



## Heat Stress

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# OSHA·NIOSH INFOSHEET

## Protecting Workers from Heat Illness

**At times, workers may be required to work in hot environments for long periods. When the human body is unable to maintain a normal temperature, heat-related illnesses can occur and may result in death. This fact sheet provides information to employers on measures they should take to prevent heat-related illnesses and death.**



### Factors That Increase Risk to Workers

- High temperature and humidity
- Direct sun exposure (with no shade)
- Indoor exposure to other sources of radiant heat (ovens, furnaces)
- Limited air movement (no breeze)
- Low fluid consumption
- Physical exertion
- Heavy personal protective clothing and equipment
- Poor physical condition or health problems
- Some medications, for example, different kinds of blood pressure pills or antihistamines
- Pregnancy
- Lack of recent exposure to hot working conditions
- Previous heat-related illness
- Advanced age (65+)

### Health Problems Caused by Hot Environments

**Heat Stroke** is the most serious heat-related health problem. Heat stroke occurs when the body's temperature regulating system fails and body temperature rises to critical levels. **Heat stroke is a medical emergency that may rapidly result in death!**

*Symptoms of heat stroke include:*

- Confusion
- Loss of consciousness
- Seizures
- Very high body temperature
- Hot, dry skin or profuse sweating

*If a worker shows signs of possible heat stroke:*

- **Heat stroke is a life-threatening emergency! While first aid measures are being implemented, call 911 and get emergency medical help.**

- **Make sure that someone stays with the worker until help arrives.**
- Move the worker to a shaded, cool area and remove outer clothing.
- Wet the worker with cool water and circulate the air to speed cooling.
- Place cold wet cloths or ice all over the body or soak the worker's clothing with cold water.

**Heat Exhaustion** is the next most serious heat-related health problem.

*Symptoms of heat exhaustion:*

- Headache
- Nausea
- Dizziness
- Weakness
- Irritability
- Thirst
- Heavy sweating
- Elevated body temperature
- Decreased urine output

*If a worker shows signs of possible heat exhaustion:*

- Workers with signs or symptoms of heat exhaustion should be taken to a clinic or emergency room for medical evaluation and treatment.
- If medical care is not available, **call 911 immediately.**
- Make sure that someone stays with the worker until help arrives.
- Workers should be removed from the hot area and given liquids to drink.
- Remove unnecessary clothing including shoes and socks.
- Cool the worker with cold compresses to the head, neck, and face or have the worker wash his or her head, face and neck with cold water.

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- Encourage frequent sips of cool water. If the worker is unable to drink, get emergency medical help immediately.

**Heat Cramps** are muscle pains usually caused by physical labor in a hot work environment. Heat cramps are caused by the loss of body salts and fluid during sweating.

*If a worker shows signs of possible heat cramps:*

- Workers should replace fluid loss by drinking water and having a snack, and/or carbohydrate-electrolyte replacement liquids (e.g., sports drinks) every 15 to 20 minutes.
- Workers should avoid salt tablets.
- Get medical help if the worker has heart problems, is on a low sodium diet, or if cramps do not subside within one hour.

**Heat Rash** is the most common problem in hot work environments. Heat rash is caused by sweating and looks like a red cluster of pimples or small blisters. Heat rash usually appears on the neck, upper chest, in the groin, under the breasts and in elbow creases.

*If a worker shows signs of possible heat rash:*

- The best treatment for heat rash is to provide a cooler, less humid work environment.
- The rash area should be kept dry.
- Powder may be applied to increase comfort.
- Ointments and creams should not be used on a heat rash. Anything that makes the skin warm or moist may make the rash worse.

## Preventing Heat Illness

The best way to prevent heat illness is to make the work environment cooler.

*Recommendations for All Work Environments (Indoors and Outdoors):*

- Train workers and supervisors about the hazards leading to heat illness and ways to prevent them.
- Train workers to recognize symptoms in themselves and others.
- Train and encourage workers to immediately report symptoms in themselves and others.
- If you have someone who is new to the job or who has been away for more than a week, gradually increase the workload or allow more frequent breaks the first week.
- Provide workers with plenty of cool water in convenient, visible locations close to the work area. Water should have a palatable (pleasant and odor-free) taste and water temperature should be 50-60°F if possible.

