

## Legal Issues in Sun Safety for Workplaces in Quebec

This fact sheet provides an overview of legal issues in sun safety for workplaces in Quebec. This covers jurisdiction-specific occupational health and safety (OHS) legislation for both solar UV radiation and heat stress. The focus is on OHS legislation, workers compensation legislation has not been covered. The purpose of the fact sheet is to provide an overview of the OHS laws as they apply to sun safety at the time of writing (August 2016), the purpose is not to provide legal advice or opinion. This jurisdiction-specific information should be read with our fact sheet on *Legal Issues in Sun Safety for Canadian Workplaces* which provides an introduction to legal issues associated with implementing a sun safety program.

The Quebec legislation, *An Act Respecting Occupational Health and Safety (QC OHS)*, CQLR c S-2.1, has a general duty for employers and a number of other broad duties of relevance. Supervisors are not expressly referred to. Workers have some relevant duties. The primary regulation, the *Regulation respecting occupational health and safety*, CQLR c S-2.1, r 13, has extensive requirements for heat stress.

Key terms in the QC OHS:

- “worker” does not include managers, superintendents, foremen or agents;
- “workplace”;
- “industrial accident” means a sudden and unforeseen event, attributable to any cause, which happens to a person, arising out of or in the course of his work and resulting in an employment injury to him;
- “occupational disease” means a disease contracted out of or in the course of work and characteristic of that work or directly related to the risks peculiar to that work;
- “radiation” means any transmission of energy in the form of particles or electromagnetic waves with or without the production of ions when interacting with matter;
- “health and safety committee”;
- “principal contractor” means the owner or any other person who, on a construction site, is responsible for the carrying out of all the work;
- inspector; and
- safety representative.

The employer’s general duty is found in section 51: every employer must take the necessary measures to protect the health and ensure the safety and physical well-being of his worker. There are a number of other relevant duties in section 51 regarding, for example, information and training. Under section 52, every employer shall, in accordance with the regulations, keep and maintain a register of risks connected with certain jobs, identifying, in particular, the contaminants and dangerous substances connected with certain jobs, and a register of the risks connected with the kind of work performed by each worker in his employ. “Supervisor” is not defined and there is no specific supervisor duty section.

A health and safety committee is required where there are 20 or more workers. The functions

of the committee set out in section 70 go beyond advisory functions. The committee chooses the physician in charge of health services in the establishment, establishes training and information programs, selects protective devices and equipment, participate in hazard identification and assessment, etc.

A safety representative has functions similar to those of a committee.

The worker has some relevant duties in section 49. A worker has a right to refuse to perform particular work if he has reasonable grounds to believe that the performance of that work would expose him to danger to his health, safety or physical well-being, or would expose another person to a similar danger (s.12).

The employer, in accordance with the regulations may be required to establish a “prevention program” (s.58). The object of a prevention program is to eliminate, at the source, risks to the health, safety, and physical well-being of workers (s.59). The committee and regulator review the prevention program. Extreme sun injuries may be reportable to the regulator (s.62).

Section 112: The physician in charge of health services in an establishment must prepare a specific health program for that establishment. The program must be submitted to the health and safety committee for approval. Section 113 lists requirements for the program.

The primary regulation under the QC OHSA, *Regulation respecting occupational health and safety*, CQLR c S-2.1, r 13, refers to radiation sources but the wording suggests that infra-red and UV radiation from the sun were not contemplated. The regulation defines “heat stress” as heat unbalance in a worker caused by working in a hot environment. Section 3 states the purpose of the regulation is to establish standards pertaining in particular to ... heat stress...

#### Heat Stress

121. Compulsory measurements: In any establishment employing 50 workers or more where workers are exposed to heat stress conditions in which the heat stress index reaches or exceeds the continuous work curve in the graph in Schedule V, this index shall be measured twice a year, once during the summer, at each work station where the index is reached or exceeded.

The measurements obtained in accordance with the first paragraph shall be entered in a register. The register shall be kept for at least 5 years. O.C. 885-2001, s. 121.

122. Method: For the purposes of this Regulation, the heat stress index is measured by the Wet BulbGlobe Temperature Index (W.B.G.T. method) as established in Schedule V. O.C. 885-2001, s. 122.

123. Index exceeds the continuous work curve: In any establishment where workers are exposed to heat stress conditions such that the heat stress index

exceeds the continuous work curve in the graph in Schedule V, the employer shall ensure that the workers thus exposed undergo medical supervision and shall provide them with water at a temperature of between 10 °C and 15 °C, and one shower per 15 exposed workers. O.C. 885-2001, s. 123.

