

HEAT STRESS



NIOSH Fast Facts



[Protecting Yourself from Heat Stress](http://niosh/docs/2010-114/pdfs/2010-114.pdf)  ([/niosh/docs/2010-114/pdfs/2010-114.pdf](http://niosh/docs/2010-114/pdfs/2010-114.pdf))
[Print](http://niosh/docs/2010-114/) ([/niosh/docs/2010-114/](http://niosh/docs/2010-114/)) or [order](http://wwwn.cdc.gov/pubs/niosh.aspx) (<http://wwwn.cdc.gov/pubs/niosh.aspx>) this free card for easy access to important safety information.

Overview

Workers who are exposed to extreme heat or work in hot environments may be at risk of heat stress. Exposure to extreme heat can result in occupational illnesses and injuries. Heat stress can result in heat stroke, heat exhaustion, heat cramps, or heat rashes. Heat can also increase the risk of injuries in workers as it may result in sweaty palms, fogged-up safety glasses, and dizziness. Burns may also occur as a result of accidental contact with hot surfaces or steam.

Workers at risk of heat stress include outdoor workers and workers in hot environments such as firefighters, bakery workers, farmers, construction workers, miners, boiler room workers, factory workers, and others. Workers at greater risk of heat stress include those who are 65 years of age or older, are overweight, have heart disease or high blood pressure, or take medications that may be affected by extreme heat.

Prevention of heat stress in workers is important. Employers should provide training to workers so they understand what heat stress is, how it affects their health and safety, and how it can be prevented.

Types of Heat Stress

[Heat Stroke](#) (# [Heat Stroke](#)) | [Heat Exhaustion](#) (# [Heat Exhaustion](#)) | [Heat Syncope](#) (# [Heat Syncope](#)) | [Heat Cramps](#) (# [Heat Cramps](#)) | [Heat Rash](#) (# [Heat Rash](#))

Heat Stroke

Heat stroke is the most serious heat-related disorder. It occurs when the body becomes unable to control its temperature: the body's temperature rises rapidly, the sweating mechanism fails, and the body is unable to cool down. When heat stroke occurs, the body temperature can rise to 106 degrees Fahrenheit or higher within 10 to 15 minutes. Heat stroke can cause death or permanent disability if emergency treatment is not given.

Symptoms

Symptoms of heat stroke include:

- Hot, dry skin or profuse sweating
- Hallucinations
- Chills
- Throbbing headache
- High body temperature
- Confusion/dizziness
- Slurred speech

First Aid

Take the following steps to treat a worker with heat stroke:

- Call 911 and notify their supervisor.
- Move the sick worker to a cool shaded area.
- Cool the worker using methods such as:
 - Soaking their clothes with water.
 - Spraying, sponging, or showering them with water.
 - Fanning their body.

Heat Exhaustion

Heat exhaustion is the body's response to an excessive loss of the water and salt, usually through excessive sweating. Workers most prone to heat exhaustion are those that are elderly, have high blood pressure, and those working in a hot environment.

Symptoms

Symptoms of heat exhaustion include:

- Heavy sweating
- Extreme weakness or fatigue
- Dizziness, confusion
- Nausea
- Clammy, moist skin
- Pale or flushed complexion
- Muscle cramps
- Slightly elevated body temperature
- Fast and shallow breathing

First Aid

Treat a worker suffering from heat exhaustion with the following:

- Have them rest in a cool, shaded or air-conditioned area.
- Have them drink plenty of water or other cool, nonalcoholic beverages.
- Have them take a cool shower, bath, or sponge bath.

Heat Syncope

Heat syncope is a fainting (syncope) episode or dizziness that usually occurs with prolonged standing or sudden rising from a sitting or lying position. Factors that may contribute to heat syncope include dehydration and lack of acclimatization.

Symptoms

Symptoms of heat syncope include:

- Light-headedness
- Dizziness
- Fainting

First Aid

Workers with heat syncope should:

- Sit or lie down in a cool place when they begin to feel symptoms.
- Slowly drink water, clear juice, or a sports beverage.

Heat Cramps

Heat cramps usually affect workers who sweat a lot during strenuous activity. This sweating depletes the body's salt and moisture levels. Low salt levels in muscles causes painful cramps. Heat cramps may also be a symptom of heat exhaustion.

Symptoms

Muscle pain or spasms usually in the abdomen, arms, or legs.

