

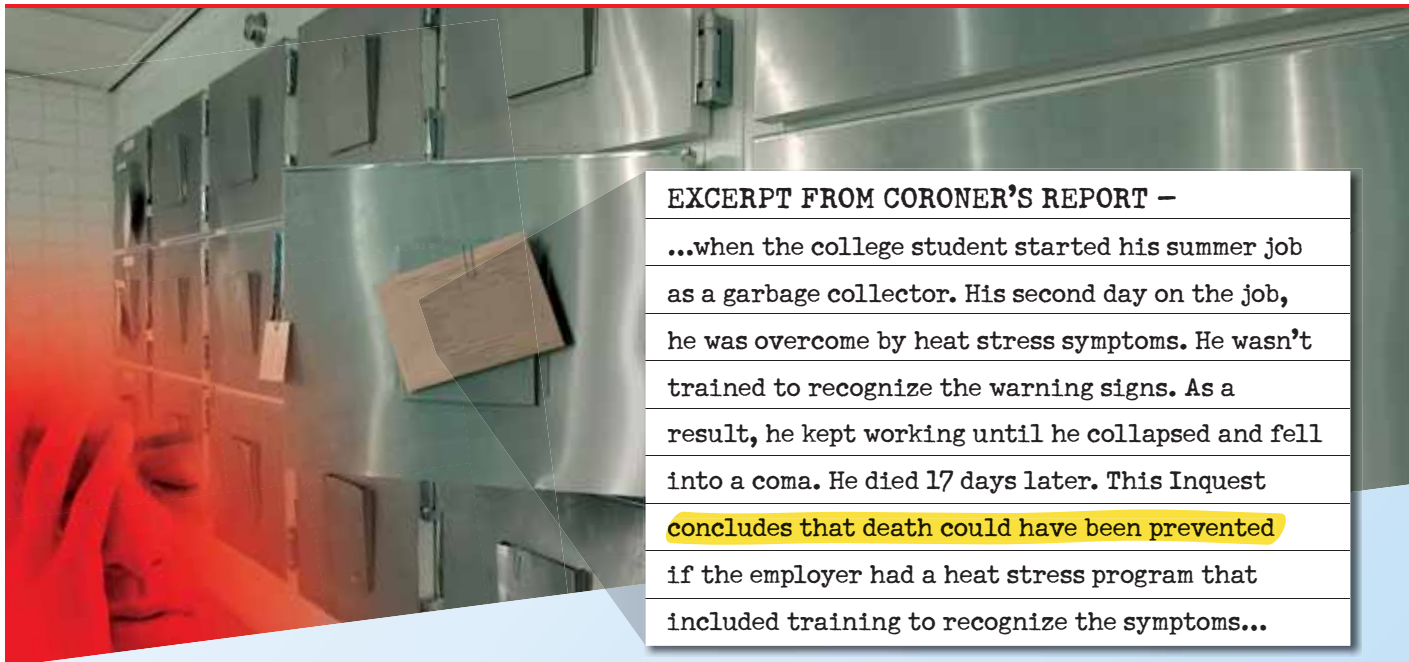
HEAT STRESS AWARENESS GUIDE



Included in this guide:
HEAT STRESS AWARENESS TOOL & POSTER

keep
your
COOL!

HEAT STRESS AWARENESS GUIDE



EXCERPT FROM CORONER'S REPORT –

...when the college student started his summer job as a garbage collector. His second day on the job, he was overcome by heat stress symptoms. He wasn't trained to recognize the warning signs. As a result, he kept working until he collapsed and fell into a coma. He died 17 days later. This Inquest concludes that death could have been prevented if the employer had a heat stress program that included training to recognize the symptoms...

Heat stress can harm or even kill people working under very hot conditions.

To help employers and workers learn how to prevent heat stress, this guide

- summarizes the causes, symptoms, and treatment of heat-related illness
- presents a five-step approach for using the Humidex to assess heat stress hazards
- outlines specific actions for managing and controlling heat stress

Key information presented in this guide is summarized in the *Heat Stress Awareness Tool* (see page 7).