- Remind workers to frequently drink small amounts of water before they become thirsty to maintain good hydration. Simply telling them to drink plenty of fluids is not sufficient. During moderate activity, in moderately hot conditions, workers should drink about 1 cup every 15 to 20 minutes. Instruct workers that urine should be clear or lightly colored.
- Workers should eat regular meals and snacks as they provide enough salt and electrolytes to replace those lost through sweating as long as enough water is consumed. Electrolyte drinks (e.g. Gatorade®) are usually not necessary.
- Set up a buddy system if possible; if not, check routinely (several times an hour) to make sure workers are making use of water and shade and not experiencing heat-related symptoms.
- Make workers aware that it is harmful to drink extreme amounts of water. Workers should generally not drink more than 12 quarts (48 cups) in a 24 hour period. If higher amounts of fluid replacement are needed due to prolonged work in high heat conditions, a more comprehensive heat illness prevention program may be warranted.
- Reduce the physical demands of the job. If heavy job tasks cannot be avoided, change work/rest cycles to increase the amount of rest time.
- Schedule frequent rest periods with water breaks in shaded or air-conditioned recovery areas. Note that air conditioning will NOT result in loss of heat tolerance and is recommended for rest breaks.

*Additional Recommendations for Outdoor Work Environments*

- Monitor weather reports daily and reschedule jobs with high heat exposure to cooler times of the day. Be extra vigilant during heat waves when air temperatures rise above normal. When possible, routine maintenance and repair projects should be scheduled for the cooler seasons of the year.

*Additional Recommendations for Indoor Work Environments*

- Indoor workplaces may be cooled by using air conditioning or increased ventilation, if cooler air is available from the outside.
- Other methods to reduce indoor temperature include providing reflective shields to redirect radiant heat, insulating hot surfaces, and decreasing water vapor pressure, e.g., by sealing steam leaks and keeping floors dry.
- The use of fans to increase the air speed over the worker will improve heat exchange between the

skin surface and the air, unless the air temperature is higher than the skin temperature.

- Reflective clothing, such as safety vests, worn as loosely as possible, can minimize heat illness. Water-dampened cotton whole-body suits are an inexpensive and effective personal cooling technique. Cooling vests with pockets that hold cold packs are comfortable and effective.
- More complex and expensive water-cooled suits are also available; however, these may require a battery-driven circulating pump and liquid coolant.
- In worksites where high ambient temperatures typically occur (e.g., foundries, steel mills), professional consultation should be sought to evaluate the extent of the heat exposure and to make recommendations on how to prevent heat-related illnesses.

## Resources

For more information about protecting workers from heat-related illnesses visit:

- OSHA online at:  
[www.osha.gov/SLTC/heatstress/index.html](http://www.osha.gov/SLTC/heatstress/index.html)  
and [www.osha.gov/dts/osta/otm/otm\\_iii/otm\\_iii\\_4.html](http://www.osha.gov/dts/osta/otm/otm_iii/otm_iii_4.html)
- NIOSH online at:  
<http://www.cdc.gov/niosh/topics/heatstress/>
- Cal/OSHA's Heat Safety program at:  
[www.99calor.org/english.html](http://www.99calor.org/english.html)

## OSHA Publications

OSHA has an extensive publications program. For a listing of free items, visit OSHA's web site at [www.osha.gov/publications](http://www.osha.gov/publications) or contact the OSHA Publications Office, U.S. Department of Labor, 200 Constitution Avenue, N.W., N-3101, Washington, DC 20210. Telephone (202) 693-1888 or fax to (202) 693-2498.

## Contacting OSHA

To report an emergency, file a complaint or seek OSHA advice, assistance or products, call (800) 321-OSHA (6742) or contact your nearest OSHA regional, area, or State Plan office; TTY: 1-877-889-5627.

## Contacting NIOSH

To receive documents or more information about occupational safety and health topics, please contact NIOSH: 1-800-CDC-INFO (1-800-232-4636); TTY: 1-888-232-6348; e-mail: [cdcinfo@cdc.gov](mailto:cdcinfo@cdc.gov) or visit the NIOSH web site at [www.cdc.gov/niosh](http://www.cdc.gov/niosh).

This InfoSheet is advisory in nature and informational in content. It is not a standard or regulation, and it neither creates new legal obligations nor alters existing obligations created by OSHA standards or the Occupational Safety and Health Act. Pursuant to the OSH Act, employers must comply with safety and health standards and regulations issued and enforced either by OSHA or by an OSHA-approved State Plan. In addition, the Act's General Duty Clause, Section 5(a)(1), requires employers to provide their employees with a workplace free from recognized hazards likely to cause death or serious physical harm. The mention of any nongovernmental organization or link to its web site in this guidance does not constitute an endorsement by NIOSH or OSHA of that organization or its products, services, web site.

For more complete information:



U.S. Department of Labor  
Hilda L. Solis, Secretary of Labor



[www.osha.gov](http://www.osha.gov)  
(800) 321-OSHA



[www.cdc.gov/niosh](http://www.cdc.gov/niosh)  
(800) 232-4636

# OSHA Fact Sheet

## Working Outdoors in Warm Climates

Hot summer months pose special hazards for outdoor workers who must protect themselves against heat, sun exposure, and other hazards. Employers and employees should know the potential hazards in their workplaces and how to manage them.

