

437-002-XXXX Heat Illness Prevention

(1) Scope and Application

- (a) OAR 437-002-0143 applies to all places of employment that are not adequately climate controlled with a cooling system.
- (b) The requirements of OAR 437-002-0143 apply to work environments that are not equipped with a cooling system when employees are exposed to ambient heat at or above an applicable temperature listed in Table 1 and by various workloads. The applicable temperatures are based upon Wet Bulb Global Temperature (WBGT) measurements and are provided for both acclimatized and unacclimatized workers.
- (c) Workloads are defined as the following:
- A. Light workload - Sitting, standing, light arm/hand work and occasional walking
 - B. Moderate workload - Normal walking, moderate lifting.
 - C. Heavy workload - Heavy material handling, walking at a fast pace.
 - D. Very Heavy - Pick and shovel work.

Note: See Mandatory Appendix A (1) for examples of workloads

Table 1

Workload	Limit for Unacclimated Workers (Action Limit)	Limit for Acclimatized Workers (Threshold Limit Value)
	Effective WBGT	
Light	82.4 °F	86 °F
Moderate	77 °F	82.4 °F
Heavy	73.4 °F	78.8 °F
Very heavy	69.8 °F	77 °F

EXCEPTION:

- OAR 437-002-XXXX does not apply to incidental exposure when an employee is not required to perform a work activity outdoors for more than fifteen minutes in any sixty-minute period. This exception may be applied once every hour during the work shift.
- Heat that is generated from the work process only is not subject to these provisions, but must follow 437-002-0144(2).

(3) This standard applies to the control of heat injuries and illnesses. When any other applicable standard addresses other hazards that may be present, you must comply with the provisions of that standard and this standard. Where the requirements of one standard are more restrictive than the other, follow the more stringent requirements.

(4) Definitions

Acclimatization - temporary adaptation of the body to work in the heat that occurs gradually when a person is exposed to it. Acclimatization peaks in most people within four to fourteen days of regular work for at least two hours per day in the heat.

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Clothing adjustment factors – added to the Wet Bulb Globe Temperature (WBGT) to determine the total thermal stress a worker may experience. See Mandatory Appendix A (2) for additional information.

Cold water - water between the temperature ranges of 35°F - 65°F

Cool water - water between the temperature ranges of 66°F - 77°F

Double-layer woven clothing - Clothing worn in two layers allowing air to reach the skin. For example, coveralls worn on top of regular work clothes.

Drinking water - Potable water that is suitable to drink. Drinking water packaged as a consumer product and electrolyte-replenishing beverages (i.e., sports drinks) that do not contain caffeine are acceptable.

Engineering controls - The use of devices to reduce exposure and aid cooling (i.e., air conditioning).

Heat Illness - a serious medical condition resulting from the body's inability to cope with a particular heat load, and includes heat cramps, heat exhaustion, heat syncope and heat stroke.

Heat wave – According to the US EPA, it is a period lasting at least four days with an average temperature that would only be expected to occur once every 10 years, based on the historical record.

Environmental risk factors for heat illness - conditions that create the possibility that heat illness could occur, including air temperature, relative humidity, radiant heat from the sun and other sources, conductive heat sources such as the ground, air movement, workload severity and duration, protective clothing and personal protective equipment worn by employees.

Monitor - one or more employees designated by the employer that is trained to observe signs related to heat illness and take appropriate actions when signs are identified.

Personal risk factors for heat illness - factors such as an individual's age, degree of acclimatization, health, water consumption, alcohol consumption, caffeine consumption, and use of prescription medications that affect the body's water retention or other physiological responses to heat.

Outdoor environment - An environment where work activities are conducted outside. Work environments such as inside vehicle cabs, sheds, and tents or other structures may be considered an outdoor environment if the environmental factors affecting temperature are not managed by engineering controls. Construction activity is considered to be work in an indoor environment when performed inside a structure after the outside walls and roof are erected.

