

Extreme Temperature Procedure (formerly Heat Stress)

Approved by: Academic Coordinating Committee

Authorizer: Director, Safety and Security

Reference Code: OSP-024 / O5 V2

Effective Date: 6/26/2014

PROCEDURE STATEMENT:

The purpose of this procedure is to establish guidelines to ensure safe working conditions in extreme temperature conditions, both hot and cold, and reduce the potential risk of heat or cold induced illness during periods of hot, humid or cold weather.

SCOPE:

This procedure applies to all affected workers, contractors and sub-contractors who are identified as being exposed to extreme temperature conditions during the hot weather season of May 1st to September 30th when a heat or humidex trigger activates this procedure, and the cold weather season of October 1st to April 30th, and is based on acclimatized workers.

DEFINITIONS:

a) Heat Stress

The net heat load to which a worker may be exposed from the combined contribution of metabolic heat, the thermal environment and clothing requirements.

b) Heat Strain

The overall physiological response of the body resulting from heat stress.

c) Signs and Symptoms of Heat Stress

Heat Rash	Red bumpy rash with severe itching
Fainting	Sudden fainting after at least two hours of work, cool moist skin, weak pulse
Heat Cramps	Involuntary muscle spasms
Heat Exhaustion	Feeling faint, nausea, ashen appearance, hot red dry skin, low grade fever
Heat Stroke	Rapid heartbeat, shallow breathing, confusion, cessation of sweating, unconsciousness

d) Thermal Hygrometer

An instrument that measures air temperature and humidity.

e) Heat or Humidex Trigger

Conditions that activate this procedure as follows:

- Humidex reaches or exceeds 35°C
- Environment Canada advisory when air temperature exceeds 30°C and Humidex exceeds 40°C
- Heat waves of three or more days of temperature exceeding 32°C
- Ministry of Environment advisory of Smog Alert

f) Hypothermia

A condition in which the body's core temperature drops below that required for normal metabolism and body functions. This is generally considered to be 35°C.

g) Signs and Symptoms of Hypothermia

Stage	Core Temperature	Signs and Symptoms
Mild Hypothermia	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.
Moderate Hypothermia	35 – 33.9°C (95 – 93°F)	Shivering, intense, muscle 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.

Stage	Core Temperature	Signs and Symptoms
Severe Hypothermia	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)	Unconsciousness, 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.

h) Frostbite

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 (0°C/32°F), 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.

i) Frostnip

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 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 foot wear. 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.

j) Wind Chill

The perceived decrease in air temperature felt by the body on exposed skin due to the flow of air.

RESPONSIBILITIES:

Managers and Supervisors

- a) Ensure awareness and understanding of this procedure by workers who may be affected.
- b) Recognize potential conditions and initiate this procedure.
- c) Inform workers exposed to extreme temperature conditions when a weather alert is issued.
- d) Monitor all workers for signs and symptoms of heat stress or cold exposure.
- e) Monitor workloads during periods of hot or cold weather and adjust the work schedules accordingly.
- f) Respond to all concerns addressed by workers and respond to all symptoms regardless of the humidex rating or wind chill.

Occupational Safety Office

- a) Ensure this procedure is reviewed annually.
- b) Provide extreme temperature awareness information for all affected workers, supervisors and management.
- c) Update and maintain all documents associated with this procedure.
- d) Communicate extreme temperature changes to supervisors and post alerts via Conestoga's digital message boards.
- e) Monitor and record temperature/humidity during extreme temperature events.
- f) Monitor procedure effectiveness and compliance with current legislation.

Joint Health and Safety Committee (JHSC)

- a) Assist the Occupational Safety Office and management to determine if conditions warrant implementation of this procedure.
- b) Participate in all training and understand the Committee's roles and responsibilities.
- c) Participate in procedure review.
- d) Ensure through workplace inspection that adequate supply of cool drinking water and comfort cooling areas are available prior to the hot season.

First Aid Reps

- a) Participate in training and be aware of the signs and symptoms of extreme temperature exposure and how to treat related illnesses.
- b) Understand this procedure in the event of an extreme temperature related illness.

Workers

- a) Participate in all training and know their responsibilities under the current legislation.
- b) Understand the signs and symptoms of heat stress or hypothermia and report all symptoms to their immediate Supervisor.
- c) Review Conestoga message boards and electronic mail during extreme temperature periods.
- d) Follow all guidelines and recommendations set out in this procedure.

