



Corporate Policy and Procedure

POLICY	Thermal Stress Policy (Heat and Cold)
CATEGORY	Corporate
AUTHORITY	All Departments
RELATED POLICES	Standard Operating Procedure; Job Safety Analysis Policy (JSA); Non-Routine Work Policy
APPROVED BY	Executive Team
EFFECTIVE DATE	January 1, 2020
REVISION DATE	January 1, 2021

Policy Statement

Guided by our corporate values, implementing a thermal stress program reduces the potential for heat and cold related illnesses or injuries.

Scope

This policy applies to all City of Guelph departments.

Purpose

The purpose of this program is to identify and manage risks associated with working in the heat or cold weather conditions for the City of Guelph.

Definitions

Cold Stress – The production of physiological effects due to cold temperatures and/or wind chill.

Equivalent Chill Temperature (ECT) – Also known as wind chill (See below).

Extreme Weather Conditions – For the purpose of this program refer to the charts at Appendix B and C and the areas marked “Non-emergency work should stop”

Frostbite – Freezing of tissue, resulting in tissue destruction.

Heat Stress - means the total net heat load on the body that result from exposure to external sources and from internal metabolic heat production as a result of work. Some examples of heat stress are sunburn, heat cramps, heat exhaustion and heat stroke.

Heat Exhaustion - Excessive fluid loss in hot environment. Symptoms are moist clammy skin, sweaty, weakness and dizziness.

Heat Stroke - Failure of body's heat regulating mechanism. Skin may be flushed or red in colour, hot to touch, lowered level of consciousness.

Hypothermia – Condition of reduced core body temperature to 35°C resulting in loss of dexterity, loss of mental alertness, collapse or possible death.

Wind Chill – The combined effect of air temperature and wind. Also expressed as "equivalent chill temperature" (ECT), wind chill is defined as heat loss resulting from the effects of air temperature and wind velocity upon exposed skin.

Roles and Responsibilities

Executive Team

- Ensure that service area leaders are aware of the need for, and importance of developing thermal stress plans in their areas of responsibility.

General Manager

- Ensure required thermal stress prevention plans are completed and communicated
- Ensure division managers are communicating the need for thermal stress plans for their areas.

Division Manager (where applicable)

- Ensure thermal stress plans are developed, implemented.
- Ensure all affected workers are trained on the hazards, health effects and prevention plans for thermal stress

Manager/Supervisor

- Ensure workers are trained on the signs, symptoms, treatment and precautions
- Ensure workers are trained on the content of this program.
- Ensure workers take the necessary precautions based on humidex/wind chill predictions and warnings
- Ensure risk assessments are conducted on specific work to determine if additional precautions are required.
- A safe work plan is developed for outdoor emergency work during extreme heat or cold conditions (refer to Appendix B)
- Ensure prompt reporting of incidents related to thermal stress.

Workers

- Participate in all required training
- Follow the plan to reduce thermal stress as appropriate
- Consult with their medical practitioner if they have any medical conditions that could be affected by thermal stresses.
- Notify their supervisor or the Occupational Nurse at ext. 2267 of any medical conditions or medication that could impact their ability to work in a hot or cold environment.
- Report to their supervisor or lead hand any symptoms of thermal related illness or concerns as soon as possible
- Seek appropriate treatment immediately

- Watch your coworkers for any signs or symptom of thermal related stress.

Joint Health & Safety Committee

- Participate in risk assessments and developing safe work plans as requested.

Health & Safety

- Communicate weekly of humidex/wind chill predictions for the upcoming week during peak periods'
- Notify workers of extreme weather warnings and recommended precautions.
- Provide training on thermal related illnesses and this program
- Assist in conducting hazard assessments on specific work
- Assist in developing safe work plans for emergency work in extreme weather conditions and provide information.