The appendices include:

- a self-audit checklist
- an example of a heat stress policy
- an outline of the essential elements of a heat stress program
- some useful contact information

Your **Health and Safety Association**, the **Workers Health and Safety Centre**, and the **Occupational Health Clinics for Ontario Workers** can provide you with:

- technical support
- workplace-specific information
- training on injury and illness prevention
- consulting services





About this guide

The *Heat Stress Awareness Guide* was developed by the members of the Occupational Health and Safety Council of Ontario (OHSCO)* to provide information and advice on managing and controlling heat stress in the workplace.

The audience for this Guide includes employers, managers, supervisors, workers, joint health and safety committee (JHSC) members, health and safety representatives, and workplace union representatives. Unions, employer associations, and health and safety professionals may also find the information in this Guide useful.

*For a list of OHSCO members see Appendix E.

Disclaimer

The material contained in this manual is for information and reference purposes only and not intended as legal or professional advice. The adoption of the practices described in this manual may not meet the needs, requirements, or obligations of individual workplaces.

Use, reproduction, and duplication of this manual is recommended and encouraged.

Occupational Health and Safety Council of Ontario (OHSCO)



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Is heat stress a concern in your workplace?

- Has anyone been affected by heat in your workplace?
- Are fans needed to keep workers cool?
- Is work done in direct sunlight?
- Are there heat-producing processes or equipment in the workplace?
- Do workers wear extra clothing/protective equipment that can make them hot (e.g., overalls, respirators, hard hats, etc.)?
- Have workers ever expressed concern about heat in the workplace?

Chances are that you answered “yes” to at least one of these questions. Actually, heat stress is something most workplaces must deal with — not just those with workers working in the hot sun or beside hot furnaces or machinery.

The purpose of this heat stress tool kit is to provide workplace parties with strategies for:

- recognizing the symptoms
- assessing the risk
- putting together an effective control program

The law

Employers have a duty under Section 25(2)(h) of the *Occupational Health and Safety Act* to take every precaution reasonable in the circumstances for the protection of a worker. This includes developing policies and procedures to protect workers in hot environments due to hot processes or hot weather. For compliance purposes, the Ministry of Labour recommends the current threshold limit value (TLV) for heat stress and heat strain, published by the American Conference of Governmental Industrial Hygienists (ACGIH). These values are based on preventing unacclimatized workers' core temperatures from rising above 38°C. See Ministry of Labour web document “Heat stress health and safety guideline” for details.

Limitations:

This Heat Stress Awareness Guide is a translation of the ACGIH Heat Stress/Strain Threshold Limit Value (TLV®) from WBGT (wet bulb globe temperature) units into Humidex. This translation assumes unacclimatized workers doing work involving moderate physical activity, and wearing summer shirt, pants, underwear, socks and shoes. This Humidex plan can be adjusted for the radiant heat from the sun (see Step #5 on page 7). If your workplace conditions involve unusual radiant heat, or, workers are required to wear clothing which does not allow sweat to evaporate easily, the ACGIH Heat Stress/Strain TLV® should be consulted rather than this Humidex Plan.





Factors influencing heat stress

The heating and cooling balance in the body depends on the following factors:

- air temperature
- humidity (moisture in the air)
- radiant heat load (sun, furnaces, molten material, steam, etc.)
- physical activity (how hard you're working)
- cooling (by the evaporation of sweat)
- body adjustments (acclimatization)

There are two sources of heat exposure, the outside environment and internal muscle activity. (80% of muscle energy is turned into body heat.) High temperatures and high levels of physical work create heat stress. The body cools itself by evaporating sweat. High humidity hinders sweat from evaporating.

Can you get used to heat?

Yes. The body will get used to working in a hot environment gradually over time. This process of the body becoming more efficient at cooling itself down is known as "acclimatization":

- The body redirects blood to the skin's surface
- The heart becomes more efficient
- Sweating starts sooner, and there is more of it
- Sweat contains less salt

During this adjustment period, symptoms of fatigue, dizziness, heat rash, and stomach discomfort are common. Acclimatization takes time — a rule of thumb for assuming you have acclimatized is when the last five of seven days have workplace temperatures in the heat stress range. It should be noted, however, that dehydration can cancel the benefits of acclimatization. Acclimatized workers will generally be able to work longer in a hot environment than unacclimatized workers.

