

# IPS ITCS

Industrial Performance Services

Industrial Tubular Catalyst Services



## COLD WEATHER SAFETY/COLD STRESS PROCEDURE

V:2023.1

# Cold Weather Safety/Cold Stress Procedure

January 2023

## Purpose

To ensure employees are familiar with the signs and symptoms cold weather induced health problems (such as hypothermia, frostbite and trench foot), cold weather safety and cold stress while working on the job and the procedures in which IPS★ITCS will follow to ensure employee safety while working in cold weather conditions.

## Scope

A cold environment challenges the worker in three ways: by air temperature, air movement (wind speed), and humidity (wetness). In order to work safely, these challenges have to be counterbalanced by proper insulation (layered protective clothing), by physical activity and by controlled exposure to cold (work/rest schedule).

## Cold Stress

When you're cold, blood vessels in your skin, arms, and legs constrict, decreasing the blood flow to your extremities. This helps your critical organs stay warm, but your extremities are at risk for frostbite.

**Hypothermia** occurs when body heat is lost faster than it can be replaced. When the core body temperature drops below the normal 98.6°F to around 95°F, the onset of symptoms normally begins. The person may begin to shiver and stomp their feet in order to generate heat. Workers may lose coordination, have slurred speech, and fumble with items in the hand. The skin will likely be pale and cold.

**Frostbite** occurs when the skin actually freezes and loses water. In severe cases, amputation of the frostbitten area may be required. While frostbite usually occurs when the temperatures are 30° F or lower, wind chill factors can allow frostbite to occur in above freezing temperatures. Frostbite typically affects the extremities, particularly the feet and hands. The affected body part will be cold, tingling, stinging, or aching followed by numbness. Skin color turns red, then purple, then white, and is cold to the touch. There may be blisters in severe cases.

**Trench Foot** or immersion foot is caused by having feet immersed in cold water at temperatures above freezing for long periods of time. It is similar to frostbite but considered less severe. Symptoms usually consist of tingling, itching, or burning sensation. Blisters may be present.

**Wind chill** is essentially the air temperature that would feel the same on exposed human flesh as the given combination of air temperature and wind speed. It can be used as a general guideline for deciding clothing requirements and the possible health effects of cold.

**Wind chill** accelerates heat loss—sometimes to a dramatic extent. For example, when the air temperature is -22°F (-30°C),

- with no wind, there is little danger of skin freezing;
- with 10 mph (16 km/h) wind (a flag will be fully extended), your skin can freeze in about a minute; and
- with 20 mph (32 km/h) wind (capable of blowing snow), your skin can freeze in 30 seconds.

Use the chart below when estimating the combined cooling effect of wind and low air temperatures on exposed skin or when determining clothing insulation requirements to maintain the deep body core temperature.

		<b>WIND CHILL CHART</b>									
		Ambient Temperature (°C)									
		4	-1	-7	-12	-18	-23	-29	-34	-40	
Wind km/h	Velocity mph	Equivalent Chill Temperature (°C)									
<b>Calm</b>											
0	0	4	-1	-7	-12	-18	-23	-29	-34	-40	
8	5	3	-3	-9	-14	-21	-26	-32	-38	-44	
16	10	-2	-9	-16	-23	-30	-35	-43	-50	-57	
24	15	-6	-13	-20	-28	-36	-43	-50	-58	-65	
32	20	-8	-16	-23	-32	-39	-47	-55	-63	-71	
40	25	-9	-18	-26	-34	-42	-51	-59	-67	-76	
48	30	-16	-19	-22	-36	-44	-53	-62	-70	-78	
56	35	-11	-20	-29	-37	-46	-55	-63	-72	-81	
64	40	-12	-21	-29	-38	-47	-56	-65	-73	-82	

Adapted from: Threshold Limit Values (TLV™) and Biological Exposure Indices (BEI™) booklet; published by ACGIH, Cincinnati, Ohio

<b>Little danger</b> in less than one hour exposure of dry skin	<b>DANGER</b> – Exposed flesh freezes within one minute	<b>GREAT DANGER</b> – Flesh may freeze within 30 seconds
<b>Maximum danger</b> of false sense of security		

### Prevention - the adverse effects of cold

For continuous work in temperatures below the freezing point, heated warming shelters such as tents, cabins or rest rooms should be available. The work should be paced to avoid excessive sweating. If such work is necessary, proper rest periods in a warm area should be allowed and employees should change into dry clothes. New employees should be given enough time to get acclimatized to cold and protective clothing before assuming a full workload.