First Aid

Workers with heat cramps should:

- Stop all activity, and sit in a cool place.
- Drink clear juice or a sports beverage.
- Do not return to strenuous work for a few hours after the cramps subside because further exertion may lead to heat exhaustion or heat stroke.
- Seek medical attention if any of the following apply:
 - The worker has heart problems.
 - The worker is on a low-sodium diet.
 - The cramps do not subside within one hour.

Heat Rash

Heat rash is a skin irritation caused by excessive sweating during hot, humid weather.

Symptoms

Symptoms of heat rash include:

- Heat rash looks like a red cluster of pimples or small blisters.
- It is more likely to occur on the neck and upper chest, in the groin, under the breasts, and in elbow creases.

First Aid

Workers experiencing heat rash should:

- Try to work in a cooler, less humid environment when possible.
- Keep the affected area dry.
- Dusting powder may be used to increase comfort.

Recommendations for Employers

Employers should take the following steps to protect workers from heat stress:

- Schedule maintenance and repair jobs in hot areas for cooler months.
- Schedule hot jobs for the cooler part of the day.
- Acclimatize workers by exposing them for progressively longer periods to hot work environments.
- Reduce the physical demands of workers.
- Use relief workers or assign extra workers for physically demanding jobs.
- Provide cool water or liquids to workers.
 - Avoid alcohol, and drinks with large amounts of caffeine or sugar.
- Provide rest periods with water breaks.
- Provide cool areas for use during break periods.
- Monitor workers who are at risk of heat stress.
- Provide heat stress training that includes information about:
 - Worker risk
 - Prevention
 - Symptoms
 - The importance of monitoring yourself and coworkers for symptoms
 - Treatment
 - Personal protective equipment

Recommendations for Workers

Workers should avoid exposure to extreme heat, sun exposure, and high humidity when possible. When these exposures cannot be avoided, workers should take the following steps to prevent heat stress:

- Wear light-colored, loose-fitting, breathable clothing such as cotton.
 - Avoid non-breathing synthetic clothing.
- Gradually build up to heavy work.
- Schedule heavy work during the coolest parts of day.
- Take more breaks in extreme heat and humidity.
 - Take breaks in the shade or a cool area when possible.
- Drink water frequently. Drink enough water that you never become thirsty. Approximately 1 cup every 15-20 minutes.
- Avoid alcohol, and drinks with large amounts of caffeine or sugar.

- Be aware that protective clothing or personal protective equipment may increase the risk of heat stress.
- Monitor your physical condition and that of your coworkers.

CDC Resources

OSHA-NIOSH INFOSHEET: Protecting Workers from Heat Illness
(<http://www.cdc.gov/niosh/docs/2011-174/>)

MMWR: Heat-Related Deaths among Crop Workers, 1992-2006
(<http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5724a1.htm>)

CDC: Extreme Heat (<http://emergency.cdc.gov/disasters/extremeheat/>)

Additional information on heat stress illnesses and prevention.

En Español (<http://emergency.cdc.gov/disasters/extremeheat/es/>)

Chinese (<http://emergency.cdc.gov/disasters/extremeheat/chi/index.asp>)

French (<http://emergency.cdc.gov/disasters/extremeheat/fr/>)

German (<http://emergency.cdc.gov/disasters/extremeheat/ge/>)

Haitian Creole (<http://emergency.cdc.gov/disasters/extremeheat/cr/>)

Portuguese (<http://emergency.cdc.gov/disasters/extremeheat/po/>)

Vietnamese (<http://emergency.cdc.gov/disasters/extremeheat/vi/>)

NIOSH: Criteria for a Recommended Standard: Occupational Exposure to Hot Environments (Revised Criteria 1986) (/niosh/docs/86-113/)

This document presents the criteria, techniques, and procedures for the assessment, evaluation, and control of occupational heat stress by engineering and preventive work practices. Included are ways of predicting health risks, procedures for control of heat stress, and techniques for prevention and treatment of heat-related illnesses.

NIOSH: Working in Hot Environments (/niosh/docs/86-112/)

Workers who are suddenly exposed to working in a hot environment face additional and generally avoidable hazards to their safety and health. This publication discusses the safety and health consequences of heat stress.