HEAT RASH

CAUSES	Hot humid environment; plugged sweat glands
SYMPTOMS	Red bumpy rash with severe itching
TREATMENT	Change into dry clothes and avoid hot environments, rinse skin with cool water

SUNBURN

CAUSES	Too much exposure to the sun
SYMPTOMS	Red, painful, or blistering and peeling skin
TREATMENT	If the skin blisters, seek medical aid, use skin lotions (avoid topical anaesthetics) and work in the shade

HEAT CRAMPS

CAUSES	Heavy sweating drains a person's body of salt, which cannot be replaced just by drinking water
SYMPTOMS	Painful cramps in arms, legs, or stomach that occur suddenly at work or later at home Heat cramps are serious because they can be a warning of other more dangerous heat-induced illnesses
TREATMENT	Move to a cool area; loosen clothing and drink an electrolyte-replacement beverage, if the cramps are severe or don't go away, seek medical aid



Causes, symptoms, and treatment

Heat stress symptoms are a set of natural signals telling you that something needs to be done to balance your body's heating and cooling. As your body heats up, it tries to rid itself of excess heat through the evaporation of sweat. If it is unable to cool itself this way, your body temperature will increase. When body temperature gets above 38-39°C, the brain starts to overheat, leading to a shutdown of your body's cooling system (sweating stops). Your temperature now rises even faster, leading to heat stroke and possibly death. The causes, symptoms, and treatment of various heat-related illnesses are listed below.

CAUSES	FAINTING
	Fluid loss and inadequate water intake
SYMPTOMS	Sudden fainting after at least two hours of work; cool moist skin; weak pulse
TREATMENT	GET MEDICAL ATTENTION Assess need for CPR; move to a cool area; loosen clothing; make person lie down; and when the person is conscious , offer sips of cool water.
	Fainting may also be due to other illnesses.

CAUSES	HEAT EXHAUSTION
	Fluid loss and inadequate salt and water intake causes the body's cooling system to start to break down
SYMPTOMS	Heavy sweating; cool, moist skin; body temperature above 38°C; weak pulse; normal or low blood pressure; tired and weak, nausea and vomiting; very thirsty; panting or breathing rapidly; blurred vision
TREATMENT	GET MEDICAL AID This condition can lead to heat stroke, which can kill; move the person to a cool shaded area; loosen or remove excess clothing; provide cool water to drink; fan and spray with cool water

CAUSES	HEAT STROKE
	If a person's body has used up all its water and salt reserves, it will stop sweating, which can cause body temperature to rise; heat stroke may develop suddenly or may follow from heat exhaustion
SYMPTOMS	High body temperature (above 41°C) and any of the following: the person is weak, confused, upset, or acting strangely; has hot, dry, red skin; a fast pulse; headache or dizziness; in later stages, a person may pass out and have convulsions
TREATMENT	THIS IS AN IMMEDIATE MEDICAL EMERGENCY. PROMPT ACTION MAY SAVE THE PERSON'S LIFE
	CALL AN AMBULANCE This condition can kill a person quickly; remove excess clothing; fan and spray the person with cool water; offer sips of cool water, if the person is conscious



How is heat stress measured?

The Ministry of Labour uses “wet bulb globe temperature” (WBGT) to measure heat stress. This calculation takes into account air temperature, radiant heat and humidity. Exposure standards are divided into categories based on physical activity and workers’ acclimatization. Adjustments are made for wearing types of clothing and personal protective equipment. Taking WBGT measurements properly requires specialized equipment and expertise. Workplaces with very hot work processes or where workers have experienced heat-related illnesses should measure the WBGT.

Most workplaces don’t have “hot processes” but hot weather can pose health risks to their workers. For these hot work environments, a *Hot Weather Plan* is appropriate. This is a simplified heat stress prevention program and should establish implementation criteria, or “triggers,” to put the plan into effect. Criteria may include:

- Humidex reaching or exceeding 35
- Environment Canada Humidex advisory (air temperature exceeding 30°C and Humidex exceeding 40) or Ontario Ministry of the Environment smog alert
- Heat waves (three or more days of temperatures of 32°C or more)

Generally, Hot weather plans should be in place between May 1 and September 30.

This tool kit provides a simplified version of the WBGT by converting it into Humidex values. It allows workplaces to measure heat stress using only workplace temperature and humidity. (See Appendix B on page 12 for more details.) The following five steps help determine actions to reduce heat stress.