### Sun

Sunlight contains ultraviolet (UV) radiation, which causes premature aging of the skin, wrinkles, cataracts, and skin cancer. There are no safe UV rays or safe suntans. Be especially careful in the sun if you burn easily, spend a lot of time outdoors, or have any of the following physical features: numerous, irregular, or large moles; freckles; fair skin; or blond, red, or light brown hair. Here's how to block those harmful rays:

- Cover up. Wear loose-fitting, long-sleeved shirts and long pants.
- Use sunscreen with a sun protection factor (SPF) of at least 30. Be sure to follow application directions on the bottle or tube.
- Wear a hat. A wide brim hat, not a baseball cap, works best because it protects the neck, ears, eyes, forehead, nose, and scalp.
- Wear UV-absorbent sunglasses (eye protection). Sunglasses don't have to be expensive, but they should block 99 to 100 percent of UVA and UVB radiation. Before you buy sunglasses, read the product tag or label.
- Limit exposure. UV rays are most intense between 10 a.m. and 4 p.m.

OSHA Card—Protecting Yourself in the Sun  
[www.osha.gov/Publications/osha3166.pdf](http://www.osha.gov/Publications/osha3166.pdf)

### Heat

The combination of heat and humidity can be a serious health threat during the summer months. If you work outside (for example, at a beach resort, on a farm, at a construction site) or in a kitchen, laundry, or bakery you may be at increased risk for heat-related illness. So, take precautions. Here's how:

- Drink small amounts of water frequently.
- Wear light-colored, loose-fitting, breathable clothing—cotton is good.

- Take frequent short breaks in cool shade.
- Eat smaller meals before work activity.
- Avoid caffeine and alcohol or large amounts of sugar.
- Work in the shade.
- Find out from your health care provider if your medications and heat don't mix.
- Know that equipment such as respirators or work suits can increase heat stress.

There are three kinds of major heat-related disorders—heat cramps, heat exhaustion and heat stroke. You need to know how to recognize each one and what first aid treatment is necessary.

OSHA Heat Stress Fact Sheet:  
[www.osha.gov/OshDoc/data\\_Hurricane\\_Facts/heat\\_stress.pdf](http://www.osha.gov/OshDoc/data_Hurricane_Facts/heat_stress.pdf)

OSHA Heat Stress Quick Card:  
[www.osha.gov/Publications/osha3154.pdf](http://www.osha.gov/Publications/osha3154.pdf)

### Lyme Disease/Tick-Borne Diseases

These illnesses (i.e., Rocky Mountain spotted fever) are transmitted to people by bacteria from bites of infected deer (blacklegged) ticks. In the case of Lyme disease, most, but not all, victims will develop a “bulls-eye” rash. Other signs and symptoms may be non-specific and similar to flu-like symptoms such as fever, lymph node swelling, neck stiffness, generalized fatigue, headaches, migrating joint aches, or muscle aches. You are at increased risk if your work outdoors involves construction, landscaping, forestry, brush clearing, land surveying, farming, railroads, oil fields, utility lines, or park and wildlife management. Protect yourself with these precautions:

- Wear light-colored clothes to see ticks more easily.



- Wear long sleeves; tuck pant legs into socks or boots.
- Wear high boots or closed shoes that cover your feet completely.
- Wear a hat.
- Use tick repellants, but not on your face.
- Shower after work. Wash and dry your work clothes at high temperature.
- Examine your body for ticks after work. Remove any attached ticks promptly and carefully with fine-tipped tweezers by gripping the tick. Do not use petroleum jelly, a hot match, or nail polish to remove the tick.

OSHA Lyme Disease Fact Sheet:  
[www.osha.gov/OshDoc/data\\_LymeFacts/lyme fac.pdf](http://www.osha.gov/OshDoc/data_LymeFacts/lyme fac.pdf)

### West Nile Virus

West Nile virus is transmitted by the bite of an infected mosquito. Mild symptoms include fever, headache, and body aches, occasionally with a skin rash on the trunk of the body and swollen lymph glands. Symptoms of severe infection include headache, high fever, neck stiffness, stupor, disorientation, coma, tremors, convulsions, muscle weakness, and paralysis. You can protect yourself from mosquito bites in these ways:

- Apply Picaridin or insect repellent with DEET to exposed skin.
- Spray clothing with repellents containing DEET or permethrin. (Note: Do not spray permethrin directly onto exposed skin.)
- Wear long sleeves, long pants, and socks.
- Be extra vigilant at dusk and dawn when mosquitoes are most active.
- Get rid of sources of standing water (used tires, buckets) to reduce or eliminate mosquito breeding areas.

