

General  
Issue: 05

Heat Stress

Revised: Dec. 8, 2010

# Safety BULLETIN

## WORKERS VERSUS HOT ENVIRONMENTS: HEAT STRESS

For the next one to two months, many workers will spend some part of their working day in a hot environment which will pose special hazards to personal safety and health.

### Heat Stress and Body Reactions

Four environmental factors affect the amount of stress a worker faces in hot work areas: temperature, humidity, radiant heat (direct sunlight), and air velocity. Perhaps more important to the level of stress and individual faces are personal characteristics such as age, weight, fitness, medical condition, and acclimatization to the heat.

The human body reacts to high external temperature by circulating blood to the skin. This increases skin temperature and allows the body to give off excess heat through the skin. However, if the muscles are being used for physical labor, less blood is available to flow to the skin and release the heat.

Sweating helps the body maintain a stable internal temperature in the face of heat. But sweating is effective only if the humidity level is low enough to permit evaporation and if the fluids and salts lost are adequately replaced.

Of course, other ways of reducing the risk of heat stress such as moving to a cooler place, reducing work pace or load, or removing or loosening some clothing are advised.

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 person 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 often is fainting and then possible death if the person is not removed from the heat stress.

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## 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 ceases and the body can no longer rid itself of excess heat. Signs include:

- (1) Mental confusion, delirium, loss of consciousness, convulsions, or coma;
- (2) Body temperature of 106 degrees F or higher;
- (3) Hot, dry skin which may be red, mottled, or bluish.

Victims of heat stroke will die unless treated promptly. While medical help is being called, the victim must be moved immediately to a cool area and his/her clothing soaked with cool water. He/she should be fanned vigorously to increase cooling. Prompt first aid can prevent permanent injury to the brain and other vital organs.

**Heat exhaustion** is the result of the loss of fluid through sweating when a worker has failed to consume enough fluids or salt or both. The worker with heat exhaustion still sweats, but experiences extreme weakness or fatigue, giddiness, nausea, or flushed, and the body temperature normal or slightly higher. Treatment is usually simple; the victim should rest in a cool place and drink salted liquids. Sever cases that involve vomiting or loss of consciousness may require longer treatment under medical supervision.

**Heat cramps**, painful spasms of the bone muscle, 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 salted liquids by mouth or saline solutions intravenously for quicker relief, if medically determined to be required.

**Fainting** may be a problem for the worker not acclimated to a hot environment that 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 rash**, or 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 impairs work performance or even results in temporary total disability. It can be prevented by resting in a cool place and allowing the skin to dry.

### Preventing Heat Stress

Most heat-related health problems can be prevented or the risk of developing them reduced. Following a few basic precautions should lessen heat stresses.

**Acclimatization** to the heat through short exposures followed by longer periods of work in the hot environment can reduce heat stress. New employees and workers returning from an absence of two weeks or more should have a five-day period of acclimatization. This period should begin with 50 percent of the normal workload and time exposure the first day and gradually building up to 100 percent on the fifth day.

**A variety of engineering controls**, including 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. Evaporative cooling and mechanical refrigeration also reduce heat in hot conditions. Eliminating steam leaks also will help. Equipment modifications, the use of power tools to reduce manual labor, and using personal cooling devices or protective clothing are other ways to reduce heat exposure for workers.

**Work practices**, such as providing an acclimation period for new workers and those returning from two week absences and making plenty of drinking water, as much as a quart per worker per hour, available at the workplace can help reduce the risk of heat disorders. Training First Aid workers to recognize and treat heat stress disorders and making the names of trained first aid staff known to all employees is essential. Employers should also consider their individual workers' physical conditions when determining their fitness for working in hot environments. Older workers, obese workers, and personnel on some types of medication are at greater risk.

**Alternating work and rest periods** with longer rest periods in a cool area can help workers avoid heat strain. 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 strain and should permit workers to interrupt their work if they are extremely uncomfortable.

**Employee education** is very vital! Workers should be aware of the need to replace fluids and salt loss through sweat. They should learn to recognize dehydration, exhaustion, fainting, heat cramps, salt deficiency, heat exhaustion, and heat strokes as heat disorders. Workers should also be informed of the importance of daily weighing before and after work to avoid dehydration.