5 Steps to

Step 1 Training

- Measurements by themselves cannot guarantee worker protection from heat stress. It is essential that workers learn to recognize the early signs and symptoms of heat stress and know how to prevent them! (See Appendix E on page 18 for training resources.)
- If it’s possible, workers need to be able to alter their pace of work, take rest breaks, and drink in response to early symptoms (a cup of water every 20 minutes). The ideal heat stress response plan would let workers regulate their own pace by “listening” to their bodies.

Step 2 Clothing

- The Heat stress action chart on the awareness tool (page 7) assumes workers are wearing regular summer clothes (light shirt and pants, underwear, and, socks and shoes).
- If workers wear a double layer of woven clothing (e.g., cotton overalls on top of summer clothes), add 5° of Humidex to the workplace measurement (using the Heat stress reference chart in Appendix B, on page 12).
- Estimate the correction factor for other kinds of clothing/protective equipment by comparing them with cotton overalls (e.g., gloves, hard hat, apron, and protective sleeves might be equivalent to a little less than half the evaporation resistance of overalls, so add 1° or 2° of Humidex).
- If completely encapsulating suits are worn, heat stress should be managed by monitoring vital signs, as recommended by the ACGIH TLV.

Step 3 Select a measurement location

- Divide the workplace into zones that have similar heat exposures.
- Select a representative location in each zone where you can take measurements.



Reduce Heat Stress

Step 4 Measure workplace temperature and humidity



- Using a **thermal hygrometer** (usually \$20-\$60 at hardware or office-supply stores), measure the temperature and relative humidity in your workplace. Avoid placing the thermal hygrometer in direct sunlight or in contact with hot surfaces.
- Once you have the temperature and humidity, be sure to adjust for clothing (Step 2), and radiant heat (Step 5). Then use the Heat stress awareness tool (or the table on page 13 in Appendix B) to determine the appropriate heat stress prevention response.
- For more detailed calculations (e.g., for acclimatized workers), see Appendix B on page 12 or the calculator located at www.ohcow.on.ca/menuweb/heat_stress_calculator.htm.

Step 5 Adjust for radiant heat

- For outdoor work in direct sunlight between the hours of 10 a.m. and 5 p.m., add 2°-3° (prorate according to percentage cloud cover) to your Humidex measurement.
- For indoor radiant heat exposures, use your training, knowledge and experience to judge whether the exposure involves more or less radiant heat than direct sunlight and adjust the 2°-3° correction factor appropriately.

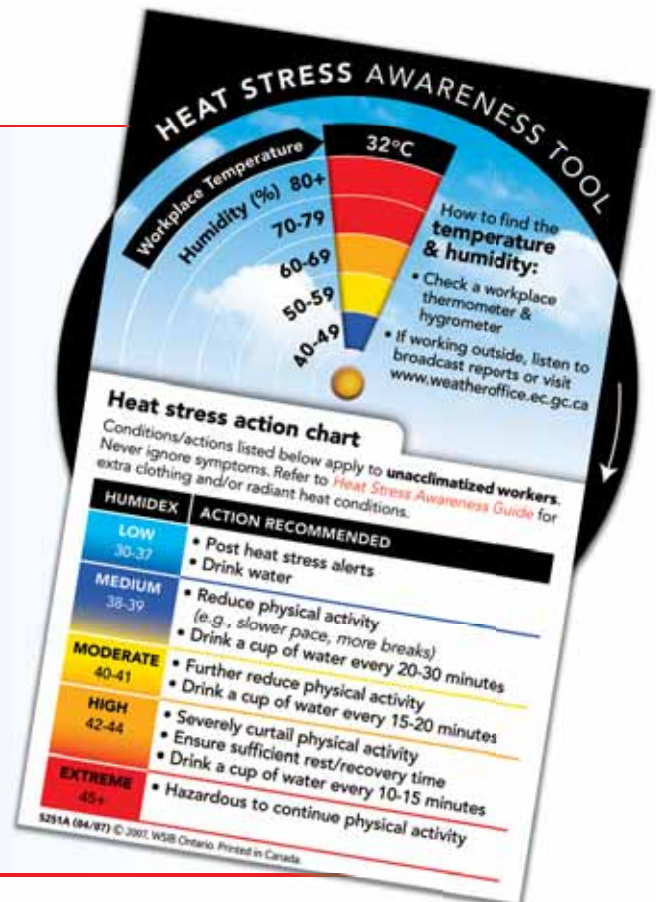
Note: The Heat stress action chart is based on workplace measurements, not weather station/media reports. (Temperatures inside buildings do not necessarily correspond with outside temperatures.)