OSHA West Nile Virus Fact Sheet:  
[www.osha.gov/OshDoc/data\\_Hurricane\\_Facts/west\\_nile\\_virus.pdf](http://www.osha.gov/OshDoc/data_Hurricane_Facts/west_nile_virus.pdf)

OSHA Safety and Health Information Bulletin:  
 “Workplace Precautions Against West Nile Virus”

<http://www.osha.gov/dts/shib/shib082903b.pdf>

### Poison Ivy-Related Plants

Poison ivy, poison oak and poison sumac have poisonous sap (urushiol) in their roots, stems, leaves and fruits. The urushiol may be deposited on the skin by direct contact with the plant or by contact with contaminated objects, such as clothing, shoes, tools, and animals.

Approximately 85 percent of the general population will develop an allergy if exposed to poison ivy, oak or sumac. Forestry workers and firefighters who battle forest fires have developed rashes or lung irritations from inhaling the smoke of burning plants.

- Wear long-sleeved shirts and long pants, tucked into boots. Wear cloth or leather gloves.
- Apply barrier creams to exposed skin.
- Educate workers on the identification of poison ivy, oak, and sumac plants.
- Educate workers on signs and symptoms of contact with poisonous ivy, oak, and sumac.
- Keep rubbing alcohol accessible. It removes the oily resin up to 30 minutes after exposure.

OSHA Web Page—Poisonous Plants:  
[www.osha.gov/SLTC/etools/sawmills/poison.html](http://www.osha.gov/SLTC/etools/sawmills/poison.html)

**This is one in a series of informational fact sheets highlighting OSHA programs, policies or standards. It does not impose any new compliance requirements. For a comprehensive list of compliance requirements of OSHA standards or regulations, refer to Title 29 of the Code of Federal Regulations. This information will be made available to sensory impaired individuals upon request. The voice phone is (202) 693-1999; teletypewriter (TTY) number: (877) 889-5627.**

For more complete information:



U.S. Department of Labor

[www.osha.gov](http://www.osha.gov)

(800) 321-OSHA

## Protecting Workers from Heat Stress

### Heat Illness

Exposure to heat can cause illness and death. The most serious heat illness is heat stroke. Other heat illnesses, such as heat exhaustion, heat cramps and heat rash, should also be avoided.

There are precautions your employer should take any time temperatures are high and the job involves physical work.

### Risk Factors for Heat Illness

- High temperature and humidity, direct sun exposure, no breeze or wind
- Low liquid intake
- Heavy physical labor
- Waterproof clothing
- No recent exposure to hot workplaces

### Symptoms of Heat Exhaustion

- Headache, dizziness, or fainting
- Weakness and wet skin
- Irritability or confusion
- Thirst, nausea, or vomiting

### Symptoms of Heat Stroke

- May be confused, unable to think clearly, pass out, collapse, or have seizures (fits)
- May stop sweating

### To Prevent Heat Illness, Your Employer Should

- Establish a complete heat illness prevention program.
- Provide training about the hazards leading to heat stress and how to prevent them.
- Provide a lot of cool water to workers close to the work area. At least one pint of water per hour is needed.



U.S. Department of Labor

For more information:

**OSHA<sup>®</sup>** Occupational Safety and Health Administration  
[www.osha.gov](http://www.osha.gov) (800) 321-OSHA (6742)

- Modify work schedules and arrange frequent rest periods with water breaks in shaded or air-conditioned areas.
- Gradually increase workloads and allow more frequent breaks for workers new to the heat or those that have been away from work to adapt to working in the heat (acclimatization).
- Routinely check workers who are at risk of heat stress due to protective clothing and high temperature.
- Consider protective clothing that provides cooling.



## How You Can Protect Yourself and Others

- Know signs/symptoms of heat illnesses; monitor yourself; use a buddy system.
- Block out direct sun and other heat sources.
- Drink plenty of fluids. Drink often and BEFORE you are thirsty. Drink water every 15 minutes.
- Avoid beverages containing alcohol or caffeine.
- Wear lightweight, light colored, loose-fitting clothes.



## What to Do When a Worker is Ill from the Heat

- Call a supervisor for help. If the supervisor is not available, call 911.
- Have someone stay with the worker until help arrives.
- Move the worker to a cooler/shaded area.
- Remove outer clothing.
- Fan and mist the worker with water; apply ice (ice bags or ice towels).
- Provide cool drinking water, if able to drink.

**IF THE WORKER IS NOT ALERT or seems confused, this may be a heat stroke. CALL 911 IMMEDIATELY and apply ice as soon as possible.**

**If you have any questions or concerns, call OSHA at 1-800-321-OSHA (6742).**



U.S. Department of Labor

For more information:



**Occupational  
Safety and Health  
Administration**

[www.osha.gov](http://www.osha.gov) (800) 321-OSHA (6742)