



HEAT STRESS

Heat Stress is very real and it can arise in many different situations. Forms of heat stress include heat rash, heat cramps, heat exhaustion, and heat stroke. Being able to recognize and prevent the signs and symptoms of heat stress and knowing how to treat them if they arise will be your first line of defense in making sure that heat related illness does not overtake you or your co-workers. This document offers knowledge and resources so that you may educate yourself and your workforce on this important topic.

RECOGNITION

HEAT RASH

Heat rash is skin irritation caused by sweat that does not evaporate from the skin. Heat rash is the most common problem in hot work environments. The symptoms of heat rash will look like clusters of red bumps on the skin and they will often appear on the neck, upper chest, and folds of skin. For first aid measures for these symptoms you should move the person into a cooler, less humid environment if possible. And it is going to best to keep the affected areas of the skin dry.

HEAT CRAMPS

Heat cramps are caused by the loss of body salts and fluid during sweating. Low salt levels in muscles cause painful cramps. Tired muscles are usually the ones most affected by cramps. Cramps may occur during or after working hours. A person with heat cramps will most likely feel muscle spasms and pain. The areas affected will usually be somewhere in the abdomen, arms, or legs. The first aid measures for these symptoms will be to have the person rest in a shady, cool area. The person with heat related cramps should drink water or some other cool beverage. And the supervisor or manager should wait a few hours before allowing the worker with heat cramps to return to strenuous work. If the heat related cramps do not go away these first aid measures then the person should seek medical attention.

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HEAT EXHAUSTION

Heat exhaustion is the body's response to loss of water and salt from heavy sweating. A person with heat exhaustion will most likely have the following symptoms: cool and moist skin, they will be sweating heavily, headache, nausea or vomiting, dizziness, light headedness, weakness, thirst, irritability, and a fast heartbeat. The first aid measures for heat exhaustion are to have the person sit or lie down in a cool, shady area. Give them plenty of water or other cool beverages to drink. Cool the person with cold compresses or ice packs. Take them to the clinic or emergency room for medical evaluation or treatment if signs or symptoms worsen or do not improve within 60 minutes. The person should not return to work that day.

HEAT STROKE

Heat stroke is the most serious form of heat-related illness and it happens when the body becomes unable to regulate its core temperature. Sweating stops and the body can no longer rid itself of excess heat. A person with heat stroke will show the following symptoms: confusion, fainting, seizures, excessive sweating or red, hot, dry skin, and a very high body temperature. The best thing to do first is to call 911. While you are waiting for the emergency services to arrive you should place the person in a shady, cool area. Loosen their clothing and remove outer clothing if possible. Fan air on the person and place cold packs in their armpit areas. Wet the person with cold water and apply ice packs, cool compresses, or ice if it is available. Provide fluids, preferably water, as soon as possible. And stay with the person until help arrives.

PREVENTION

Most heat-related health problems can be prevented, or the risk of developing them can be reduced. Recognizing the hazard before it arises is the key to preventing a heat related illness. Good engineering controls and work practices will help you avoid these issues before they arise. Wearing the right personal protective equipment and educating the workforce on heat stress matters will help in creating a safer work environment for all.

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ENGINEERING CONTROLS

The best way to prevent heat-related illness is to make the work environment cooler. This is possible in an indoor environment but not always possible in outdoor operations. A variety of engineering controls can reduce workers' exposure to heat:

- Air conditioning (such as air-conditioned mobile equipment cabs and air conditioning in break rooms).
- Increased general ventilation.
- Cooling fans.
- Local exhaust ventilation at points.
- Reflective shields to redirect radiant heat.
- Insulation of hot surfaces (such as furnace walls).
- Elimination of steam leaks.