Shade - blockage of direct sunlight. One indicator that blockage is sufficient is when objects do not cast a shadow in the area of blocked sunlight. Shade is not adequate when heat in the area of shade defeats the purpose of shade, which is to allow the body to cool. For example, a car sitting in the sun does not provide acceptable shade to a person inside it, unless the car is running with a working air conditioning. Shade may be provided by any natural or artificial

Commented [BT4]: https://www.epa.gov/sites/production/files/2016-08/documents/print_high-low-temps-2016.pdf#:~:text=Climate%20Change%20Indicators%20in%20the%20United%20States%3A%20High,every%2010%20years%2C%20based%20on%20the%20historical%20record.

means that does not expose employees to unsafe or unhealthy conditions and that does not deter or discourage access or use.

Vapor barrier clothing - Clothing that significantly inhibits or completely prevents sweat produced by the body from evaporating into the outside air. Such clothing includes encapsulating suits, various forms of chemical resistant suits used for PPE, and other forms of nonbreathing clothing.

Wet bulb globe temperature (WBGT) - The Wet Bulb Globe Temperature (WBGT) is a measure of the heat stress in direct sunlight, which takes into account: temperature, humidity, wind speed, sun angle and cloud cover (solar radiation). See OSHA Technical Manual (OTM) Section III: Chapter 4 to determine the WBGT. See Mandatory Appendix A (3)

(5) Provision of water

(a) Employees must have access to potable water means safe drinking water that meets the bacteriological and chemical quality requirements in OAR Chapter 333, Division 61, Public Water Systems, Oregon Health Authority, including but not limited to the requirements to ensure that workers are provided with cold or cool water for drinking. The water must be located as close as practical to the areas where employees are working. Where drinking water is not plumbed or otherwise continuously supplied, it must be provided in sufficient quantity at the beginning of the work shift to provide 32 oz per employee per hour for drinking for the entire shift. Employers may begin the shift with smaller quantities of water if they have effective procedures for replenishment during the shift as needed to allow employees to drink 32 oz or more per hour. The frequent drinking of water, as described in section (8), must be encouraged. However, do not allow employees to drink more than 48 oz, per NIOSH recommendations.

Note: NIOSH recommends that the drinking water be less than 59 °F

(6) Access to shade

(a) Shade must be present when the temperature exceeds 80 degrees Fahrenheit. When the outdoor temperature in the work area exceeds 80 degrees Fahrenheit, the employer must have and maintain one or more areas with shade at all times while employees are present that are either open to the air or provided with ventilation or cooling. The amount of shade present must be at least enough to accommodate the number of employees on recovery or rest periods, so that they can sit in a normal posture fully in the shade without having to be in physical contact with each other. Per OAR 437-001-0744, the requirements for physical distancing apply (until repealed or amended). The shade must be located as close as practical to the areas where employees are working. Shade present during meal periods must be at least enough to accommodate the number of employees on the meal period who remain onsite.

(b) Shade must be available when the temperature does not exceed 80 degrees Fahrenheit. When the outdoor temperature in the work area does not exceed 80 degrees Fahrenheit, either provide shade as per subsection (6)(a) or provide timely access to shade upon an employee's request.

Commented [BT6]: <https://www.cdc.gov/niosh/mining/USerFiles/works/pdfs/2017-126.pdf>

Commented [BT8]: <https://www.cdc.gov/niosh/docs/2016-106/pdfs/2016-106.pdf>

See the Executive Summary, last paragraph

- (c) Employees must be allowed to take a preventative cool-down rest in the shade when they feel the need to do so to protect themselves from overheating. Employees must have access to shade at all times. An employee who takes a preventative cool-down rest must:
 - (A) Be monitored and asked if he or she is experiencing symptoms of heat illness;
 - (B) Be encouraged to remain in the shade; and
 - (C) Not be ordered back to work until any signs or symptoms of heat illness have abated, but in no event less than 5 minutes in addition to the time needed to access the shade.
- (d) If an employee exhibits signs or reports symptoms of heat illness while taking a preventative cool-down rest or during a preventative cool-down rest period, provide appropriate first aid or emergency response according to subsection (f) of this section.