124. Special measures: In any establishment where workers are exposed to heat stress conditions such that the heat stress index exceeds the continuous work curve in the graph in Schedule V, the following measures shall be taken:

- (1) re-equip the exposed work station with reflecting screens, additional insulation or ventilation to reduce the heat stress index of the work station to a value less than or equal to the values of the continuous work curve;
- (2) if the application of paragraph 1 proves impossible or does not allow the continuous work curve to be reached, control the work load, the time of exposure and the rest time in accordance with the alternate work-rest regimen prescribed for that purpose in Schedule V;
- (3) if the application of paragraphs 1 and 2 proves impossible or does not allow the continuous work curves indicated in the graph in Schedule V to be reached or while waiting for the alterations required under paragraph 1 to be done, ensure that the workers wear appropriate individual equipment in accordance with the nature of the heat stress. O.C. 885-2001, s. 124.

#### SCHEDULE V

(s. 121, 122, 123 and 124)

#### EVALUATION OF HEAT STRESS

Wet Bulb-Globe Temperature Index (WBGT) is computed by using the following equations:

(a) outdoors with solar load:  $WBGT = 0.7 WB + 0.2 GT + 0.1 DB$

(b) indoors or outdoors with no solar load:  $WBGT = 0.7 WB + 0.3 GT$

where:

WB = natural wet-bulb temperature

DB = dry-bulb temperature

GT = globe thermometer temperature

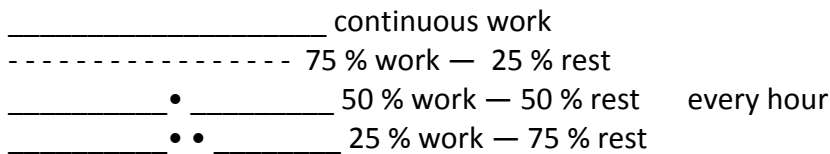
To determine WBGT, the instruments required are a black globe thermometer, a natural (static) wet-bulb thermometer and a dry-bulb thermometer.

Exposure to temperatures in excess of those in Table 1 is permitted under the following conditions: the worker must be under medical supervision and it must be proven that his tolerance for working in heat is greater than that of the average worker.

Table 1  
PERMISSIBLE HEAT EXPOSURE LIMIT VALUES, IN °C (WBGT °C (WBGT))

Alternative Regimen work/rest	Work load		
	Light work	Moderate work	Heavy work
Continuous work	30.0	26.7	25.0
Work 75%, rest 25% (every hour)	30.6	28.0	25.9
Work 50%, rest 50% (every hour)	31.4	29.4	27.9
Work 25%, rest 75% (every hour)	32.2	31.1	30.0

Chart  
PERMISSIBLE HEAT EXPOSURE VALUES



Method of measurement  
WBGT values are measured as follows:

(1) The range of the dry and the natural wet bulb thermometer must be between -50 °C and +50 °C, with an accuracy of ± 0.5 °C. The dry bulb thermometer must be shielded from the sun and other radiant surfaces without restricting the airflow around the bulb. The wick of the natural wet bulb thermometer must be kept wet with distilled water for at least 30 minutes before the temperature reading is made. It is not enough to immerse an end of the wick into a reservoir of distilled water and wait until the wick becomes wet by capillarity; the wick must be wetted by direct application of water from a syringe one-half hour before each reading. The wick must extend over the bulb of the thermometer, covering the stem about one additional bulb length. The wick should always be clean, and new wicks should be washed before being used.

(2) A globe thermometer, consisting of a 15-centimetre diameter hollow copper sphere painted on the outside with a matte black finish or equivalent, must be used. The bulb or sensor of the thermometer (range: -5 °C to +100 °C; accuracy: ± 0.5 °C) must be set at the centre of the sphere. The globe thermometer must be exposed at least 25 minutes before it is read.

(3) A stand must be used to suspend the 3 thermometers so that they do not restrict free air flow around the bulbs, and so that there is no obstacle between the heat sources and the wet bulb globe thermometer.

(4) Any other type of temperature sensor may be used that gives a reading identical to that of a mercury thermometer under the same conditions.

(5) The thermometers must be placed so that the readings are representative of the conditions in which the men work or rest, respectively.

#### Work load

The total heat load is the sum of the heat produced by the body and the environmental heat. Therefore, if the work is performed under hot environmental conditions, the workload category of each job must be established and the permissible heat exposure limit value pertinent to the work load evaluated against the applicable standard in order to protect the worker from exposure beyond the permissible limit.

The jobs performed by a worker must be classified in the following categories:

- (a) light work: up to 200 kcal/h (sitting or standing to control machines; performing light hand or arm work, etc.);
- (b) moderate work: from 200 to 350 kcal/h (walking about with moderate lifting and pushing, etc.);
- (c) heavy work: from 350 to 500 kcal/h (pick and shovel work, etc.)

Table I thus gives the permissible heat exposure limit value for the specified work load.

