



Complete Program Title: Heat Stress Prevention Program	Risk Management Manual (RMM) Number: 408
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Responsible Executive: Vice-President, Administration	Enquiries: Environmental and Occupational Health Support Services (EOHSS) ehss@mcmaster.ca
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1 PURPOSE

- 1.1 To promote awareness of the risks associated with extreme heat in the workplace.
- 1.2 To provide direction regarding safe and efficient best practices in the workplace and prevent heat related illness and injury.
- 1.3 To ensure compliance with the Occupational Health and Safety Act.

2 SCOPE

- 2.1 All work areas and work stations utilized by McMaster University faculty, staff, volunteers, and students.

3 Related Documents

- 3.1 Occupational Health & Safety Act RSO 1990 O. Reg. 851 for Industrial Establishments.
- 3.2 Workplace Safety and Insurance Act, 1997
- 3.3 McMaster University RMM# 100 Workplace & Environmental Health and Safety Policy
- 3.4 McMaster University RMM# 101 Risk Management System
- 3.5 McMaster University RMM# 300 Safety Orientation and Training Program
- 3.6 McMaster University RMM# 324 Job Hazard Analysis Program

4 DEFINITIONS

- 4.1 **Employer** – A person who employs one or more workers or contracts for the services of one or more workers and includes a contractor or sub-contractor who performs work or supplies services and a contractor or sub-contractor who undertakes with the owner, constructor, contractor or sub-contractor, to perform work or supply services.
- 4.2 **Fainting** – loss of consciousness due to insufficient blood flow to the brain; frequently caused by some emotional or sensory stimulus.
- 4.3 **Heat Cramps** – painful muscle spasms, usually of the leg muscles, that occur after vigorous exercise, can also occur in the arms and stomach. No long-term problems should arise from heat cramps.
- 4.4 **Heat Stroke** – breakdown of the body's cooling mechanisms causing core body temperature to exceed 41° Celsius; a life-threatening emergency causing unconsciousness and death if not promptly treated in hospital.
- 4.5 **Acclimatization** – a set of physiological adaptations; the process of an individual adjusting to a gradual change in their environment, such as temperature change. Full heat acclimatization requires up to 3 weeks of continued physical activity under heat-stress conditions.
- 4.6 **Humidex** – an index that combines the effects of temperatures and humidity to quantify human discomfort due to perceived heat.
http://www.ccohs.ca/oshanswers/phys_agents/humidex.html
- 4.7 **Relative Humidity** – the moisture content of air expressed as a percent of the maximum it can hold at a given temperature, (% RH). Optimum relative humidity for comfort is between 30% to 60%.
- 4.8 **Temperature** – expressed in degrees Celsius (°C) or degrees Fahrenheit (°F); optimum temperature for comfort is 22 to 24°C (72 to 75°F). Temperature preferences vary greatly among individuals.
- 4.9 **WBGT** – wet bulb globe temperature, an index used to quantify the true level of heat stress on an individual from the combined effects of air temperature, humidity, air movement, and radiant heat. The ACGIH "Work-Rest Regimen" table is based on wet bulb globe temperatures.
- 4.10 **Supervisor** – Person who has charge of a workplace or authority over a worker.
- 4.11 **Worker** – any of the following but does not include an inmate of a correctional institution or like institution or facility who participates inside the institution or facility in a work project or rehabilitation program:
- A person who performs work or supplies services for monetary compensation
 - A secondary school student who performs work or supplies services for no monetary compensation under a work experience program authorized by the school board that operates the school in which the student is enrolled
 - A person who performs work or supplies services for no monetary compensation under a program approved by a college of applied arts and technology, university or other post-secondary institution
 - A person who received training from an employer, by who, under the Employment Standards Act 2000, is not an employee for the purposes of that

Act because the conditions set out in subsection 1 (2) of that Act have been met.

- Such other persons as may be prescribed who perform work or supply services to an employer for no monetary compensation; (“travailleur”).

4.11 Acronyms:

ACGIH – American Conference of Governmental Industrial Hygienists

ASHRAE – American Society of Heating, Refrigerating and Air Conditioning Engineers

CJHSC – Central Joint Health and Safety Committee

EHS – Employee Health Services

EOHSS – Environmental and Occupational Health Support Services

FHS Safety Office – Faculty of Health Sciences Safety Office

JHSC – Joint Health and Safety Committee

MOL – Ministry of Labour

OHCOW – Occupational Health Clinics for Ontario Workers

OHSA – Occupational Health and Safety Act

RMM – Risk Management Manual

RMSG – Risk Management Support Group

WBGT – Wet Bulb Globe Temperature

WSIB – Workplace Safety and Insurance Board

5 RESPONSIBILITIES

5.1 Role of Senior Managers (Deans / Directors / Chairs / Managers):

Senior Managers shall:

- provide the required resources and direction to support the work in the Heat Stress Prevention Program and ensure issues are reviewed.

5.2 Role of Supervisors:

Supervisors shall:

- exercise due diligence for personal safety when assigning work in extreme heat, and shall ensure that all employees are familiar with first aid procedures for heat related injuries or illnesses;
- Follow the OHCOW Humidex Based Heat Response Plan (Appendix 1);
- the ACGIH recommended ‘Work-Rest Regiments’ (Appendix 2) shall be used as a guideline when assigning work in extreme heat;

- where applicable assign work in teams of two or more for personal safety in extreme heat and humidity and, when appropriate, sun safety precautions concerning Occupational Exposure to Sunlight
[\(\[http://www.ccohs.ca/oshanswers/diseases/skin_cancer.html#tphp\]\(http://www.ccohs.ca/oshanswers/diseases/skin_cancer.html#tphp\)\); and](http://www.ccohs.ca/oshanswers/diseases/skin_cancer.html#tphp)
- ensure Injury/Incident Reports are filed with the EOHSS or FHS Safety Office for all heat related injuries and illnesses.

