellow in colour
- Top layer of skin feels hard, but the deeper tissue still feels soft
- May experience painful tingling or burning sensation
- After the first signs of frost nip,
frost bite will develop within 60 seconds



FROST BITE

- More severe than frost nip
- The skin loses water and other tissue (fat / muscle / bone) is frozen in addition to the skin being frozen
- Skin appears white, waxy, and it feels hard to the touched
- Sensations in affected area; cold, stinging, tingling, or aching followed by numbness
- Most likely to occur in the extremities (toes / fingers / ears / nose / face)

OR

- Large areas of skin exposed to cold conditions

HYPOTHERMIA

- Occurs when body heat is lost faster than it can be produced
- Exposure to cold over a long period of time, without using adequate controls, may cause the core temperature of the body to drop below normal temperature (37 °C)
- Core body temperatures below 37 °C can cause serious damage to vital organs and if left untreated, may lead to death
- Signs of hypothermia include:
 - Shivering; the body's natural reaction to try and increase the core temperature
 - Confusion; unable to process information as quickly / loss of focus
 - Loss of muscle control; may find walking difficult / “drunken stagger”
 - Increased breathing rate;
- Having clothing against the body that is wet or damp will increase the rate at which hypothermia sets in
- It is critical to seek treatment immediately if you feel that you or one of coworkers are suffering from sign of hypothermia

TREATING COLD STRESS INJURIES

When dealing with cold injuries, follow these steps to ensure you do not cause more damage to your body:

- Notify your supervisor immediately if you think you may have signs of exposure to the cold
- Remove all wet / sweaty / damp clothing immediately
- Never rub or massage the area or apply direct heat
- Do not apply direct heat to the area because you may burn the skin
- Warm the area gradually with body heat or warm water
- Once the area is warm, DO NOT re-expose it to the cold
- Seek medical attention ASAP

PREVENTING COLD STRESS

Education —

Workers should be coached to recognize the signs of cold induced illnesses and injuries. Also, you should assess the environmental and worksite conditions that may lead to cold stress each day before beginning your work tasks



Working conditions —

Be sure to monitor the length of time you are exposed to cold conditions. Take micro breaks as needed to warm up and stay hydrated

Buddy system—

Communicate with your crew about how to recognize the signs of cold stress in others. Most times we can't identify the early signs ourselves, so watch out for your co-workers and others around you



Stretch and Flex —

When blood flow decreases, muscle function also decreases. This can cause muscle reaction time to become slower. Stretch and flex through the day to increase blood flow to the major muscle groups, and keep your body warm

PREVENTION CONT.

Layer your clothing —

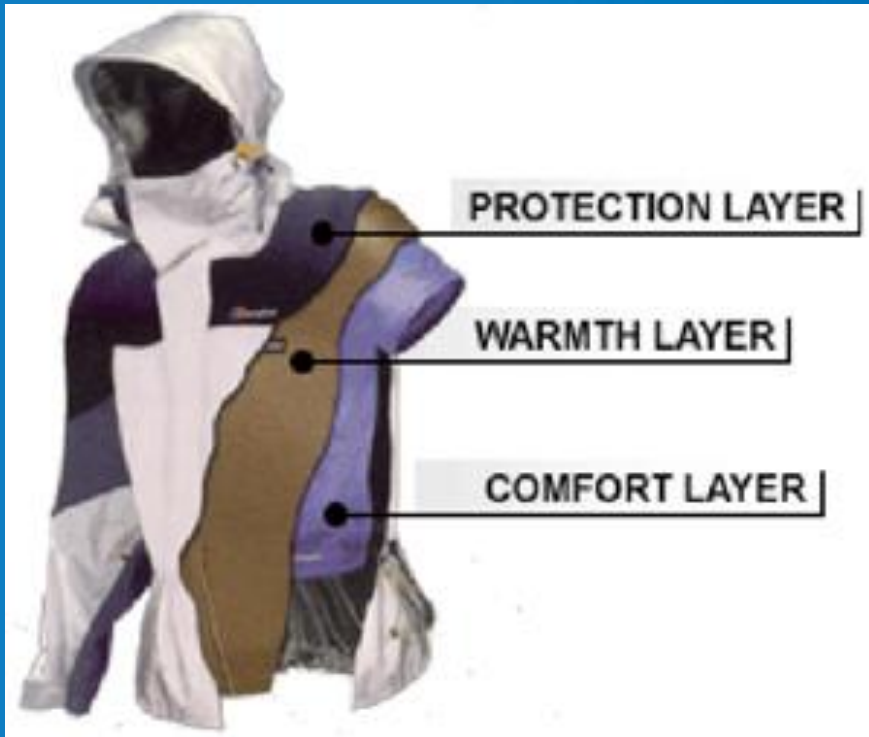
It is better to wear several thin layers of clothing instead of wearing fewer layers of thick clothing. Base layers are very important