An activity may be assigned to a particular category by measuring the metabolism of the man at work, namely by estimating his metabolism using the following Table 2:

**Table 2**  
**ASSESSMENT OF WORK LOAD AND AVERAGE VALUES OF METABOLIC RATE DURING DIFFERENT ACTIVITIES**

A. Body position and movement	kcal/h	
Sitting .....	18	
Standing .....	36	
Walking .....	120-180	
Walking uphill .....	Add 48 per metre of rise	
B. Type of work	Average (kcal/h)	Range (kcal/h)
Handwork .....	.....	12-72
light .....	24	
heavy .....	54	

Work using one arm .....	.....	42-150
light .....	60	
heavy .....	108	
 Work using both arms.....	.....	60-210
light .....	90	
heavy .....	150	
 Work using body .....	.....	150-900
light .....	210	
moderate.....	300	
heavy .....	420	
very heavy .....	540	
 Light handwork .....	writing, knitting	
Heavy handwork .....	typing	
Heavy work using one arm .....	hammering in nails (shoemaker, upholsterer)	
Light work using both arms.....	filing metal, planing wood, raking a garden	
Moderate work using both arms.	cleaning a floor, beating a carpet	
Heavy work using the body .....	railroad track laying, digging, barking trees	

C. Basal metabolism: kcal/h

Basal metabolism: minimum quantity of calorific energy used when the body is at complete rest.

Sample calculation: use of a heavy hand tool on an assembly line

A. Walking along..... 120 kcal/h

B. Intermediate value between  
heavy work using 2 arms and light  
work using the body..... 180 kcal/h

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300 kcal/h

C. Basal metabolism .....

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60 kcal/h

Total ..... 360 kcal/h

The tables in the following publications may also be used:

- (a) Astrand P.O., Rodahl K., Textbook of Work Physiology, New York, San Francisco, McGraw Hill Book Company, 1979;
- (b) Ergonomics Guide to Assessment of Metabolic and Cardiac Cost of Physical Work, Amer, Id. Hyg. Assoc. J., 32;
- (c) Energy Requirements for Physical Work, Research Progress Report No 30, Purdue Farm Cardiac Project, Agricultural Experiment Station, 1961;
- (d) Durnin, J.V.G.A., Passmore R., Energy, Work and Leisure, London, Heinemann Educational Books, 1967.

#### Alternate work/rest regimen

The permissible exposure limit values specified in Table I and the Graph are based on the assumption that the WBGT value of the resting place is the same or very close to that of the work location. Limits applicable to continuous work correspond to the following conditions: a 5-day week, an 8-hour working day with a short pause (about a half-hour) for a meal. Higher exposure limits are permitted if additional rest periods are allowed. All breaks, including pauses and administrative or operational waiting periods during work may be counted as rest time when additional rest periods must be given because of high environmental temperatures.

A worker whose job is self-paced will spontaneously limit his hourly work load to 30-35% of his maximum physical performance capacity, either by setting an appropriate work speed or by interspersing unscheduled breaks. Thus the daily average of the worker's metabolic rate seldom exceeds 330 kcal/h. However, within an 8-hour work shift, there may be periods when the worker's average metabolic rate will be higher.

When the WBGT index of the work location is different from that of the rest area, a time-weighted average value should be used for both environmental heat and metabolic rate. When the time-weighted average values are used, the curve to be referred to in the above graph is the solid line.

The time-rated average metabolic rate is determined by the following equation:

$$M \text{ moyen} = \frac{(M1) \times (t1) + (M2) \times (t2) + \dots (Mn) \times (tn)}{(t1) + (t2) + \dots (tn)}$$

where M1, M2 and Mn are estimated metabolic rates for each of the worker's work locations for the entire work period, and t1, t2 and tn are the time in

minutes spent at each corresponding metabolic rate.  
Similarly, the time-weighted average WBGT is determined by the equation:

$$\text{WBGT moyen} = \frac{(\text{WBGT}_1) \times (\text{t}_1) + (\text{WBGT}_2) \times (\text{t}_2) + \dots (\text{WBGT}_n) \times (\text{t}_n)}{(\text{t}_1) + (\text{t}_2) + \dots (\text{t}_n)}$$

where WBGT<sub>1</sub>, WBGT<sub>2</sub>, WBGT<sub>n</sub> represent values calculated in WBGT for various tasks at rest and work stations occupied during all time periods and t<sub>1</sub>, t<sub>2</sub>, t<sub>n</sub> constitute the time in minutes spent at each rest and work station.

When exposure to hot environmental conditions is continuous for several hours or the entire work day, the time-weighted average value must be computed as an hourly time-weighted average, i.e. t<sub>1</sub> + t<sub>2</sub> + ... t<sub>n</sub> = 60 minutes. Where exposure is intermittent, the time-weighted average values must be computed as two-hour time-weighted averages, i.e. t<sub>1</sub> + t<sub>2</sub> + ... t<sub>n</sub> = 120 minutes.

#### Scope of method

The WBGT method does not apply to unacclimatized workers who are physically incapable of performing a specific job or to workers who wear clothing especially adapted to certain dangerous tasks as protection against the heat O.C. 885-2001, Sch. V.

There are drinking water provisions in section 145 etc.