The risk of cold injury can be minimized by proper equipment design, safe work practices and appropriate clothing.

**Equipment Design:** For work below the freezing point, metal handles and bars should be covered by thermal insulating material. Also, machines and tools should be designed so that they can be operated without having to remove mittens or gloves.

Regularly used walkways and travel ways shall be sanded, salted, or cleared of snow and ice as soon as practicable.

**Surveillance and Monitoring:** Every workplace where the temperature may fall below 60°F (16°C) should be equipped with a suitable thermometer to monitor any further temperature changes. For colder workplaces with temperatures below the freezing point, the temperature should be monitored at least every 4 hours.

**Emergency Procedures:** Procedures for providing first aid and obtaining medical care should be clearly outlined. For each shift, at least one trained person should be assigned the responsibility of attending to emergencies.

**Education:** Workers and supervisors exposed to cold environments should receive initial and annual training regarding the health effects of cold exposure, proper rewarming procedures, recognition and first aid for frostbite and hypothermia, required protective clothing, proper use of warming shelters, the buddy system, vehicle breakdown procedures, and proper eating and drinking habits for working in the cold.

All employees should be informed of the dangers and destructive potential caused by unstable snow buildup, sharp icicles, and ice dams and know how to prevent accidents caused by them.

The following proper cold weather protection must be worn by employees when working in cold, wet, and windy conditions.

### Precautions to prevent cold stress

- Wear at least three layers of clothing. An inner layer of wool, silk or synthetic to wick moisture away from the body. A middle layer of wool or synthetic to provide insulation even when wet. An outer wind and rain protection layer that allows some ventilation to prevent overheating.

**Note:** Its always better to wear several layers of clothing rather than one thick layer.

**Note:** Except for the wicking layer do not wear tight clothing. Loose clothing allows better ventilation of heat away from the body.

- Wear a hat or hood.

**Note:** Up to 40% of body heat can be lost when the head is left exposed

- Wear gloves if the temperature is below 60°F (16°C) for sedentary work, below 40°F (4°C) for light work, and below 20°F (-7°C) for moderate work.
- Wear insulated boots or other footwear.
- Take warm, high-calorie drinks and food.
- If your clothing gets wet at 36°F (2°C) or less, change into dry clothes immediately to prevent hypothermia.

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

- If you feel hot, open your jacket but keep your hat and gloves on.
- Do not underestimate the wetting effects of perspiration. Oftentimes wicking and venting of the body's sweat and heat are more important than protecting from rain or snow.
- Give workers warm-up and rest breaks in a heated shelter. Ensure work is not conducted only within allowable exposure limits, as per company procedures.
- Workers should be under constant protective observation by a co-worker or supervisor

- Always implement a "Buddy System" to ensure that no employee is working alone in cold work environments.

Additional preventive measures include drinking plenty of liquids, avoiding caffeine and alcohol. It is easy to become dehydrated in cold weather. If possible, heavy work should be scheduled during the warmer parts of the day. Take breaks out of the cold. Try to work in pairs to keep an eye on each other and watch for signs of cold stress. Avoid fatigue since energy is needed to keep muscles warm. Take frequent breaks and consume warm, high calorie food such as pasta to maintain energy reserves

Regular inspections on cold weather supplies (e.g., hand warmers, jackets, shovels, etc.) should be carried out to ensure that supplies are always in stock.