Instructions for use of the heat stress awareness tool

1. Measure the workplace temperature and humidity.
2. Turn the wheel to display the workplace temperature. Then, find the humidity value on the left axis. Note the colour of the indicated cell.
3. Refer to the colour on the instruction chart for recommended action.

Example: If the temperature is 32°C (black ring in the window) and the relative humidity is 50%, the colour for this range is yellow. This indicates that the precautions are in the “moderate” value range. In this case, the recommended actions are:

- Further reduce physical activity
- Drink a cup of water every 15-20 minutes





Heat stress acclimatization

- Ontario summers are not hot enough for workers doing light work (sitting/standing, doing light arm work) to be considered acclimatized for WBGT purposes.
- Workers doing moderate work are only considered acclimatized in Ontario if they regularly work around heat sources (e.g., in foundries, around ovens, etc.). See Appendix B.
- Workers performing heavy work acclimatize quickly in Ontario, but for the first warm weather of the season, more caution is recommended. Even Humidex 1 (see page 13 in Appendix B) may be too high to protect fully unacclimatized workers doing heavy work.

Note: *Clothing and radiant heat must be taken into account when using this guideline. See Steps 1 to 5 outlined on previous page.*

Managing heat stress

No system can address all situations. Workplaces with particular sources of heat or humidity may need extra assistance in developing a heat stress response plan. The Health and Safety Associations listed in Appendix E on page 18 are an excellent place to start.

Some workplaces begin with rigorous systems of measurement and prescribed reactions, but once in heat stress season, workers and supervisors eventually learn to anticipate when heat stress controls “kick in.” In such situations, the system becomes less formal.

A coroner’s inquest into a college student’s death noted that prescribed responses to the measurements alone will not protect every worker. Workers must also learn to listen to what their bodies are telling them and know how to respond appropriately. The heat stress response plan must be flexible enough to protect the most vulnerable workers.

Before establishing a policy, you must determine:

1. One or more monitoring methods or criteria (e.g., self-regulation, Humidex, WBGT measurements).
2. A sampling strategy (e.g., location, frequency, time, trigger to start monitoring).
3. Responses (e.g., rests, rotation, air conditioning, voluntary staying on the job, shut down).
4. Training (when, how often, content, length, Joint Health and Safety Committee involvement, supervisors, workers, first aid).
5. Water-supply coordination (ensuring workers have sufficient quantities of water available).
6. First-aid reporting, emergency response, medical monitoring, confidentiality.

In workplaces with JHSCs or Health and Safety representatives, it is important to get them involved and incorporate their ideas into the plan. The Health and Safety Associations and the Workers Health and Safety Centre have resources available to assist in educating Health and Safety representatives and JHSC members regarding the hazards of heat stress and controls.





Once these basics are addressed, you can write your policy and response plan. A sample of a heat stress policy can be found on page 11, in Appendix A, along with a self-audit checklist on page 14 in Appendix C. It is crucial to the success of the plan to get upper management's endorsement. Once the plan is approved, it needs to be communicated and implemented. All programs need to be evaluated to ensure that they prevent heat stress.

Control measures

General control measures

- Develop, communicate and implement the heat stress plan for all workers.
- Train workers to recognize the signs and symptoms of heat stress and to know how to avoid them.
- Provide water nearby on the job site and ensure everyone drinks about one cup of water every 20 to 30 minutes, even if they're not thirsty.
- Establish a first-aid response system with trained first-aid providers and a means to record and report heat stress incidents.
- Allow time for workers to acclimatize to the heat and the work. This usually takes about two weeks.
- Measure Humidex (or WBGT) levels and allow for self-limitation of exposure. (If this is not possible, adjust the work/rest cycles accordingly.)
- Encourage workers to use a buddy system — each buddy looks out for early signs and symptoms of heat stress in the other.

Job-specific control measures

- Provide barriers to shield workers from radiant heat exposure. Provide cooling fans when air temperature is below skin temperature (35°C) **and** the humidity is below 70%. Consider cooling or dehumidifying the workplace.