Procedure

1. The Health & Safety Department shall send out weekly notices to all workers of the humidex/wind chill predictions during extreme weather conditions and provide information on precautions to take.
2. Risk assessments shall be conducted on specific tasks and/or locations to determine contributing factors to potential thermal stress and identification of controls and precautions necessary to prevent thermal stress related illnesses.
3. Workers shall be trained in the hazards, health effects and prevention methods when dealing with thermal stress conditions.
4. A plan for monitoring thermal conditions for inside work shall be developed, implemented and communicated to all employees affected.
5. All reported incidents of thermal stress illness or injury shall be investigated.

Work Scheduling

- Where practical the work schedule shall be modified to accommodate work at a time when heat or cold stress is least likely to occur.
- Workers working in extreme weather conditions shall not work alone.
- The Buddy System shall be implemented to watch for signs of heat or cold related illnesses.
- Rotate tasks where possible so the same employees are not continually working in a hot or cold/wet environment.
- Additional scheduled rest breaks should be taken in heated or cooled buildings, trailers or in cases where neither are available, a heated or cooled vehicle.
 - **Note: Shorter (10 minutes) but frequent work/rest cycles are of the greatest benefit to the employee.**
- Extended lunch breaks in a cooled or warm environment after 4 hours in extreme weather conditions. See highlighted area on charts at Appendix B.
- Should a worker get wet in cold conditions, they shall change into dry clothes as soon as possible.

Personal Risk Factors for Heat or Cold Stress

There are some permanent or temporary conditions (e.g. age, weight, heart or lung conditions, diabetes, dehydration, fatigue, some medications, etc.) that can make a person more vulnerable to heat or cold stress related illnesses. Workers with medical

conditions may need medical advice about what accommodations would be right for them.

Acclimatization

The longer you work in the heat the more efficient your body becomes at keeping cool. If you are not used to working in the heat, it takes time to become “acclimatized” or accustomed. This can take a week to 10 days of gradual exposure to the heat. Acclimatization needs to be taken into account even after a three day weekend.

Acclimatization must be factored into the work plan when:

- An employee starts a new job
- An employee has been working in a moderate environment for a long duration and is assigned to work in a very hot environment
- When an employee returns from a prolonged absence (more than 9 days).

Training

All workers required to work in conditions that have the potential to cause heat or cold stress shall be trained on this program, signs and symptoms of thermal stress and preventive measure

Reference Documents

Occupational Health & Safety Act
ACGIH Cold Stress Guidelines
OHCOW – Heat Stress Guidelines

Appendices

- [Appendix A – Health Effects of Thermal Stress](#)
- [Appendix B – Guidelines for Additional Breaks](#)
- [Appendix C – Humidex Based Heat Response Plan](#)

Revision History

Document Owner	Issue / Revised Date	Reason For Changes
Health & Safety	November 2019	New Issue

Appendix A: Health Effects of Thermal Stress

Wind Chill Hazards

Wind Chill	Risk of Frostbite	Health Concern	What to do
0 to -9	Low Risk	<ul style="list-style-type: none"> Slight increase in discomfort 	<ul style="list-style-type: none"> Dress warmly, with the outside temperature in mind.
-10 to -27	Moderate Risk	<ul style="list-style-type: none"> Uncomfortable Risk of hypothermia, frostnip if outside for long periods without adequate protection 	<ul style="list-style-type: none"> Dress in layers of warm clothing, with an outer layer that is wind-resistant. Wear a hat, mittens or insulated gloves, a scarf and insulated, waterproof footwear. Stay dry. Keep active.
-28 to -39	High Risk exposed skin can freeze in 10 to 30 minutes	<ul style="list-style-type: none"> High risk of frostnip or frostbite: Check face and extremities (fingers, toes, ears and nose) for numbness or whiteness High risk of hypothermia if outside for long periods without adequate clothing or shelter from wind and cold. 	<ul style="list-style-type: none"> Dress in layers of warm clothing, with an outer layer that is wind-resistant. Cover exposed skin. Wear a hat, mittens or insulated gloves, a scarf, neck tube or face mask and insulated, waterproof footwear. Stay dry. Keep active.
-40 to -47	Very High Risk exposed skin can freeze in 5 to 10 minutes*	<ul style="list-style-type: none"> Very high risk of frostnip or frostbite: Check face and extremities (fingers, toes, ears and nose) for numbness or whiteness (frostbite) Risk of hypothermia if outside for long periods without adequate clothing or shelter from wind and cold. 	<ul style="list-style-type: none"> 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.
Warning Level -48 to -54	Severe Risk: exposed skin can freeze in 2 to 5 minutes*	<ul style="list-style-type: none"> Check face and extremities frequently for numbness or whiteness (frostbite) Serious risk of hypothermia if outside for long periods 	<ul style="list-style-type: none"> 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. Be ready to cut short or cancel outdoor activities. Keep active.