### Health effects of exposure to cold

Cooling of body parts may result in various cold injuries - nonfreezing injuries, freezing injuries - and hypothermia which is the most serious. Nonfreezing cold injuries include chilblain, immersion foot and trench foot. Frostnip and frostbite are freezing injuries.

Toes, fingers, ears, and nose are at greatest risk because these areas do not have major muscles to produce heat. In addition, the body will preserve heat by favoring the internal organs and thus reducing the flow of blood to the extremities under cold conditions. Hands and feet tend to get cold more quickly than the torso because:

- they lose heat more rapidly since they have a higher surface area-to-volume ratio, and
- they are more likely to be in contact with colder surfaces than other parts of the body.

If the eyes are not protected with goggles in high wind chill conditions, the corneas of the eyes may freeze.

The most severe cold injury is hypothermia which occurs from excessive loss of body heat and the consequent lowering of the inner core temperature (internal temperature of the body). Hypothermia can be fatal.

### Examples of 'nonfreezing' cold injuries

**Chilblains** are a mild cold injury caused by prolonged and repeated exposure for several hours to air temperatures from above freezing (32°F or 0°C) to as high as about 60°F (16°C). In the affected skin area there will be redness, swelling, tingling, and pain.

**Immersion foot** occurs in individuals whose feet have been wet, but not freezing cold, for days or weeks. It can occur at temperatures up to 50°F (10°C). The primary injury is to nerve and muscle tissue. Symptoms include tingling and numbness; itching, pain, swelling of the legs, feet, or hands; or blisters may develop. The skin may be red initially and turn to blue or purple as the injury progresses. In severe cases, gangrene may develop.

**Trench foot** is "wet cold disease" resulting from prolonged exposure in a damp or wet environment from above the freezing point to about 50°F (10°C). Depending on the temperature, an onset of symptoms may range from several hours to many days, but the average is three days. Trench foot is more likely to occur at lower temperatures whereas an immersion foot is more likely to occur at higher temperatures and longer exposure times. A similar condition of the hands can occur if a person wears wet gloves for a prolonged period under cold conditions described above. Symptoms are similar to an immersion foot.

## Examples of 'freezing' injuries

**Frostnip** is the mildest form of a freezing cold injury. It occurs when ear lobes, noses, cheeks, fingers, or toes are exposed to the cold and the top layers of a skin freeze. The skin of the affected area turns white, and it may feel numb. The top layer of skin feels hard, but the deeper tissue still feels normal (soft).

Frostnip can be prevented by wearing warm clothing and footwear. It is treated by gentle rewarming (e.g., holding the affected tissue next to unaffected skin of the victim or of another person). As for all cold-induced injuries, never rub the affected parts - ice crystals in the tissue could cause damage if the skin is rubbed. Do not use very hot objects such as hot water bottles to rewarm the area or person.

**Frostbite** is a common injury caused by exposure to extreme cold or by contact with extremely cold objects (especially those made of metal). It may also occur in normal temperatures from contact with cooled or compressed gases. Frostbite occurs when tissue temperature falls below the freezing point (32°F/0°C), or when blood flow is obstructed. Blood vessels may be severely and permanently damaged, and blood circulation may stop in the affected tissue. In mild cases, the symptoms include inflammation of the skin in patches accompanied by slight pain. In severe cases, there could be tissue damage without pain, or there could be burning or prickling sensations resulting in blisters. Frostbitten skin is highly susceptible to infection, and gangrene (local death of soft tissues due to loss of blood supply) may develop.

### First aid can I do if someone has frostbite

First aid for frostbite, as well as immersion or trench foot, includes:

- Seek medical attention.
- If possible, move the victim to a warm area.
- Gently loosen or remove constricting clothing or jewelry that may restrict circulation.
- Loosely cover the affected area with a sterile dressing. Place some gauze between fingers and toes to absorb moisture and prevent them from sticking together.
- Quickly transport the victim to an emergency care facility.
- DO NOT attempt to rewarm the affected area on site (but do try to stop the area from becoming any colder) - without the proper facilities tissue that has been warmed may refreeze and cause more damage.
- DO NOT rub area or apply dry heat.
- DO NOT allow the victim to drink alcohol or smoke.