Exceptions to subsections (6)(a) and (6)(b):

- (1) Unless it is not feasible or unsafe to have a shade structure, or otherwise to have shade present on a continuous basis, utilize alternative procedures for providing access to shade if the alternative procedures provide equivalent protection.

(7) Highheat procedures.

- (a) Implement high-heat procedures when the ambient outdoor temperature meets the definition of a heat wave.. These procedures must include the following to the extent practical:
 - (b) Ensure that effective communication by voice, observation, or electronic means is maintained so that employees at the work site can contact a supervisor when necessary. An electronic device, such as a cell phone or text messaging device, may be used for this purpose only if reception in the area is reliable.
 - (c) Observe employees for alertness and signs or symptoms of heat illness and implement one or more of the following:
 - (A) Must be relieved from duty and provided with a sufficient means to reduce body temperature.
 - (B) Must be monitored to determine whether medical attention is necessary.
 - (C) Must create a mandatory buddy system, or
 - (D) Other effective means of observation
 - (d) Designate one or more employees on each worksite as authorized to call for emergency medical services, and allow other employees to call for emergency services when no designated employee is available.
- (e)
- (f)

(8) Drinking water

- (a) Supply at least 32 oz of drinking water per employee per hour.

(A) Hold pre-shift meetings to the extent practical before the commencement of work to review the high heat procedures, encourage employees to drink plenty of water, and remind employees of their right to take a cool-down rest when necessary and its location.

(B) Ensure that a sufficient quantity of drinking water is readily accessible to employees at all times, reminding employees throughout the work shift to drink plenty of water. An average adult should drink 32 oz. an hour.; and

(C) Ensure that all employees have the opportunity to drink at least 32 oz of drinking water per hour.

(b) Employers are not required to supply the entire quantity of drinking water needed to be supplied for all employees on a full shift at the beginning of the shift. Employers may begin the shift with smaller quantities of drinking water if effective procedures are established for replenishment during the shift.

(9) Emergency Response Procedures

(a) Develop and implement effective emergency response procedures. These procedures must include and address the following:

(A) Ensure that effective communication by voice, observation, or electronic means is maintained so that employees at the work site can contact a supervisor or emergency medical services when necessary. An electronic device, such as a cell phone or text messaging device, may be used for this purpose only if reception in the area is reliable. When electronic devices can not provide reliable communication in the work area, the emergency response procedures must address and ensure a reliable means of summoning emergency medical services is provided and followed.

(B) Responding to signs and symptoms of possible heat illness, including but not limited to first aid measures and how emergency medical services will be provided.

(i) If a supervisor observes, or any employee reports, any signs or symptoms of heat illness in any employee, the supervisor must take immediate action commensurate with the severity of the illness.

(ii) If the signs or symptoms are indicators of severe heat illness (such as, but not limited to, decreased level of consciousness, staggering, vomiting, disorientation, irrational behavior or convulsions), immediately implement the emergency response procedures.

(iii) An employee exhibiting signs or symptoms of heat illness must be monitored and must not be left alone or sent home without being offered onsite first aid and/or being provided with emergency medical services in accordance with the employer's procedures.

(b) Contacting emergency medical services and, if necessary and instructed to do so by the medical professionals, transporting employees to a place where they can be reached by an emergency medical provider.

(c) Ensuring that, in the event of an emergency, clear and precise directions to the work site is provided as needed to emergency responders.

(10) Acclimatization Plan

Employers are responsible to ensure each employee is acclimatized to their work environment. Employers must consider the level of acclimatization that workers may have from previously working in a climate that was considerably warmer than the one under the current employer's control. Acclimatization must have been gained immediately prior (within two weeks) to beginning work or the acclimatization plan described below must be followed.