*In sustained winds over 50 km/h, frostbite can occur faster than indicated.

-55 and colder	Extreme risk: exposed skin can freeze in less than 2 minutes	Danger! <ul style="list-style-type: none">• Outdoor conditions are hazardous	<ul style="list-style-type: none">• Stay indoors.
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Health Effects of Heat Stress

Health Affect	Signs & Symptoms	Treatment	Prevention
Sunburn	<ul style="list-style-type: none"> • Hot, red, painful skin 	<ul style="list-style-type: none"> • Cool skin with water or lotion 	<ul style="list-style-type: none"> • Wear tightly woven loose fitting clothing • Use sunscreen at least every two hours • Stay in the shade • Wear a hat • Wear sunglasses with UV protection.
Heat Rash	<ul style="list-style-type: none"> • Red bumpy rash with severe itching 	<ul style="list-style-type: none"> • Change to dry clothes • Avoid hot environments. • Rinse skin with cool water.] 	<ul style="list-style-type: none"> • Keep skin dry and clean • Wear loose, breathable clothing.
Fainting	<ul style="list-style-type: none"> • Sudden fainting after at least two hours of work • Cool moist skin • Weak pulse. 	<ul style="list-style-type: none"> • Get Medical Attention • Assess need for CPR • Move to a cool area • Loosen clothing • Keep in a prone position • Offer sips of cool water if conscious. • Fainting may be due to other illnesses. 	<ul style="list-style-type: none"> • Report when feeling unwell or suffering from a medical condition • Reduce activity levels and/or heat exposure. • Drink fluid regularly • Use buddy system to check on each other
Heat Cramps	<ul style="list-style-type: none"> • Painful cramps in most worked muscles (arms, legs, stomach, etc.) • May occur suddenly or after work has stopped. 	<ul style="list-style-type: none"> • Move to a cool area • Loosen clothing • Drink cool salted water (1/4 tsp. salt in 1 litre of water) or balanced electrolyte replacement beverage • Gently massage and stretch affected muscles • If cramps persist after salt and fluid replacement, seek medical attention. 	<ul style="list-style-type: none"> • Stay hydrated • Eat a well balanced diet • Avoid caffeine and alcoholic beverages • Schedule work in coolest part of the day or on cooler days • Take frequent breaks in the shade or air conditioned space • Rotate workers on heavier tasks • Use the buddy system to check on each other.