Choose synthetic fabrics (rayon / polyester / acrylic) or wool as your base layer to absorb moisture. A middle layer could also be wool or synthetic to provide insulation

Choose fabrics made of waterproof and wind resistant material for your outer layer of clothing to create a barrier against the elements while allowing ventilation to prevent overheating

Cover your face and head with a balaclava or a toque. Up to 40% of heat can be lost when the head is left exposed

Keep a change of dry clothing available in case work clothes become wet



PERSONAL PROTECTIVE EQUIPMENT

In addition to layering your clothing, you must ensure that your PPE fits correctly over top of your winter wear

- CSA approved winter gloves
- Steel toed boots (rated for cold temperatures) with the appropriate traction aids
- CSA approved eyewear
- High visibility striping on your outermost layer



***Remember, if you choose to take layers off throughout the day, you **MUST** put your stripes back on

- Proper ear covering / toque / balaclava

Be sure to check with your supervisor with regards to any additional items you may need

WIND CHILL CHART

Actual Air Temperature T_{air} (°C)

	5	0	-5	-10	-15	-20	-25	-30	-35	-40	-45	-50
5	4	-2	-7	-13	-19	-24	-30	-36	-41	-47	-53	-58
10	3	-3	-9	-15	-21	-27	-33	-39	-45	-51	-57	-63
15	2	-4	-11	-17	-23	-29	-35	-41	-48	-54	-60	-66
20	1	-5	-12	-18	-24	-30	-37	-43	-49	-56	-62	-68
25	1	-6	-12	-19	-25	-32	-38	-44	-51	-57	-64	-70
30	0	-6	-13	-20	-26	-33	-39	-46	-52	-59	-65	-72
35	0	-7	-14	-20	-27	-33	-40	-47	-53	-60	-66	-73
40	-1	-7	-14	-21	-27	-34	-41	-48	-54	-61	-68	-74
45	-1	-8	-15	-21	-28	-35	-42	-48	-55	-62	-69	-75
50	-1	-8	-15	-22	-29	-35	-42	-49	-56	-63	-69	-76
55	-2	-8	-15	-22	-29	-36	-43	-50	-57	-63	-70	-77
60	-2	-9	-16	-23	-30	-36	-43	-50	-57	-64	-71	-78
65	-2	-9	-16	-23	-30	-37	-44	-51	-58	-65	-72	-79
70	-2	-9	-16	-23	-30	-37	-44	-51	-58	-65	-72	-80
75	-3	-10	-17	-24	-31	-38	-45	-52	-59	-66	-73	-80
80	-3	-10	-17	-24	-31	-38	-45	-52	-60	-67	-74	-81

Wind Speed V_{10m} (km/h)

Use a wind chill chart to determine the actual outdoor temperature when getting dressed for work in the morning

**Questions
Comments
Concerns**

**THINK SAFETY
WORK SAFELY**