

Heat Stress

Guideline

Revision Date: 08/10/2021

Applies To: Employees who have the potential for exposure to high heat during the course of University work activities.

Table of Contents

Summary	1
Scope	2
Reference Regulations	2
Glossary of Terms	2
Responsibility	3
Deans, Directors, and Department Heads	3
Supervisors.....	3
Employees.....	3
EHS	3
Procedures	4
Related Documents	5
Technical Support	5
Attachments	6

Summary

Work operations involving high air temperatures, radiant heat sources, high humidity, direct physical contact with hot objects, or strenuous physical activities have a high potential for inducing heat stress in employees engaged in such operations. These activities are often conducted in the following locations: the steam tunnels; sections of the Central Power Plant; pipe chases; some mechanical rooms; some kitchens; outdoor construction activities, particularly on roofs; and outdoor construction activities that require the use of protective clothing.

Although no one questions the connection between heat stress and occupational illnesses or injuries, it is difficult to predict who will be affected and when. Two people can work at the same job, under the same conditions, and while one will be affected by the heat, the other will not. Age, weight, degree of physical fitness, degree of acclimatization, metabolism, use of alcohol or drugs and a variety of medical conditions all affect a person's sensitivity to heat. Even the type of clothing worn must be considered. In addition, the measurement of a hot environment involves more than just measuring the ambient air

temperature -- radiant heat, air movement, and relative humidity are all factors that must be determined.

The risk of heat-induced illnesses and injuries may be increased and productivity reduced in situations when the total heat load exceeds the capacities of the body to maintain normal body functions. The purpose of this Guideline is to assist departments in eliminating or reducing those risk factors.

Scope

Employees who have the potential for exposure to high levels of heat during the course of University work activities are covered under this Guideline. Examples of potential high heat job tasks would include but are not limited to grounds keeping and outdoor tasks, steam tunnel activities, work tasks in kitchens or on roofs.

Reference Regulations

- [The General Duty Clause](#) (State of Michigan Act 154 of 1974, MIOSHA Act, Section 408.1011)
- Heat Stress Threshold Limit Value (American Conference of Governmental Industrial Hygienists Threshold Limit Values for Chemical and Physical Agents)
- [Occupational Safety & Health Administration Technical Manual, Section III, Chapter 4, Heat Stress](#)

Glossary of Terms

TERM	DEFINITION
Acclimatization	Refers to biological adaptations that reduce physiologic strain (e.g., heart rate and body temperature), improve physical work capabilities, improve comfort and protects vital organs (brain, liver, kidneys, muscles) from heat injury
Administrative Control	Changes in work procedures such as written safety policies, rules, supervision, schedules, and training with the goal of reducing the duration, frequency, and severity of exposure to hazardous chemicals or situations.
Conduction	The transfer of heat between materials that contact each other. Heat passes from the warmer material to the cooler material. For example, a worker's skin can transfer heat to a contacting surface if that surface is cooler, and vice versa.
Convection	The transfer of heat in a moving fluid. Air flowing past the body can cool the body if the air temperature is cool. On the other hand, air that exceeds 35°C (95°F) can increase the heat load on the body.
Engineering Controls	A device or devices used to eliminate or reduce exposure to a chemical or physical hazard through the implementation or substitution of engineered machinery or equipment.
Evaporative Cooling	When sweat evaporates from the skin. High humidity reduces the rate of evaporation and thus reduces the effectiveness of the body's primary cooling mechanism.

TERM	DEFINITION
Heat Strain	A physiological reaction to environmental heat stress. Depending on individual tolerance and specific environmental conditions, heat strain can manifest itself in a variety of heat disorders, including heat cramps, heat exhaustion, heat syncope, heat stroke, and rashes. Appendix A of this Guideline provides more detailed information on heat disorders.
Heat Stress	Any set of environmental and work load conditions which places excessive demands on the normal regulation of body temperature. When heat stress causes an imbalance between body heat gain and body heat loss, this can result in heat strain.
Radiation	The transfer of heat energy through space. A worker whose body temperature is greater than the temperature of the surrounding surfaces radiates heat to these surfaces. Hot surfaces and infrared light sources radiate heat that can increase the body's heat load.

Responsibility

Deans, Directors, and Department Heads

- Provide information to EHS concerning employees who may be exposed to high heat levels.
- Designate and empower individuals who will be responsible for implementation of this program.
- Ensure an environment where principal investigators/supervisors and other personnel are encouraged to follow this Guideline.