Health Affect	Signs & Symptoms	Treatment	Prevention
Heat Exhaustion	<ul style="list-style-type: none"> • Symptoms may resemble shock • Heavy sweating • Red, hot, dry or sweaty skin • Feeling faint or nausea • Ashen appearance • Low grade fever, at or below 40°C • Rapid heartbeat • Low blood pressure • Fatigue, weakness 	<ul style="list-style-type: none"> • Get Medical Attention • Move to a cool, shaded area • Loosen and/or remove excess clothing • Offer sips of cool water or electrolyte drinks, if conscious, and not nauseated • Sponge with cool water unless worker starts to shiver • Have employee stay in a prone position with feet elevated • Monitor the person carefully • If fever – especially greater than 40°C – fainting, confusion or seizures occur. <u>CALL 911</u> 	<ul style="list-style-type: none"> • Stay hydrated • Avoid caffeine and alcohol • Schedule work in coolest part of the day or on cooler days • Take frequent breaks in the shade or air conditioned space • Rotate workers through heavier tasks • Use the buddy system to check on each other • Report any illnesses to your Supervisor
Heat Stroke	<p>The main sign of heatstroke is a markedly elevated temperature – generally greater than 40°C</p> <ul style="list-style-type: none"> • Hot, dry skin • Changes in mental status, (i.e. personality changes, Confusion, agitation, coma) • Rapid heartbeat, • Rapid and shallow breathing • Elevated or lowered blood pressure, • Cessation of sweating • Headache, nausea, vomiting • Fainting or unconsciousness • Shock • Seizures • Cardiac arrest. 	<ul style="list-style-type: none"> • Get immediate medical attention – <u>CALL 911</u> • Move worker to cool location • Sponge with cool water and fan unless worker starts to shiver • Remove unnecessary clothing • Offer sips of cool water if alert and not nauseated 	<ul style="list-style-type: none"> • Stay hydrated • Avoid caffeine and alcohol • Schedule work in coolest part of the day or on cooler days • Take frequent breaks in the shade or air conditioned space • Rotate workers through heavier tasks • Use the buddy system to check on each other • Report any illnesses to your Supervisor • Training is signs and symptoms • Close monitor all workers at risk

Appendix B: Guidelines for Additional Breaks

While there are no maximum exposure limits for cold working environments, in Canada, there are guidelines adopted by the American Conference of Government Industrial Hygienist (ACGIH) as Threshold Limit Values TLV for cold stress.

The work/warm-up schedule provides guidance on warm-up breaks that may be needed when working in cold conditions. As the wind increases or as the temperature decreases, additional breaks should be taken. Consider having warm-up breaks when the temperature reaches -26°C and when the winds are 16 km/h or greater. All non-emergency work outside should be stopped at temperatures of -43°C if there is no noticeable wind. Refer to the chart for other scenarios when non-emergency work outside should be stopped.

WORK WARM-UP SCHEDULE FOR OUTDOOR ACTIVITIES										
Air Temp. Sunny	No Noticeable Wind		8 km/h Wind (5 mph)		16 km/h Wind (10 mph)		24 km/h Wind (15 mph)		32 km/h Wind (20 mph)	
°C	Max Work Period	# of Breaks								
-26 to -28	120 minutes	1	120 minutes	1	75 minutes	2	55 minutes	3	40 minutes	4
-29 to -31	120 minutes	1	75 minutes	2	55 minutes	3	40 minutes	4	30 minutes	5
-32 to -34	75 minutes	2	55 minutes	3	40 minutes	4	30 minutes	5	Non-emergency work should stop	
-35 to -37	55 minutes	3	40 minutes	4	30 minutes	5	Non-emergency work should stop			
-38 to -39	40 minutes	4	30 minutes	5	Non-emergency work should stop		Non-emergency work should stop			
-40 to -42	30 minutes	5	Non-emergency work should stop		Non-emergency work should stop		Non-emergency work should stop			
-43 and below	Non-emergency work should stop									

Appendix C: Humidex Based Heat Response Plan

The Humidex Based Heat Response Plan is a screening tool that helps protect workers from heat stress. This plan may not be applicable in all circumstances so be sure to consider the factors discussed in the policy above in each situation.

How to Use the Plan

Step 1: Determine which humidex to use

There are two humidex guidelines to prevent heat stress:

- **Humidex 1** is for moderate unacclimatized and heavy acclimatized work loads.
- **Humidex 2** is for light unacclimatized or moderate acclimatized work loads.