## The signs of hypothermia

<b>Mild Hypothermia</b>	37.2-36.1°C (99 - 97°F)	Normal, shivering may begin.
	36.1-35°C (97 - 95°F)	Cold sensation, goose bumps, unable to perform complex tasks with hands, shivering can be mild to severe, hands numb.

<b>Moderate Hypothermia</b>	35-33.9°C (95 - 93°F)	Shivering, intense, muscles incoordination becomes apparent, movements slow and labored, stumbling pace, mild confusion, may appear alert. Use sobriety test, if unable to walk a 9 meter (30 foot) straight line, the person is hypothermic.
	33.9-32.2°C (93 - 90°F)	Violent shivering persists, difficulty speaking, sluggish thinking, amnesia starts to appear, gross muscle movements sluggish, unable to use hands, stumbles frequently, difficulty speaking, signs of depression, withdrawn.

<b>Severe Hypothermia</b>	32.2-30°C (90 - 86°F)	Shivering stops, exposed skin blue or puffy, muscle coordination very poor, inability to walk, confusion, incoherent/irrational behavior, but may be able to maintain posture and appearance of awareness
	30-27.8°C (86 - 82°F)	Muscle rigidity, semiconscious, stupor, loss of awareness of others, pulse and respiration rate decrease, possible heart fibrillation.
	27.8-25.6°C (82 - 78°F)	Unconscious, a heartbeat and respiration erratic, a pulse may not be obvious.
	25.6-23.9°C (78 - 75°F)	Pulmonary edema, cardiac and respiratory failure, death. Death may occur before this temperature is reached.

When your core temperature drops, you're at risk for hypothermia. Early signs of hypothermia are shivering, blue lips and fingers, and poor coordination. Soon your breathing and heart rate slow down, and you become disoriented and confused. Hypothermia requires medical help.



## **First aid can I do for hypothermia**

All employees who are required to perform work in cold conditions should be knowledgeable on how to administer first aid treatment on cold induced injuries or illnesses.

Hypothermia is a medical emergency. At the first sign, find medical help immediately. The survival of the victim depends on their co-worker's ability to recognize the symptoms of hypothermia. The victim is generally not able to notice their own condition.

First aid for hypothermia includes the following steps:

- Seek medical help immediately. Hypothermia is a medical emergency.
- Ensure that wet clothing is removed.
- Place the victim between blankets (or towels, newspaper, etc.) so the body temperature can rise gradually. Body-to-body contact can help warm the victim's temperature slowly. Be sure to cover the person's head.
- Give warm, sweet (caffeine-free, nonalcoholic) drinks unless the victim is rapidly losing consciousness, unconscious, or convulsing.
- Quickly transport the victim to an emergency medical facility.
- Do not attempt to rewarm the victim on a site (e.g., do not use hot water bottles or electric blankets).
- Perform CPR (cardiopulmonary resuscitation) if the victim stops breathing. Continue to provide CPR until medical aid is available. The body slows when it is very cold and, in some cases, hypothermia victims that have appeared "dead" have been successfully resuscitated.



# Competency Assessment

No.	Questionnaire	C/NYC
Q1		
A1		
Q2		
A2		
Q3		
A3		
Q4		
A4		
Q5		
A5		

Enclosed Attachments	
Risk Assessment	<input checked="" type="checkbox"/>
Environmental Aspect and Impact	<input checked="" type="checkbox"/>
Training and Competency	<input checked="" type="checkbox"/>
Measure and Evaluation Tools	<input checked="" type="checkbox"/>

# Competency Checklist

To be filled out by Trainer and signed by Employee, Assessor and Supervisor before being returned to the HSEQT Manager for recording purposes.