WORK PRACTICES

- Employers should have an emergency plan in place that specifies what to do if a worker has signs of heat-related illness, and ensures that medical services are available if needed.
- Employers should take steps that help workers become acclimatized (gradually build up exposure to heat), especially workers who are new to working in the heat or have been away from work for a week or more. Gradually increase workloads and allow more frequent breaks during the first week of work.
- Workers must have adequate potable (safe for drinking) water close to the work area, and should drink small amounts frequently.
- Rather than being exposed to heat for extended periods of time, workers should, wherever possible, be permitted to distribute the workload evenly over the day and incorporate work/rest cycles. (See [About Work/Rest Schedules.](#))
- If possible, physical demands should be reduced during hot weather, or heavier work scheduled for cooler times of the day.
- Rotating job functions among workers can help minimize overexertion and heat exposure.
- Workers should watch out for each other for [symptoms of heat-related illness](#) and administer appropriate [first aid](#) to anyone who is developing a heat-related illness.
- In some situations, employers may need to conduct physiological monitoring of workers.

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PERSONAL PROTECTIVE EQUIPMENT

Workers should be aware that use of certain personal protective equipment (e.g., certain types of respirators and impermeable clothing) can increase the risk of heat-related illness.

In some situations, special cooling devices can protect workers in hot environments:

- In some workplaces, insulated gloves, insulated suits, reflective clothing, or infrared reflecting face shields may be needed.
- Thermally conditioned clothing might be used for extremely hot conditions; for example:
 - A garment with a self-contained air conditioner in a backpack.
 - A garment with a compressed air source that feeds cool air through a vortex tube.
 - A plastic jacket whose pockets can be filled with dry ice or containers of ice.

TRAINING

Workers and supervisors should be trained about the hazards of heat exposure and their prevention. Topics should include:

- Risk factors for heat-related illness.
- Different types of heat-related illness, including how to recognize common signs and symptoms.
- Heat-related illness prevention procedures.
- Importance of drinking small quantities of water often.
- Importance of acclimatization, how it is developed, and how your worksite procedures address it.
- Importance of immediately reporting signs or symptoms of heat-related illness to the supervisor.
- Procedures for responding to possible heat-related illness.
- Procedures to follow when contacting emergency medical services.
- Procedures to ensure that clear and precise directions to the work site will be provided to emergency medical services.



STANDARDS AND RESOURCES

EXTREME HEAT ALERTS

OSHA has partnered with the National Oceanic and Atmospheric Administration (NOAA) on [weather service alerts](#). NOAA's alerts are based on a "heat index" that indicates how hot it really feels when relative humidity is factored with the actual air temperature. This information can help workers and employers take precautions in a timely way to prevent heat-related illness. Also see OSHA Heat Stress App which is available for download on your mobile device - https://www.osha.gov/SLTC/heatillness/heat_index/heat_app.html.

Under the [General Duty Clause](#), Section 5(a)(1) of the Occupational Safety and Health Act (OSHA) of 1970, employers are required to provide their employees with a place of employment that "is free from recognizable hazards that are causing or likely to cause death or serious harm to employees." The courts have interpreted OSHA's general duty clause to mean that an employer has a legal obligation to provide a workplace free of conditions or activities that either the employer or industry recognizes as hazardous and that cause, or are likely to cause, death or serious physical harm to employees when there is a feasible method to abate the hazard. This includes heat-related hazards that are likely to cause death or serious bodily harm.

RELATED STANDARDS

- The Personal Protective Equipment (PPE) standard at [29 CFR 1910.132\(d\)](#) requires every employer in general industry to conduct a hazard assessment to determine the appropriate PPE to be used to protect employees from the hazards identified in the assessment. See also [29 CFR 1917.95](#) (maritime).
- The Recordkeeping regulation at [29 CFR 1904.7\(b\)\(5\)](#) requires that employers record certain work-related injuries and illnesses. If a worker requires medical treatment beyond first aid, the worker's illness or injury must be recorded. However, if a worker merely requires first aid for the worker's condition, the employer is not required to record the condition. For example, if a worker requires intravenous fluids, the worker's condition must be recorded. But if a worker is only instructed to drink fluids for relief of heat stress, the worker's condition is not recordable. Refer to [29 CFR 1904.7\(b\)\(5\)](#) for an explanation of the difference between medical treatment and first aid.
- The Sanitation standards at [29 CFR 1910.141](#) require employers to provide potable water.