Examples of work loads are:

- **Rest:** sitting
- **Light work:** sitting or standing to control machines; performing light hand or arm work (e.g., using a table saw); occasional walking; driving
- **Moderate work:** sustained moderate hand and arm work; light pushing or pulling; walking at a moderate pace; or moderate arm, leg, and trunk work.
- **Heavy work:** intense arm and trunk work; pick and shovel work, digging, carrying, pushing/pulling heavy loads; walking at fast pace
- **Very heavy:** very intense activity at fast to maximum pace

For Humidex 1, **general heat stress controls** are needed. General controls include providing annual heat stress training, encouraging adequate fluid replacement, permitting self-limitation of exposure, encouraging watching out for symptoms in co-workers, and adjusting expectations for workers coming back to work after an absence. Workers doing moderate work are considered acclimatized in Ontario only if they regularly work around heat sources. Clothing and radiant heat must also be taken into account.

For Humidex 2, general heat stress controls **and job-specific controls** are needed. Job-Specific Controls include **(in addition to general controls)** engineering controls to reduce physical job demands, shielding of radiant heat, increased air movement, reduction of heat and moisture emissions at the source, adjusting exposure times to allow sufficient recovery, and personal protective equipment that provides for body cooling

Step 2: Using the temperature and relative humidity in the work area, determine the applicable humidex rating using this chart.

Temp (in °C)	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																		50	47									
46		Moderate Acclimatized & Light Unacclimatized																		49	46								
45																			50	47	45								
44		Action																	49	46	43								
43	45+	only medically supervised work																	49	47	45	42							
42	42-44	work with 45 min/hr relief																	50	48	46	43	41						
41	40-41	work with 30 min/hr relief																	48	46	44	42	40						
40	38-39	work with 15 min/hr relief																		49	47	45	43	41	39				
39	34-37	warn for symptoms & extra water																		49	47	45	43	41	39	37			
38	30-33	alert for symptoms & extra water																		49	47	45	43	42	40	38	36		
37	25-29	water as needed																			49	47	45	44	42	40	38	37	35
36	*for Humidex 45+, heat stress should be managed as per the ACGIH TLV®									50	49	47	45	44	42	40	39	37	35	34									
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	31									
33					50	48	47	46	44	43	41	40	39	37	36	34	33	32	30	29									
32		50	49	48	46	45	44	42	41	40	38	37	36	34	33	32	30	29											
31	50	49	48	47	45	44	43	42	40	39	38	37	35	34	33	32	30	29	28										
30	48	47	46	44	43	42	41	40	39	37	36	35	34	33	31	30	29	28	27										
29	46	45	43	42	41	40	39	38	37	36	35	33	32	31	30	29	28	27	26										
28	43	42	41	40	39	38	37	36	35	34	33	32	31	30	29	28	27	26	25										
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																						
	100%	95%	90%	85%	80%	75%	70%	65%	60%	55%	50%	45%	40%	35%	30%	25%	20%	15%	10%										

Step 3: Respond as appropriate given the humidex rating.

Humidex 1	Response	Humidex 2
25 – 29	supply water to workers on an “as needed” basis	32 – 35
30 – 33	post Heat Stress Alert notice; encourage workers to drink extra water; start recording hourly temperature and relative humidity	36 – 39
34 – 37	post Heat Stress Warning notice; notify workers that they need to drink extra water; ensure workers are trained to recognize symptoms	40 – 42
38 – 39	work with 15 minutes relief per hour can continue; provide adequate cool (10-15°C) water; at least 1 cup (240 mL) of water every 20 minutes worker with symptoms should seek medical attention	43 – 44
40 – 41	work with 30 minutes relief per hour can continue in addition to the provisions listed previously;	45 – 46*
42 – 44	if feasible, work with 45 minutes relief per hour can continue in addition to the provisions listed above.	47 – 49*
45 or over	only medically supervised work can continue	50* or over

Humidex calculator: <http://www.ohcow.on.ca/uploads/heat-stress-calculator.html>

*at Humidex exposures above 45, heat stress should be managed as per the ACGIH TLV®