OSHA-NIOSH INFOSHEET: Protecting Workers from Heat Illness (/niosh/docs/2011-174)

Health Hazard Evaluations

- Health Hazard Evaluation Report, HETA 2006-0307-3139 
(/niosh/hhe/reports/pdfs/2006-0307-3139.pdf) [PDF - 3.67MB], Heat Stress and Strain Evaluation Among Aluminum Potroom Employees – Texas
- Health Hazard Evaluation Report, HETA 2005-0215-3099 
(/niosh/hhe/reports/pdfs/2005-0215-3099.pdf) [PDF - 3.89MB], Evaluation of Heat and Carbon Monoxide Exposures to Border Protection Officers at Ports of Entry
- Health Hazard Evaluation Report, HETA 2004-0334-3017
(<http://www2a.cdc.gov/hhe/select.asp?PjtName=41990&bFlag=0&ID=27>), Transportation Security Administration, Palm Beach International Airport, West Palm Beach, Florida
- Health Hazard Evaluation Report, HETA 2003-0311-3052 
(/niosh/hhe/reports/pdfs/2003-0311-3052.pdf), Evaluation of Heat Stress at a Glass Bottle Manufacturer, Lapel, Indiana
- Health Hazard Evaluation Report, HETA 2000-0061-2885
(<http://www2a.cdc.gov/hhe/select.asp?PjtName=33417&bFlag=0&ID=7>), United States Air Force, Seymour Johnson Air Force Base, Goldsboro, North Carolina

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[andscape owing ssistant Dies fro Heat Stroke](#)
[/niosh/face/stateface/i/02_i0_.ht_1](#)

[igrant ar Worker Dies fro Heat Stroke While Working on a To acco ar North Carolina](#)
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[ire ighter Dies of Heat Stroke While aking a ire ine D ring a Wildland ire in California](#)
[/niosh/face/stateface/ca/ca010.ht_1](#)

[Constr ction a orer Dies fro Heat Stroke at nd of Workday](#)
[/niosh/face/stateface/ky/03ky0_3.ht_1](#)

Additional reports can e fo nd y searching for heat stress on [C](#)
[/niosh/face/default.ht_1](#).

Other overn ent eso rces

[Occupational Safety and Health d inistration OSH Safety and Health Topics: Heat Stress](#)
http://www.osha.gov/S_TC/heatstress/index.ht_1  http://www.cdc.gov/Other/disclaimer.ht_1

Provides a g ide to infor ation regarding the recognition eval ation control and co pliance actions involving heat stress.

[OSH Technical an al Section III: Chapter 4 - Heat Stress](#)

http://www.osha.gov/dts/osta/ot_/ot_iii/ot_iii_4.ht_1 
http://www.cdc.gov/Other/disclaimer.ht_1

Provides descriptions of heat disorders investigative g idelines sa pling ethods control and PP .

[OSH Saw ills eTool: Heat Stresses](#) http://www.osha.gov/S_TC/etools/saw_ills/heat.ht_1 
http://www.cdc.gov/Other/disclaimer.ht_1

Provides infor ation on the ha ards of heat stress and possi le sol tions or controls.

[OSH ick Card: Heat Stress](#)  http://www.osha.gov/P_lications/osha31_4.pdf 
http://www.cdc.gov/Other/disclaimer.ht_1 PD - 2.3

Provides heat stress factors sy pto s prevention tips and first aid reco endations.

[OSH act Sheet: Protecting Workers fro ffects of Heat](#) 

http://www.osha.gov/OshDoc/data_H_rricane_acts/heat_stress.pdf 
http://www.cdc.gov/Other/disclaimer.ht_1 PD - 22

Provides infor ation that will help workers nderstand what heat stress is how it ay affect their health and safety and how it can e prevented.

[OSH act Sheet: Working O tdoors in War Cli ates](#) 

http://www.osha.gov/OshDoc/data_H_rricane_acts/working_o_tdoors.pdf 
http://www.cdc.gov/Other/disclaimer.ht_1 PD - 2

Hot s er onths pose special ha ards for o tdoor workers who st protect the selves against heat s ne pos re and other ha ards. ployers and e ployees sho ld know the potential ha ards in their workplaces and how to anage the .