Note: *When the temperature exceeds 35°C and the relative humidity is above 70%, the use of fans will increase worker's temperature because there will be little evaporation of sweat*

- Provide mechanical aids for material handling — dollies, carts, lifting devices — to reduce physical activity. Organize the work to reduce the pace of activity.
- If possible, postpone strenuous work until a cooler time of the day.
- If work is done outside, ensure that shaded areas are available.
- Rotate workers in and out of hot work areas whenever possible.
- Consider cooling vests, if feasible and effective for the individual.

Personal control measures

- Avoid eating large meals before working in hot environments.
- Avoid alcohol or beverages with caffeine. These make the body lose water and increase the risk of heat stress.
- Wear light clothing that permits the evaporation of sweat (e.g., cotton clothing). Use sunscreen and cover your head if working outside.
- Advise workers to check with their doctor if their medication may affect their heat tolerance.
- Make healthy lifestyle choices (i.e., body weight, fitness, diet, rest, etc.)

In 2004, the WSIB supported a RAC grant to study heat stress in the firefighting profession. Findings of the report titled, "The Management of Heat stress for the Firefighter", led to the development of a slide rule (later a wheel) that can be used by incident commanders to determine safe work limits for their firefighters during activities that involve wearing their full protective clothing and self contained breathing apparatus. Results of the research performed in the laboratory on firefighters in full gear exercising on treadmills have shown that submerging the forearm in cool water for 20 minutes was an effective method for lowering the body temperature along with drinking sufficient fluids and resting.



Appendix A

Heat stress policy (sample)

(Company name)

(Company name) recognizes the potential problems caused by high temperatures in the work environment. To reduce the potential for heat-related illness, (Company name) has developed the following heat stress policy.

This policy requires the full cooperation of all members of the (Company name) team: Senior management, the Joint Health and Safety Committee, supervisors, and workers. In order to monitor and evaluate the potential for heat-related problems in the workplace, a reference guide called the *Heat Stress Awareness Guide* will be used. By linking temperature and humidity, a colour code on the heat stress awareness tool (as described in the *Guide*) provides the appropriate work-site response.

Employees are asked to cooperate fully with this policy. All employees of (Company name) will be trained to recognize the signs and symptoms of heat stress — in themselves, as well as in other employees.

Employees experiencing symptoms of heat stress must report to first-aid personnel immediately to obtain proper medical attention. During days when heat stress procedures are in place, all employees will follow the contingency plans. Extra water will be available and workers will be encouraged to drink it.

In order to monitor the effectiveness of this policy, (Company name) will perform an annual review. The heat stress policy will be evaluated, improvements will be made, and acknowledgement will be given to those who make significant contributions to its success.

(Company manager)

Date



Appendix B

The following heat stress reference chart shows Humidex readings for the 2007 ACGIH moderate action level (unacclimatized) workload category WBGT values from the heat stress/strain TLV. Since the Ministry of Labour heat stress guidelines state that “hot spells in Ontario seldom last long enough for workers to acclimatize,” workers performing “moderate” work (e.g., work with some pushing, lifting) cannot be assumed to be acclimatized unless they are regularly exposed to significant radiant heat. Workers performing “heavy” work (e.g., shovelling dry sand), however, could probably be considered acclimatized once they are into the warm-weather season.

Limitations: This table is based on the assumption that the work is being performed under conditions with little or no radiant heat, and workers wearing regular summer clothing; if your conditions vary from these, use the steps listed on pages 6 and 7 to make adjustments.

An online version of the chart is available for download at www.ohcow.on.ca/menuweb/hhrplan.pdf

An online calculator can be accessed at www.ohcow.on.ca/menuweb/heat_stress_calculator.htm

Heat stress reference chart

		RELATIVE HUMIDITY (%)																				
		100%	95%	90%	85%	80%	75%	70%	65%	60%	55%	50%	45%	40%	35%	30%	25%	20%	15%	10%		
TEMPERATURE (°C)	49																			50	49	
	48																			49	48	
	47																		50	47	47	
	46																		49	46	46	
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22	31	30	30	29	28	27	27	26	25	25											22	
21	29	29	28	27	27	26	25														21	



Humidex 1 or Humidex 2

There are two Humidex guidelines to determine the appropriate actions required:

Humidex 1 refers to **unacclimatized workers** doing “moderate” work, and ranges indicate the need for **general heat stress controls**.