5.3 Role of Faculty, Staff, Students and Volunteers:

Individuals shall:

- participate in the Heat Stress Prevention Program as identified by the Job Hazard Analysis and complete Heat Stress Prevention training;
- follow the best practice extreme heat guidelines for the work involved; and
- report any heat related injuries or illnesses to the supervisor immediately, and
- report extreme heat work concerns to the supervisor and JHSC.

5.4 Role of Environmental and Occupational Health Support Services:

EOHSS shall:

- provide training on heat stress prevention; and
- assist in investigations related to heat related injuries or illnesses, including Heat Stress monitoring, where necessary.

5.5 Role of Faculty Health Science Safety Office (FHS Safety Office):

Faculty Health Sciences Safety Office shall:

- when requested, provide resources for training on heat stress prevention; and
- assist in investigations related to heat related injuries or illnesses.

5.6 Role of Central Joint Health and Safety Committee (CJHSC):

The CJHSC shall:

- review the Heat Stress Prevention Program on a regular basis.

5.7 Role of Joint Health and Safety Committees (JHSC):

JHSC's shall:

- receive all incident reports related to heat related injuries and illnesses in the workplace;
- where required by the Act, participate in the investigation of a heat related injury or illness; and
- report all extreme heat conditions noted during routine workplace safety inspections; and;
- review SOPs on heat stress prevention.

6 EDUCATION AND AWARENESS

Following websites:

- [http://www.healthandsafetyontario.ca/HSO/media/WSN/Resources/Downloads/Heat Stress Guide.pdf?ext=.pdf](http://www.healthandsafetyontario.ca/HSO/media/WSN/Resources/Downloads/Heat_Stress_Guide.pdf?ext=.pdf)
- http://www.ohcow.on.ca/edit/files/general_handouts/heat-stress-calculator.html
- https://www.labour.gov.on.ca/english/hs/pubs/gl_heat.php

7 RECORDS

- 7.1 EHS will retain copies of all injury/incident reports, and keep records of all WSIB claims involving heat related injuries and illnesses or any other work related injury.

Appendix 1 Humidex Based Heat Response Plan

What is it?

- The Humidex plan is a simplified way of protecting workers from heat stress which is based on the 2007 ACGIH Heat Stress TLV[®] (Threshold Limit Value[®]) which uses wet bulb globe temperatures (WBGT) to estimate heat strain. These WBGT's were translated into Humidex.
- The ACGIH specifies an action limit and a TLV[®] to prevent workers' body temperature from exceeding 38°C (38.5°C for acclimatized workers). Below the action limit (Humidex 1 for work of moderate physical activity) most workers will not experience heat stress. Most healthy, well-hydrated, acclimatized workers not on medications will be able to tolerate heat stress up to the TLV[®] (Humidex 2 for moderate physical activity). Between Humidex 1 and Humidex 2, general heat stress controls are needed and above Humidex 2 job-specific controls are needed.
- **Note:** in the translation process some simplifications and assumptions have been made, therefore, **the plan may not be applicable in all circumstances and/or workplaces** (follow steps #1-5 to ensure the Humidex plan is appropriate for your workplace).

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: General controls apply to unacclimatized workers and 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 (e.g. in foundries, around ovens, etc.). NOTE: clothing and radiant heat must also be taken into account when using this guideline (see steps #1-5 outlined on page 3).

Humidex 2, Job-Specific Controls: 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

Appendix 2 Heat Stress Guidelines and References

Recommended Work-Rest Regimens for Outdoor Work

All temperatures are in units of wet bulb globe temperature (WBGT) degrees Celsius. The recommendations are designed to prevent the core body temperatures of fit, acclimatized workers from rising above 38 °C.

Screen Criteria for TLV and Action Limit for Heat Stress Exposure

Allocation of Work in a Cycle of Work and Recovery	TLV® (WBGT values in °C)				Action Limit (WBGT values in °C)			
	Light	Moderate	Heavy	Very Heavy	Light	Moderate	Heavy	Very Heavy
75 to 100%	31.0	28.0	--	--	28.0	25.0	--	--
50 to 75%	31.0	29.0	27.5	--	28.5	26.0	24.0	--
25 to 50%	32.0	30.0	29.0	28.0	29.5	27.0	25.5	24.5
0 to 25%	32.5	31.5	30.5	30.0	30.0	29.0	28.0	27.0

Recommendations for Work in Hot Environments

- Wear light-coloured clothing for working outside to allow free air movement and sweat evaporation.
- Increase the frequency and length of rest breaks.
- Schedule hot jobs at cooler times of the day.
- Provide cool drinking water and consume a cup every 20 minutes or so.
- Make sure everyone is properly acclimatized.
- Recognize the signs and symptoms of heat stress and use a “buddy system” since people are not likely to notice their own symptoms.

ACGIH – Heat Stress Tables http://www.osha.gov/dts/osta/otm/otm_iii/otm_iii_4.html#iii.4_3

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