[National Oceanic t ospheric d inistration s NO National Weather Service: Heat](#)

[Inde](#) http://www.nws.noaa.gov/o_/heat/index.sht_1 
http://www.cdc.gov/Other/disclaimer.ht_1

[NO : Heat Wave - a or S er iller](#) 

http://www.nws.noaa.gov/o_/roch_res/heatwave.pdf 

<http://www.cdc.gov/Other/disclaimer.html> PD - 268

Provides general information regarding the recognition and control of heat stress.

www.osha.gov/skininfo/heatstress/heatstresshp.html

<http://www.cdc.gov/Other/disclaimer.html>

Provides documents related to heat stress in the mining industry.

www.fs.fed.us/fire/safety/fitness/heatstress/hs.html

<http://www.cdc.gov/Other/disclaimer.html>

This brochure focuses on the risks of heat stress and what the firefighter should do to minimize those risks.

www.ehponline.org/docs/2009/11/heatstress/heatstress.html

<http://www.cdc.gov/Other/disclaimer.html>

<http://www.cdc.gov/Other/disclaimer.html>

Additional Resources

www.acgih.org/store/ProductDetail.cfm?id=1361

<http://www.cdc.gov/Other/disclaimer.html>

Purchase this document <http://www.acgih.org/store/ProductDetail.cfm?id=1361>

<http://www.cdc.gov/Other/disclaimer.html>

www.ansi.org/recordDetail.asp?sk=ISO_33_3a2004

<http://www.cdc.gov/Other/disclaimer.html>

This document specifies a method for the analytical evaluation and interpretation of the thermal stress experienced by a subject in a hot environment. It describes a method for predicting the sweat rate and the internal core temperature that the human body will develop in response to the working conditions.

<http://www.cdc.gov/Other/disclaimer.html>

Purchase this document http://www.ansi.org/recordDetail.asp?sk=ISO_33_3a2004

<http://www.cdc.gov/Other/disclaimer.html>

www.ansi.org/recordDetail.asp?sk=ISO_128_4_3a2001

<http://www.cdc.gov/Other/disclaimer.html>

This International Standard provides advice to those concerned with the safety of human exposures to extreme hot or cold thermal environments.

Purchase this document http://www.ansi.org/recordDetail.asp?sk=ISO_128_4_3a2001

<http://www.cdc.gov/Other/disclaimer.html>

www.ansi.org/recordDetail.asp?sk=ISO_243_3a18

<http://www.cdc.gov/Other/disclaimer.html>

This document gives a method which can easily be used in an industrial environment for evaluating the stresses on an individual. It applies to the evaluation of the mean effect of heat on an individual during a period representative of his activity but it does not apply to very short periods nor to ones of comfort.

Purchase this document http://www.ansi.org/recordDetail.asp?sk=ISO_243_3a18

<http://www.cdc.gov/Other/disclaimer.html>

N SD

N SD: Keep Cool <http://www.nasdonline.org/docs/d000001-d000100/d000004/d000004.html> <http://www.cdc.gov/Other/disclaimer.html>
 Outdoor worker flyer about heat stress.

N SD: Dangers of Heat Stress <http://www.nasdonline.org/docs/d001601-d00100/d001633/d001633.html> <http://www.cdc.gov/Other/disclaimer.html>
 Provides a script that can be used to deliver a 15-minute training session to employees. The text explains the impact that hot weather work can have on health describes preventive measures and to check briefly on first aid.

Spanish <http://www.nasdonline.org/document/88/d001633s/la-agresion-termica.html> <http://www.cdc.gov/Other/disclaimer.html>

N SD: Heat Stress <http://www.nasdonline.org/docs/d00101-d001800/d00102/d00102.html> <http://www.cdc.gov/Other/disclaimer.html>
 flyer that will enable the reader with information to be able to identify symptoms of heat stroke and exhaustion and know the emergency procedures for both.

Spanish <http://www.nasdonline.org/document/138/d00102s/estres-por-calor.html> <http://www.cdc.gov/Other/disclaimer.html>

Teasdale University - Teasdale Cooperative Extension: Coping with Hot Work Environments

<https://agrillifebookstore.org/publications/details.cfm?whichpublication=20> <http://www.cdc.gov/Other/disclaimer.html>

<http://www.cdc.gov/Other/disclaimer.html>

Spanish <https://agrillifebookstore.org/publications/details.cfm?whichpublication=2080> <http://www.cdc.gov/Other/disclaimer.html>

<http://www.cdc.gov/Other/disclaimer.html>

Related links

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Page last reviewed: May 16, 2012

Page last updated: May 18, 2012

Content source: [National Institute for Occupational Safety and Health](#) Education and Information Division

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