Workers that are exposed to hot work environments, readily show signs of distress and discomfort, such as increased core temperatures and heart rates, headache or nausea, and other symptoms of heat exhaustion. The employer must observe all employees closely during heat waves. Employers must create and implement an acclimatization plan to include:

- (a) Gradually increase exposure time in hot environmental conditions over a period of 7 to 14 days.
- (b) For new workers, the schedule must be no more than 20% of the usual duration of work in the hot environment on day 1 and a no more than 20% increase on each additional day.
- (c) For workers who have had previous experience with the job, the acclimatization regimen must be no more than 50% of the usual duration of work in the hot environment on day 1, 60% on day 2, 80% on day 3, and 100% on day 4.
- (d) Supervisors must ensure that employees, once acclimatized, acclimatization is maintain by following the recommendations in Mandatory Appendix A (4)

(11) Heat Illness Prevention Plan.

- (a) The employer must establish, implement, and maintain, an effective heat illness prevention plan. The plan must be made available at the worksite to employees and to Oregon OSHA upon request. The plan must, at a minimum, contain:
 - (A) Procedures for the provision of water and access to shade.
 - (B) Procedures for the monitor
 - (C) The high heat procedures referred to in subsection (7).
 - (D) Emergency Response Procedures in accordance with subsection (9).
 - (E) Acclimatization plan and in accordance with subsection (10).
- (b) **Heat Alert Program (HAP)** A written Heat Alert Program must be developed and implemented whenever the National Weather Service or other competent weather service forecasts that a heat wave is likely to occur the following day or days.

(12) Training

- (a) **Employee training.** Effective training annually in the following topics must be provided to each supervisory and non-supervisory employee before the employee begins work that should reasonably be anticipated to result in exposure to the risk of heat illness:
- (A) The environmental and personal risk factors for heat illness, as well as the added burden of heat load on the body caused by exertion, clothing, and personal protective equipment.
 - (B) The employer's procedures for complying with the requirements of this standard, including, but not limited to, the employer's responsibility to provide water, shade, cool-down rests, and access to first aid as well as the employees' right to exercise their rights under this standard without retaliation.
 - (C) The importance of frequent consumption of small quantities of water, up to 4 cups per hour, when the work environment is hot and employees are likely to be sweating more than usual in the performance of their duties.
 - (D) The concept, importance, and methods of the acclimatization plan pursuant to the employer's procedures under subsection (10)
 - (E) The different types of heat illness, the common signs and symptoms of heat illness, and appropriate first aid and/or emergency responses to the different types of heat illness, and in addition, that heat illness may progress quickly from mild symptoms and signs to serious and life threatening illness.
 - (F) The importance to employees of immediately reporting to the employer, directly or through the employee's supervisor, symptoms or signs of heat illness in themselves, or in co-workers.
 - (G) The employer's procedures for responding to signs or symptoms of possible heat illness, including how emergency medical services will be provided should they become necessary.
 - (H) The employer's procedures for contacting emergency medical services, and if necessary and instructed to do so by the medical professionals, for transporting employees to a point where they can be reached by an emergency medical service provider.
 - (I) The employer's procedures for ensuring that, in the event of an emergency, clear and precise directions to the work site can and will be provided as needed to emergency responders. These procedures must include designating a person to be available to ensure that emergency procedures are invoked and followed when appropriate.
 - (J) The effects of nonoccupational factors (drugs, alcohol, obesity, etc.) on tolerance to occupational heat stress.
 - (K) The proper care and use of heat-protective clothing and equipment and the added heat load caused by exertion, clothing, and personal protective equipment.
 - (L) The role, expectations, and responsibilities of the monitor.

(14) Supervisor training.

(a) Prior to supervising employees performing work in work environments that could reasonably result in exposure to the risk of heat illness, effective training on the following topics must be provided to the supervisor:

- (A) The information required to be provided by section (10)(a)(A).
- (B) The procedures the supervisor is to follow to implement the applicable provisions in this section.
- (C) The procedures the supervisor is to follow when an employee exhibits signs or reports symptoms consistent with possible heat illness, including emergency response procedures.
- (D) How to monitor weather reports and how to respond to hot weather advisories.