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- The Medical Services and First Aid standards at [29 CFR 1910.151](#) require that persons onsite be adequately trained to render first aid, in the absence of medical facilities within close proximity.
 - [OSHA Technical Manual \(OTM\)](#). OSHA Directive TED 01-00-015 [TED 1-0.15A], (January 20, 1999). Includes a chapter on [Heat Stress](#) with useful sections on the signs and symptoms of heat stress, sampling methods, control suggestions, and guidelines for investigating heat stress in the workplace.
 - [Heat Stress: General Workplace Review](#). Contains a list of factors that should be considered when investigating heat stress in the workplace.
 - [Heat Stress-Related Illness or Accident Follow-up](#). Includes a brief list of questions to answer when investigating a heat stress illness or accident.
 - [Measurement of Wet Bulb Globe Temperature](#). Provides a brief overview of how to measure and calculate the Wet Bulb Globe Temperature.
 - [Working Outdoors in Warm Climates](#). OSHA Fact Sheet, (September 2005).
 - [Protecting Yourself in the Sun](#). OSHA Publication 3166, (2003). Also available in [Spanish](#). Contains suggestions to protect employees from harmful ultraviolet (UV) radiation.
 - [Protecting Yourself From Heat Stress](#). U.S. Department of Health and Human Services (DHHS), National Institute for Occupational Safety and Health (NIOSH) Publication No. 2010-114, (April 2010). Fast Facts pocket card.
 - [Criteria for a Recommended Standard: Occupational Exposure to Hot Environments](#). U.S. Department of Health and Human Services (DHHS), National Institute for Occupational Safety and Health (NIOSH) Publication No. 86-113, (April 1986).
 - [Heat Injury Prevention & Sun Safety](#). U.S. Army Public Health Command.
 - [Beat the Heat](#). Centers for Disease Control. Podcast discussing symptoms of heat-related illnesses and how to prevent them.
 - [OSHA Campaign to Prevent Heat Illness in Outdoor Workers](#)
 - [Heat Illness](#). National Institutes of Health, Medline Plus. Includes information in multiple languages.
 - [Heat: A Major Killer](#). National Oceanic and Atmospheric Administration (NOAA), National Weather Service. Links to landing page with NWS's heat index description and chart.
 - <https://www.dol.gov/dol/media/webcast/20110426-heat-michaels/index-english.htm> - Video from OSHA Director Dr. Michaels
 - https://www.osha.gov/SLTC/heatillness/heat_index/heat_app.html - Heat Stress App from OSHA
 - https://www.osha.gov/SLTC/heatillness/osha_heattraining_guide_0411.pdf - English – OSHA Heat Training Guide

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- https://www.osha.gov/SLTC/heatillness/osha_heattraining_guide_0411_sp.pdf - Spanish – OSHA Heat Training Guide

OSHA LETTERS OF INTERPRETATION

- [The use of hard hats while working on roofs in hot weather](#). (August 1, 2014). Addresses concerns related to the use of hard hats and roofers' risk of heat-related illnesses from exposure to excessive heat.
- [Whether the use of personal protective equipment is mandatory when working under heat stress conditions](#). (May 18, 2010). OSHA guidance for choosing appropriate PPE to protect workers from electrical hazards when heat stress is a factor.
- [Clarification of preexisting injury/illness and recordkeeping](#). (October 6, 2009). Clarifies recordkeeping requirements for heat-related illnesses.
- [Acceptable methods to reduce heat stress hazards in the workplace](#). (October 17, 2001). Identifies feasible and acceptable methods that can be used to reduce heat stress in workplaces.
- [Fire retardant PPE requirements and PPE hazard assessment](#). (March 27, 1998). Identifies heat and cold stress as factors considered under PPE hazard assessment.
- Search all available [letters of interpretation](#) for heat.