

Humidex Based Heat Response Plan

EASY TO USE | HEALTH EFFECTS | VULNERABILITY TO HEAT STRESS

The Humidex Heat Stress plan is an easy and simple way of protecting workers from heat stress. It is based on the 2007 American Conference of Governmental Hygienists (ACGIH) Heat Stress TLV® (Threshold Limit Value®) – a document the Ministry of Labour uses in enforcement. The Humidex based plan translates the wet bulb globe temperatures found in the TLV® into a Humidex reading.

Note:

- The translation process makes some simplifications, so **the plan may not be applicable in all circumstances or workplaces** (follow steps #1-5 to ensure the plan is appropriate for your workplace).
- Clothing and radiant heat must also be taken into account when using this guideline (see steps #1-5 at right).

ACCLIMATIZATION

The MOL heat stress guideline notes that "hot spells in Ontario seldom last long enough for workers to acclimatize". Workers performing "moderate" work (e.g. work with some pushing, lifting) would also not be assumed to be acclimatized unless they around heat sources regularly (for example, in foundries or around ovens). Workers performing "heavy" work (e.g. shovelling dry sand), however, could probably be considered acclimatized once into the warm weather season.

HUMIDEX 1 or 2 ?

There are two Humidex guidelines to prevent heat stress.

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

For Humidex 1, general heat stress controls are needed and for Humidex 2, general heat stress controls and job-specific controls are needed (below)

Health Effect	Symptoms	Treatment
Heat Rash	Red bumpy rash with severe itching.	Change into dry clothes and avoid hot environments. Rinse skin with cool water. Wash regularly to keep skin clean and dry.
Fainting	Sudden fainting after at least two hours of work; cool moist skin; weak pulse.	GET MEDICAL ATTENTION. Assess need for CPR. Move to a cool area; loosen clothing; make person lie down; and if the person is conscious, offer sips of cool water. Fainting may also be due to other illnesses.
Heat Cramps	Heat cramps are painful, involuntary muscle spasms that usually occur during heavy exercise in hot environments. Inadequate fluid intake often contributes to this problem. The spasms may be more intense and more prolonged than typical nocturnal leg cramps. Muscles most often affected include the calves, arms, abdomen and back, although the cramps may involve any muscle group involved in the exercise.	If you suspect heat cramps: Rest briefly and cool down. Drink water or an electrolyte-containing sports drink. Practice gentle, range-of-motion stretching and gentle massage of the affected muscle group.
Heat Exhaustion	Signs and symptoms of heat exhaustion often begin suddenly, sometimes after excessive exercise, perspiration and inadequate fluid intake. Features resemble shock and include: feeling faint, nausea, ashen appearance, rapid heartbeat, low blood pressure, hot, red, dry or sweaty skin, low-grade fever, generally less than 40°C.	If you suspect heat exhaustion: Get the person out of the sun and into a shady or an air-conditioned location. Lay the person down and elevate the feet slightly. Loosen or remove the individual's clothing. Have the person drink cool water, not iced, or a sports drink containing electrolytes. Cool the person by spraying him or her with cool water and fanning. Monitor the person carefully. Heat exhaustion can quickly become heatstroke. If fever — especially greater than 40°C — fainting, confusion or seizures occur, CALL FOR EMERGENCY MEDICAL ASSISTANCE.
Heat Stroke	The main sign of heatstroke is a markedly elevated temperature — generally greater than 40°C — with hot, dry skin and changes in mental status ranging from personality changes to confusion and coma. Other signs may include: rapid heartbeat, rapid and shallow breathing, elevated or lowered blood pressure, cessation of sweating, irritability, confusion or unconsciousness, fainting, which can be the first sign in older adults.	If you suspect heatstroke: Move the person out of the sun and into a shady or an air-conditioned space. Dial 911 or CALL FOR EMERGENCY MEDICAL ASSISTANCE. Cool the person by covering him or her with damp sheets or by spraying with cool water. Direct air onto the person with a fan or newspaper.

There are many factors (e.g. age, heart or lung conditions, dehydration, fatigue, some medications, etc.) that can make a person more vulnerable to heat. Despite these factors, workers may be able to cope given adequate knowledge of the signs and symptoms of heat stress and given the latitude to make adjustments to their pace of work. It is more often the young, fit workers, thinking they are invincible who succumb to heat strain. Some workers may need medical advice about what accommodations are right for them.

5 STEPS for dealing with Heat Stress

- Step #1: Training**
- the Humidex plan by itself cannot guarantee that workers will not be affected by heat stress. workers must learn to recognize the early signs and symptoms of heat stress and know how to prevent them!
 - if possible, workers should be able to alter their pace of work, rest breaks, and fluid intake in response to early symptoms (1 cup every 20 minutes)
 - the ideal heat stress response plan would let workers regulate their own pace by "listening to their body" without need for measurements.
- Step #2: Select a Measurement Location**
- split the workplace into heat stress zones and put a thermal hygrometer in each zone.
 - identify a representative location within the zone where measurements can be taken (if you want to base your actions on a single reading, select the highest heat stress zone).
- Note:** this Humidex Plan is based on workplace measurements, not weather station/media reports (temperatures inside do not necessarily correspond with temperatures outside)
- Step #3: Measure Workplace Humidex**
- a thermal hygrometer (usually \$20-\$60 at hardware or office supply stores) is a simple way to measure the temperature and relative humidity in your workplace
 - once you have the temperature and humidity, use the table at left to determine the corresponding Humidex value and the appropriate heat stress prevention response. Remember to adjust for clothing (step #4) and radiant heat (step #5)
 - measurements should be recorded at least hourly if the Humidex is above 30° or temperature above 26°C.

HUMIDEX HEAT STRESS RESPONSE PLAN

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%	
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19																				10
18																				8
17																				6
16																				4
15																				2
14																				0

NEVER IGNORE ANYONE'S SYMPTOMS NO MATTER WHAT THE HUMIDEX!

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

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

Humidex 1, General Controls:	Humidex 2, General controls + Job-Specific Controls:
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.	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. Personal protective equipment that cools the body.

- Step #4: Adjust for Clothing**
- evaporating sweat is the main way the body cools. The best thing is the kind that makes it easiest for sweat to evaporate. The Humidex plan assumes workers wear summer clothes (light shirt & pants, underwear, socks, and shoes).
 - for cotton overalls on top of summer clothes one should add 5° Humidex.
 - for different clothing configurations, estimate the correction factor by comparing with cotton overalls (e.g. gloves, hard hat, apron, protective sleeves might be equivalent to a little less than half the evaporation resistance of overalls, so add 1° or 2° Humidex).
 - If clothes do not allow sweat evaporation (encapsulated suits), heat stress should be managed by monitoring vital signs (see ACGIH TLV®).
- Step #5: Adjusting for Radiant Heat**
- for outdoor work in direct sunlight between 10 am and 4 pm, add 2-3° (pro-rata according to percentage cloud cover) Humidex
 - for indoor radiant heat exposures, use common sense to judge whether the exposure involves more or less radiant heat than direct sunlight and adjust the 2-3° correction factor accordingly.

*The items regarding heat cramps, heat exhaustion, and heat stroke are copyright Mayo Foundation for Medical Education and Research. All Rights reserved. Used with permission from www.mayoclinic.com. Heat Rash and Fainting adapted from Ontario Ministry of Labour Heat Stress Guideline: <http://www.labour.gov.on.ca/english/hs/guidelines/sgt.html> (accessed Feb/07).