PROCEDURE:

- a) The Heat Stress Awareness Guide issued by the Occupational Health and Safety Council of Ontario (OHSCO) in conjunction with the American Congress of Governmental Industrial Hygienists (ACGIH) Guidelines shall be used to determine the appropriate requirements and guidelines to prevent serious heat induced illness.
- b) The threshold limit values (TLV) and Biological Exposure Indices (BEI) published by ACGIH shall be adopted for working in cold weather conditions. These guidelines shall be used to determine the appropriate requirements to prevent serious cold induced illness
- c) The intent for this procedure is a heat humidex and cold wind chill based action plan. It makes provisions for measurements of temperature and relative humidity using regularly calibrated thermo hygrometers based on outdoor environmental triggers and wind chill values published by Environment Canada.
- d) The thermal hygrometer shall be calibrated annually prior to May 1st of each year and shall be kept in the Occupational Safety Office. Secondary calibration shall be done by co-locating them in a hot environment and recorded to ensure they are in proper working order.
- e) Through hazard assessments performed by the Occupational Safety Office, faculty, JHSC and managers, various areas at Conestoga have been identified with possible heat stress and cold temperature hazards. These areas require monitoring of temperature and humidex readings along with a control plan to ensure compliance with the applicable legislated standards.
- f) During hot and cold weather conditions, supervisors shall monitor weather and thermal conditions in the workplace when a heat and humidex trigger or cold weather warning is activated and any other time as needed. The Occupational Safety Office shall record temperature readings at least every two hours. Supervisors shall monitor worker symptoms and ensure compliance with this procedure.
- g) Hot weather readings shall be converted to humidex values off the Occupational Health Clinics for Ontario Workers (OHCOW) chart and appropriate actions taken based on those results (see Appendix A for chart values).
- h) Cold weather readings shall be converted to the wind chill values based on the chart published by ACGIH using temperature readings on site and published by Environment Canada (see Appendix B for chart values).
- i) Adjustments shall be made for clothing and radiant heat in the light work category based on acclimatized workers.

- j) Portable thermo hygrometers shall be stationed in affected areas and readings can be reviewed by any worker at any time. Temperature and humidity readings shall be taken by the Occupational Safety Office or designate every two hours during extreme weather conditions. These readings shall be posted on the message boards in the affected area.
- k) This procedure is based on light work, therefore, metabolic heat production and rest periods shall be in a cooler environment.
- l) The Occupational Safety Office shall review this procedure with the program coordinators and the JHSC, and any possibilities of engineering and/or administrative controls to reduce the chance of any extreme temperature related illness shall be implemented.
- m) Cooling and warm areas shall be available to workers on campus.
- n) Fans shall be available at various locations on campus.
- o) Some heavy work tasks shall be rescheduled to early morning or evening whenever possible.
- p) Other related workplace tasks may be used as heat or cold relief, provided it is communicated to the workers that they are on extreme temperature relief.
- q) Workers shall be encouraged to watch for and identify signs in themselves and others (encourage the use of buddy system).
- r) Workers shall be directed to take water at least hourly during hot and humid periods and specifically before beginning demanding tasks. Workers shall be encouraged to drink more water than thirst dictates.
- s) In extreme conditions it may be necessary to slow down the pace of work and have workers self-pace at a reasonable schedule.
- t) The responsibility for the implementation of this procedure shall rest on the management and supervision of Conestoga, but all workers shall adhere to the recommendations and follow the guidelines as set in this procedure. Any worker with a pre-existing medical condition that might make them susceptible to working in an extreme temperature environment shall notify their Supervisor and provide medical confirmation that such a condition exists. Conestoga as an employer shall investigate ways to accommodate susceptible worker limitations through engineering and/or administrative methods (e.g., assign lighter work or alter work/rest regime).
- u) If a worker experiences signs and symptoms of extreme temperature induced illness the first aid rep shall abide by the following:
 - For all heat related symptoms if the worker cools down, recovers and does not have an elevated pulse rate they may be able to return to work.

- Otherwise, the worker shall be taken to a clinic or hospital for medical assessment and/or treatment.
- For all cold weather exposure symptoms the worker shall be moved to a warm area, constricting clothing loosened, first aid administered and/ or medical attention sought.
- First aid reps shall complete the first aid form and record the signs and symptoms and assessment results on the forms.
- First aid reps shall report all instances of suspected extreme temperature induced illnesses to their Supervisor immediately.

Regardless of a worker’s protest, in the event that heat stroke is suspected, immediate measures to cool the victim shall start and 9-1-1 shall be called. The victim shall NOT be left unattended until his/her condition has been medically assessed.