Mandatory Appendix A

(1) ACGIH, 2011. Heat Stress and Strain, in TLVs and BEIs, American Conference of Industrial Hygienists, Cincinnati, OH. Website last accessed 5/12/2021; <https://www.osha.gov/heat/heat-index/work-rates-loads>

Work Rate Category	Example Motions	Example Tasks
Light	<ul style="list-style-type: none">• Sitting with light manual work with hands and arms• Driving• Standing with some light arm work and occasional walking• Casual walking (2 miles per hour)	<ul style="list-style-type: none">• Using small bench tools or small power tools• Inspecting and sorting produce• Sorting light materials• Assembling small parts• Driving vehicle on roads• Nailing

	<ul style="list-style-type: none"> Lifting 10 pounds fewer than eight times per minute, or 25 pounds less than four times per minute 	
Moderate	<ul style="list-style-type: none"> Sustained moderate hand and arm work Moderate arm and leg work Moderate arm and trunk work Moderate pushing and pulling Walking at a moderate speed Lifting 10 pounds 10 times per minute, or 25 pounds six times per minute 	<ul style="list-style-type: none"> Picking fruits and vegetables (bending, squatting) Painting with a brush Pushing or pulling lightweight carts or wheelbarrows Off road operation of trucks, tractors or construction equipment Operating an air hammer Weeding or hoeing
Heavy	<ul style="list-style-type: none"> Intense arm and trunk work Carrying, shoveling, manual sawing Pushing or pulling heavy loads Walking at a fast pace (4 miles per hour) Lifting 10 pounds 14 times per minute, or 25 pounds 10 times per minute 	<ul style="list-style-type: none"> Transferring heavy materials, shoveling Sledgehammer work Hand mowing, digging Concrete block laying Pushing or pulling loaded hand carts or wheelbarrows
Very heavy	<ul style="list-style-type: none"> Very intense activity at fast to maximum pace Jogging, running or walking faster than 4 miles per hour <p>Lifting 10 pounds more than 18 times per minute, or 25 pounds more than 13 times per minute</p>	<ul style="list-style-type: none"> Heavy shoveling or digging Ax work Climbing stairs, ramps or ladders

(2) Clothing adjustment factors

Type of Clothing	Clothing Adjustment Factor – This amount must be added to the measured WBGT when determining heat stress.
Normal work clothes (e.g., long sleeve shirt and pants)	0
Cloth (woven) coveralls*	0
SMS polypropylene coveralls*	0.9 °F
Polyolefin coveralls*	1.8 °F
Double layer of clothing	5.4 °F
Limited-use vapor-barrier coveralls*	19.8 °F

* Coveralls assume that only undergarments, not a second layer of clothing, are worn underneath.

Table adapted from *TLVs® and BEIs®. Thermal stress: heat stress and heat strain.* (ACGIH, 2017).

Other clothing adjustment factors are available in the literature

(3) OSHA Technical Manual (OTM) Section III: Chapter 4. Heat Stress.
<https://www.osha.gov/otm/section-3-health-hazards/chapter-4> Last accessed May 17, 2021.

(4) Maintaining acclimatization

- Can be maintained for a few days of non-heat exposure
- Absence from work in the heat for a week or more results in a significant loss in the beneficial adaptations leading to an increased likelihood of acute dehydration, illness, or fatigue.
- Can be regained in 2 to 3 days upon return to a hot job.
- Appears to be better maintained by those who are physically fit.
- Seasonal shifts in temperatures may result in difficulties.
- Working in hot, humid environments provides adaptive benefits that also apply in hot, desert environments, and vice versa.
- Air conditioning will not affect acclimatization.

(5) OSHA-NIOSH Heat Safety Tool App - The OSHA-NIOSH Heat Safety Tool is a useful resource for planning outdoor work activities based on how hot it feels throughout the day. Featuring real-time heat index and hourly forecasts, specific to your location, as well as occupational safety and health recommendations from OSHA and NIOSH, available online; <https://www.cdc.gov/niosh/topics/heatstress/heatapp.html> Website last accessed May 13, 2021