Procedure	Competency	Date	Competent YES / NO	Employee Signature

(Please tick appropriate box)

This employee is competent in performing the job.


This employee has not attained the competency level.

\*

\* *If the employee has not attained all competency levels, the General Manager must assess the action to be taken, provide an extension of training or alternative action as listed below.*

Alternate action to be taken: \_\_\_\_\_

Signed By	Employee:	_____	Date:	_____
	Trainer:	_____	Date:	_____
	Assessor:	_____	Date:	_____
	Regional Manager:	_____	Date:	_____

# Environmental Aspects and Impacts

## Identified Environmental Aspects and Impacts

The following table is a summary of the likely environmental aspects and impacts that may be identified during site inspections. The significance of each impact needs to be assessed using the Risk Assessment Model.

Activity	Aspect	Impact
<b>Purchasing &amp; Administrative Work</b>	Consumption of goods	Conservation of natural resources
	Consumption of energy (eg. Electrical equipment and facilities)	Release of greenhouse gases and atmospheric pollution; Consumption of natural resources; Habitat loss
	Generation of waste (eg. Paper)	Consumption of space for waste disposal; Habitat loss
<b>Climate Control</b>	Consumption of energy	Release of greenhouse gases and atmospheric pollution; Consumption of natural resources; Habitat loss
	Generation of noise	Disturbance to community; Habitat loss
<b>Cleaning of – offices / vehicles</b>	Storage, use and release of chemicals	Contamination of air, water or soil; Risk to human health
<b>Transport (Fleet vehicles / staff travel)</b>	Consumption of energy	Release of greenhouse gases and atmospheric pollution; Consumption of natural resources; Loss of habitat at all stages of generation; Light pollution
	Consumption of goods (eg. Oil)	Consumption of natural resources; Generation of waste; Habitat loss; Biodiversity impacts
	Generation of waste (eg. Oil)	Consumption of space for waste disposal; Potential contamination of water or soil; Habitat loss
	Exhaust emission	Release of greenhouse gases and atmospheric pollution
	Use of dangerous goods (eg. Batteries)	Potential contamination of air, water or soil; Risk to human health
	Generation of noise	Disturbance to community; Habitat degradation
<b>Operations</b>		

Sample only.  
To be filled in

# Risk Assessment

Risk Assessment // insert name here

<p><b>Step No:</b> Logical sequence</p>	<p><b>Sequence of Basic Job Steps documented in the Procedure, Work Instruction and project plans. Break down Job into steps.</b></p> <p>Each step should be logical and accomplish a major task.</p>	<p><b>Potential Safety &amp; Environmental Hazards/Impacts at the site of the Job</b></p> <p>Identify the actual and potential health and safety hazards and the environmental impacts associated with each step of the job.</p>	<p><b>Risk Rating</b></p> <p>Refer to the risk matrix or HSEQT.PRO. Risk Mgt</p>	<p><b>Recommended Corrective Action or Procedure</b></p> <p><i>Determine the corrective actions necessary to reduce the risk to as low as reasonably practical (ALARP) refer to HSEQ.PRO.Risk Mgt. The risk must be reduced or controlled to ALARP before work commences.</i></p> <p>Document who is responsible for implementing the controls to manage each hazard identified.</p>	<p><b>Risk Rating</b> refer to the risk matrix or HSEQT.PRO.Risk Mgt</p>
1.					
2.					
3.					
4.					
5.					

# Audit



<b>Process:</b> insert// <b>Procedure:</b> Insert //		Date:		Audited by:	
		Location of Audit:		Area Mgr/Supervisor:	
Item	Question	Evidence Sited	Comments		Conformance Score 0,3,5
1.					
2.					
3.					
4.					
5.					
6.					
7.					
AUDITOR'S SIGNATURE:		CONFORMANCE SCORE:     / 25		0 – Non-Conformance	
SAFETY REP'S SIGNATURE:		CONFORMANCE %:		3 – Continuous Improvement Opportunity	
				5 – Total Conformance	