Humidex 2 refers to **acclimatized workers** doing “moderate” work, and ranges indicate the need for **specific controls**.

The ACGIH specifies an action limit and a TLV to prevent workers’ body temperatures from exceeding 38°C (38.5°C for acclimatized workers). Below the action limit (which corresponds to Humidex 1 for work of moderate physical activity), most workers will not experience heat stress. Most healthy, well-hydrated, acclimatized workers not on medication will be able to tolerate heat stress up to the TLV (Humidex 2 for moderate physical activity).

NEVER IGNORE ANYONE’S SYMPTOMS, REGARDLESS OF YOUR MEASUREMENTS!

Note: Clothing and radiant heat must also be taken into account when using this guideline (See Steps 1 to 5 outlined on pages 6 and 7).

Humidex 1 general controls include providing annual heat stress training, encouraging adequate fluid replacement, permitting self-limitation of exposure, encouraging employees to watch out for symptoms in co-workers, and adjusting expectations for workers coming back to work after an absence.

Humidex 2 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 body-cooling equipment.

Example: Suppose the temperature in the workplace is measured at **33°C** and the relative humidity is **50%**. The **Humidex** would be **41** (see heat stress reference chart, page 12).

Therefore, recommended action is as follows:

Humidex 1: 30 minutes/hour relief, and;

Humidex 2: Full work, with warning to be wary of heat stress symptoms and to drink extra water.

Humidex 1 general controls	ACTION RECOMMENDED	Humidex 2 specific controls
30 – 37	Warn for symptoms and extra water	36 – 42
38 – 39	Work with 15 minutes/hour relief	43 – 44
40 – 41	Work with 30 minutes/hour relief	45 – 46*
42 – 44	Work with 45 minutes/hour relief	47 – 49*
45+	Hazardous to continue physical activity	50+*

* For Humidex ranges above 45, heat stress should be managed as per the ACGIH TLV



Appendix C

The self-audit checklist

A self-audit can determine what mechanisms and practices your workplace has in place to combat heat stress. It also indicates which programs or practices may be deficient and require attention.

LEADERSHIP

- Written heat stress policy and plan
- Responsibilities and accountabilities identified for:
 - Employer
 - Supervisor
 - JHSC/H&S representative
 - Worker

EMPLOYEE TRAINING

For all relevant personnel

- What is heat stress?
- Symptoms and health effects
- Personal risk factors
- Jobs at risk
- Monitoring results
- Actions to be taken for controlling heat stress
- Heat stress policy and plan
- Controls as established — engineering, administration, work practices
- Personal protective equipment
- First aid
- Reporting procedures
- Medical surveillance



STANDARDS & PROCEDURES

- Identification of potential heat hazards and jobs at risk
- Visual observations
- Accident/incident reports
- Absentee rate, employee complaints, medical records
- Assessment and evaluation of risk

MONITORING

- Weather as a trigger
- Type of testing
- Frequency
- Workload categories for job
- Clothing insulation values
- Comparison of monitoring results to acceptable standards

CONTROLS

- Controls (e.g., shielding heat sources, ventilation, fans, air conditioning, reducing metabolic workload, acclimatization, work scheduling, rotation, work/rest regimen, water, personal protective equipment)
- Evaluation of overall program effectiveness
- Compliance with standards and procedures



Appendix D

Essentials for a successful heat stress prevention program

The following elements are important in making your heat stress prevention program successful:

Leadership commitment

Management must recognize that a heat stress prevention program is required to prevent heat stress, and must show commitment to a heat stress prevention program through appropriate assignment of resources. Employees must be involved at every step of the program's development and implementation.

Identifying hazards, assessing risk, and determining needs

The organization must perform and document an assessment to identify all risk factors in the workplace that could lead to heat stress. Consideration should be given to legislative requirements, industry best practices, internal lost-time data, etc. Tools to perform this assessment could include walk-through inspections, surveys, checklists, and task analysis. These assessments should be repeated periodically, or as often as processes in the organization change.

Implementation of the plan and strategy

Once the risks and needs have been identified, the organization should develop a plan to address them. The plan should define responsibilities, accountabilities, timelines, and milestones for implementing the plan.