REFERENCES:

[Occupational Health and Safety Act](#) – Section 25 (2) (h)

[Heat Stress Awareness Guide](#) – WSIB Ontario (OHSCO)

[Humidex Based Heat Response Plan](#) – OHCOW

ACGIH Guidelines, 2006 – Threshold Limit Values and Biological Exposure Indices

REVISION LOG:

Revision Date	Summary of Changes
July 13, 2010	New Procedure
August 26, 2010	Policies and Procedures Committee - Approved
September 8, 2010	Academic Coordinating Committee - Approved
July 10, 2012	Added signs and symptoms of heat stress and supplementary training sources
May 7, 2014	Procedure revised to include working in cold conditions and named changed from Heat Stress Procedure to Extreme Temperature Procedure
June 26, 2014	Academic Coordinating Committee - Approved

APPENDIX A

Humidex Heat Stress Response Plan

Humidex 1	Response	Humidex 2
25 – 29	Supply water to workers on an “as needed” basis	30 – 33
30 – 33	Post Heat Stress Alert notice; encourage workers to drink extra water; start recording hourly temperature and relative humidity	34 – 37
34 – 37	Post Heat Stress Warning notice; notify workers that they need to drink extra water; ensure workers are trained to recognize symptoms	38 – 41
38 – 39	Provide 15 minutes relief per hour; provide adequate cool (10 – 15°C) water; at least 1 cup (250 mL) of water every 20 minutes; workers with symptoms should seek medical attention	42 – 43
40 – 42	Provide 30 minutes relief per hour in addition to the provisions listed above	44 – 45
43 – 44	If feasible, provide 45 minutes relief per hour in addition to the provisions listed above	46 – 48
45 or over	Only medically supervised work can continue	49 or over

Humidex calculator: http://www.ohcow.on.ca/menuweb/heat_stress_calculator.htm

Humidex Heat Stress Response Plan

Temp (in oC)	Relative Humidity (in %)																							
	100%	95%	90%	85%	80%	75%	70%	65%	60%	55%	50%	45%	40%	35%	30%	25%	20%	15%	10%					
49																				50				
48	NEVER IGNORE ANYONE'S SYMPTOMS DESPITE YOUR MEASUREMENTS!!!																							
47	Moderate Unacclimatized & Heavy Acclimatized								Moderate Acclimatized & Light Unacclimatized															
46																								
45																								
44																								
43	45+								only medically supervised work								49+							
42	43-44								75% relief								46-48							
41	40-42								50% relief								44-45							
40	38-39								25% relief								42-43							
39	34-37								warning & double water								38-41							
38	30-33								alert & water								34-37							
37	25-29								water as needed								30-33							
36									50	49	47	45	44	42	40	39	37	35	34	33				
35									50	48	47	45	43	42	40	39	37	36	34	33				
34									49	48	46	45	43	42	40	39	37	36	34	33				
33									49	48	46	45	43	42	40	39	37	36	34	33				
32									50	49	48	46	45	44	42	41	40	39	37	36				
31	50	49	48	47	45	44	43	42	40	39	38	37	35	34	33	32	30	29	28	27				
30	48	47	46	44	43	42	41	40	39	37	36	35	34	33	31	30	29	28	27	26				
29	46	45	43	42	41	40	39	38	37	36	35	33	32	31	30	29	28	27	26	25				
28	43	42	41	40	39	38	37	36	35	34	33	32	31	30	29	28	27	26	25	24				
27	41	40	39	38	37	36	35	34	33	32	31	30	29	28	27	26	25							
26	39	38	37	36	35	34	33	33	32	31	30	29	28	27	26	25								
25	37	36	35	34	33	33	32	31	30	29	28	27	26	26	25									
24	35	34	33	33	32	31	30	29	28	28	27	26	25											
23	33	32	31	31	30	29	28	28	27	26	25													
22	31	30	30	29	28	27	27	26	25	25														
21	29	29	28	27	26	26	25																	

APPENDIX B

WIND CHILL CHART										
		Ambient Temperature (°C)								
		4	-1	-7	-12	-18	-23	-29	-34	-40
Wind km/h	Velocity mph	Equivalent Chill Temperature (°C)								
Calm										
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

Little danger in less than one hour exposure of dry skin

Maximum danger of false sense of security

DANGER – Exposed flesh freezes within one minute

GREAT DANGER – Flesh may freeze within 30 seconds