Supervisors

- Implement all procedures in accordance with this Guideline.
- Follow Work Connections procedures for illnesses or injuries.
- Contact EHS to request technical assistance when necessary.

Employees

- Conduct assigned tasks in a safe manner, wear all assigned personal protective equipment, and only use equipment for which they have been formally trained.
- Report any job related illnesses or injuries, questions on health and safety, or any unsafe or unhealthy working conditions to their supervisor.

EHS

- Conduct on-site heat stress evaluations to identify work environments where precautions are needed using the OSHA Technical Manual as a guideline. (See Appendix A for excerpts.) Provide technical assistance to departments in implementing the appropriate controls for their situation.
- Provide training on heat stress to workers and their supervisors and maintain records of such training.
- Serve as a University liaison for local, county, and state agencies regarding safety issues and inspections.
- Schedule and maintain records of all medical surveillance services.

-
- Review and revise the Heat Stress Program as needed.
 - Revise the Hearing Conservation Guideline as needed for compliance with applicable regulations.

Procedures

1. Determining when a Heat Stress Program should be implemented:

The incidence of heat stress is the result of a variety of factors. Factors to be evaluated when considering the need for a Heat Stress Program Include:

- a. Ambient temperature
- b. Relative Humidity
- c. Work location and air movement for cooling
- d. Type of work required - the metabolic heat generated during Heavy, moderate, or light work
- e. Required work clothing and safety equipment -impermeable work clothing increases the potential for heat stress
- f. Employee symptoms and/or complaints
- g. Employee conditioning and/or acclimatization

2. Heat Stress Control Measures

Implement the appropriate control measures for the specific work condition, from among the following possible control methods:

a. Engineering controls

Ventilation, air cooling, fans, shielding, and insulation are the five major types of engineering controls used to reduce heat stress in hot work environments.

Heat reduction can also be achieved by using power assists and tools that reduce the physical demands placed on a worker. However, for this approach to be successful, these devices must require less than the effort required without them.

Where feasible, eliminate steam leaks and shut down hot machinery and equipment.

b. Administrative Controls

The workers should be allowed to take frequent rest breaks in a cooler environment. The higher the heat stress conditions, the longer the rest period should be. The supervisor and worker(s) should agree on a reasonable work schedule that minimizes the duration of heat exposure to the extent possible. Rotation of workers may be one feasible alternative.

c. Protective Clothing

If working outside, wear loose fitting, light colored, porous clothing which allows free air circulation over the body. Wear a well-ventilated broad brimmed hat. If working inside, wear as little clothing as necessary.

d. Work Practices

Cool water (50-60°F) or any cool liquid (except alcoholic beverages) should be made available to workers to encourage them to drink small amounts frequently, e.g., one cup every 20 minutes. An ample supply of liquids should be placed close to the work area. Although some commercial replacement drinks contain salt, this is not necessary for acclimatized individuals because most people add enough salt to their diets.

In some situations, a buddy system (no less than two employees) may be appropriate so the employees can observe each other for early signs of heat strain. Establish a means of communication so that employees can call for assistance or medical emergency when necessary. EHS can assist supervisors in determining when a buddy system and communications would be appropriate.

e. Training

Heat stress training is the key to good work practices for both employees and supervisory personnel. All employees need to understand the reasons for using appropriate work practices to prevent heat stress and ensure a successful program.

Employees who work in hot environments and their supervisors will attend heat stress training conducted by EHS prior to being assigned work tasks in a hot environment. An outline of the training program is contained in Appendix B of this Guideline. Training records will be kept by EHS.

3. Medical Surveillance

Employees identified by EHS evaluation as working in hot work environments will be provided with a medical evaluation. The Medical Surveillance Program is administered by EHS: for more information, contact EHS at (734) 647-1142.

Related Documents

- Occupational Safety and Environmental Health Policy: [SPG 605.1](#)
- Protective Clothing and Equipment Policy: [SPG 201.45](#)
- [MIOSHA Heat Stress: Guidelines for Combating Heat Stress](#)

Technical Support

Supervisors may refer to Appendix A or contact their EHS representative or call (734) 647-1142 for technical assistance in evaluating potential heat stress environments and implementing appropriate control measures.

Attachments

- [Occupational Safety & Health Administration Technical Manual, Section III, Chapter 4, Heat Stress](#)
- [Heat Stress Training Outline](#)