Standards

The organization should establish and document its standards for heat stress prevention, considering guidelines from professional bodies, industry best practices, etc.

Procedures, guidelines, and practices

Procedures, guidelines, and practices to implement all identified heat stress policies and standards must be documented. They should define, step by step, the process to accomplish a task or activity, including work/rest regimes (how often, when, in what areas, etc.), as defined in the standards.

Communication

The organization should communicate the requirements of all heat stress standards, policies, and procedures to all employees.

Training and personnel development

Employees may need training on such topics as:

- Definition of heat stress
- Signs and symptoms of heat-related disorders
- Importance of reporting signs and symptoms to supervisors
- When, how, and why to take breaks from hot work
- Recognition, assessment, and evaluation of heat stress
- Controls for heat stress

Measurement

The organization should keep track of data that can provide an evaluation of the heat stress prevention program. For example, you should keep track of lost-time injuries due to heat and hot weather conditions, worker complaints of discomfort after prolonged work, and purchases of equipment meeting standards that have been set. You may want to repeat a needs assessment or a heat survey done earlier to get comparative data after controls have been put in place to check if the controls are adequate.



Evaluation

The organization should analyze the measurement data to determine the degree of compliance and effectiveness of the heat stress prevention program by looking at indicators such as:

- Reduction in heat-related symptoms and illness through implementation of controls
- Reduction in absenteeism or lost time related to heat
- Increase in workers' knowledge about heat stress recognition and prevention
- Decrease in complaints of discomfort
- Adherence to work/rest regimens on hot days

Recognition, improvement, correction

Develop an improvement plan based on the measurement and evaluation findings, and include opportunities for improvement and correction. If you ensure that all components of this continuous-improvement loop are in place, you will increase the effectiveness of your heat stress prevention program.



Appendix E

Research and support

Technical support is available from your Health and Safety Association. Workplace-specific information, as well as training and consulting services for illness and injury prevention, are provided by the Health and Safety Associations of Ontario, the Workers Health and Safety Centre, and the Occupational Health Clinics for Ontario Workers.

Ontario Ministry of Labour
www.labour.gov.on.ca

Institute for Work and Health
www.iwh.on.ca

Workplace Safety and Insurance Board
www.wsib.on.ca

Construction Safety Association of Ontario
www.csao.org

Education Safety Association of Ontario
www.esao.on.ca

Electrical & Utilities Safety Association
www.eusa.on.ca

Farm Safety Association
www.farmsafety.ca

Industrial Accident Prevention Association
www.iapa.ca

Mines and Aggregates Safety and Health Association
www.masha.on.ca

Municipal Health and Safety Association
www.mhsao.com

Ontario Forestry Safe Workplace Association
www.ofswa.on.ca

Ontario Safety Association for Community and Healthcare
www.osach.ca

Ontario Service Safety Alliance
www.ossa.com

Pulp & Paper Health and Safety Association
www.pphsa.on.ca

Transportation Health & Safety Association of Ontario
www.thsao.on.ca

Workers Health & Safety Centre
www.whsc.on.ca

Occupational Health Clinics for Ontario Workers
www.ohcow.on.ca

Other sources of information on heat stress include:

Health Canada
www.hc-sc.gc.ca

Occupational Safety and Health Administration (USA)
www.osha.gov/SLTC/heatstress/recognition.html

For information on humidity, weather reports, and smog alerts:

Environment Canada
www.msc.ec.gc.ca

Environment Canada fact sheet:
summer severe weather
www.on.ec.gc.ca/severe-weather/summer.html

OHCOW Humidex-based heat stress calculator
www.ohcow.on.ca/menuweb/heat_stress_calculator.htm

Environment Canada Humidex calculator
lavoieverte.qc.ec.gc.ca/meteo/Documentation/Humidex_e.html

Environment Canada weather office
www.weatheroffice.ec.gc.ca/canada_e.html

Air Quality Ontario smog advisories
www.airqualityontario.com



Appendix F

Environment Canada contacts

Environment Canada provides regional weather details and forecasts via the services listed below:

www.weatheroffice.ec.gc.ca

Environment Canada (toll-free at **1-800-668-6767**) for options to obtain the latest weather conditions and forecast for your location.

