



Protecting Workers in Hot Environments

Summary: Four environmental factors affect the stress a worker faces in a hot work area: temperature, humidity, radiant heat (i.e., from the sun or furnace), and air velocity. Most important to the level of stress an individual faces are personal characteristics such as age, weight, fitness, medical conditions and acclimatization to the heat.

The body reacts to high external temperature by circulating blood to the skin, which increases skin temperature and allows the body to give off excess heat through the skin. Sweating is another means the body uses to maintain a stable internal body temperature in the face of heat. However, sweating is only effective if the humidity levels is low enough to permit evaporation and if the fluids and salts lost are adequately replaced.

If the body cannot dispose of excess heat, it will store it. When this happens, the body's core temperature rises and the heart rate increases. As the body continues to store heat, the individual begins to lose concentration and has difficulty focusing on a task, may become irritable or sick and often loses the desire to drink. The next stage is most often fainting and death is possible if the person is not removed from the heat stress.

Heat Disorders:

Heat Stroke- The most serious health problem for workers in hot environments is caused by the failure of the body's internal mechanism to regulate its core temperature. Sweating stops and the body can no longer rid itself of excess heat. Signs include (1) mental confusion, delirium, loss of consciousness, convulsions or coma, (2) a body temperature of 106 degrees or higher, and (3) hot, dry skin, which may be red, mottled, or bluish. Victims of heat stroke will die unless treated properly. While awaiting medical help, the victim must be removed to a cool area and his or her clothing soaked with cool water. He or she should not be fanned vigorously to increase cooling. Prompt first aid can prevent permanent injury to the brain and other vital organs.

Heat Exhaustion- This results from loss of fluid through sweating when a worker has failed to drink enough fluids or take in enough salt, or both. The worker with heat exhaustion still sweats, but experiences extreme weakness or fatigue, giddiness, nausea, or headache. The skin is clammy and moist, the complexion is pale or flushed, and the body temperature normal or slightly higher. Treatment is usually simple: the victim should rest in a cool place and drink electrolyte solution (i.e., Gatorade, PowerAde). Severe cases involving victims who vomit or lose consciousness may require longer treatment under medical supervision.

Heat Cramps- Painful spasms of the muscles are caused when workers drink large quantities of water, but fail to replace their bodies' salt loss. Tired muscles, those used for performing work, are usually the ones most susceptible to cramps. Cramps may occur during or after working hours and may be relieved by taking liquids by mouth or saline solutions intravenously for quicker relief, if medically determined to be required.

Fainting- (heat syncope) may be a problem for the worker unacclimatized to a hot environment who simply stands still in the heat. Victims usually recover quickly after a brief period of lying down. Moving around, rather than standing still, will usually reduce the possibility of fainting.

Heat Disorders, continued-

Heat Rash- Also known as prickly heat, may occur in hot and humid environments where sweat is not easily removed from the surface of the skin by evaporation. When extensive or complicated by infection, heat rash can be so uncomfortable that it inhibits sleep and impedes a workers performance or even result in temporary total disability. It can be prevented by resting in a cool place and allowing skin to dry.

Preventing Heat Stress

1. General ventilation and spot cooling by local exhaust ventilation at points of high heat production may be helpful. Shielding is required as protection from radiant heat sources, i.e., hats, sunglasses, etc. Cooling fans can also reduce heat in hot conditions.
2. Work practices, such as providing plenty of drinking water- as much as a quart per worker, per hour- at the workplace can help reduce the risk of heat disorders. Training workers in first aid to recognize and treat heat stress disorders and making their names known to all is essential. Employers should also consider an individual worker's physical condition when determining his or her fitness for working in hot environments. Older workers, obese workers and personnel on some types of medication are at greater risk.
3. Alternating work and rest periods with longer rest periods in a cool area can help workers avoid heat stress. If possible, heavy work should be scheduled during the cooler parts of the day and appropriate protective clothing provided. Supervisors should be trained to detect early signs of heat stress and should permit workers to interrupt their work if they are extremely uncomfortable.
4. Acclimatization to the heat through short exposures followed by longer periods of work in the hot environment can reduce heat stress.
5. Employee education is vital so that workers are aware of the need to replace fluids and salt lost through sweat and can recognize dehydration, exhaustion, fainting, heat cramps, etc.