

CHUBB®

# Heat Stress Awareness in Construction



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## INTRODUCTION

Heat is the leading cause of death among all weather-related phenomena in the United States. Excessive heat in the workplace can cause a number of adverse health effects, including heat stroke and even death if not treated properly. Yet, there is no Federal Occupational Safety and Health (OSHA) standard that regulates heat stress hazards in the workplace.<sup>1</sup>

OSHA is proposing to issue a new standard titled Heat Injury and Illness Prevention in Outdoor and Indoor Work Settings. The standard would apply to all employees conducting outdoor and indoor work in all general industry, construction, maritime and agriculture sectors where OSHA has jurisdiction, with some exceptions.

### **What the New Rule Will Cover:**

#### **The rule applies to all employers and would require them to:**

- Develop a written heat injury and illness prevention plan
- Identify heat hazards
- Develop emergency response procedures
- Train employees and supervisors
- Keep records of monitoring data

The rule would be triggered when employees are exposed to temperatures of 80 degrees for more than 15 minutes in a 60-minute period.

## HEAT STRESS IN CONSTRUCTION

Construction workers exposed to hot environments or extreme heat can be at risk of heat-related illness and injuries. Heat stress is the combination of workers' exposure to heat from physical activity, environmental factors, and/or their clothing which results in an increase in the body's heat storage, known as net heat load (NIOSH 2016). Heat strain is the physiological response to heat stress when the body tries to increase heat loss to the environment in order to maintain a stable body temperature. Core body temperature must be maintained within 1 degree C (1.8-degree F) of normal (about 37 degree C or 98.6-degree F) in order to continue to function normally. (NIOSH 2016)<sup>2</sup>

Factors that influence our ability to maintain normal core body temperature include air temperature, humidity, skin temperature, the speed and temperature of air moving over the body, radiant temperature, clothing type and amount, hydration, and other individual physical and medical characteristics.<sup>2</sup>

Heat stress can lead to unrelieved heat strain, which in turn can increase the risk for Heat Related Illnesses

(HRIs). HRIs include heat stroke, heat exhaustion, fainting, heat cramps, and heat rash. Heat stroke can occur in two forms, classic and exertional. While both can occur in hot environments, exertional heat stroke can happen in the absence of a hot environment, such as working in the winter while wearing protective clothing that doesn't allow the body's heat to dissipate adequately. Sweating, while usually absent in classic heat stroke, is often present in exertional heat stroke.<sup>2</sup>

Construction work is typically labor intensive, which can cause the body to generate excessive heat within the body. Construction workers often work outdoors during the hottest times of the year. Some construction work occurs in non-climate-controlled spaces such as attics and crawlspaces, or indirect sunlight on roofs, roadways, bridges and runways. Other construction jobs may expose workers to heat sources that are part of the work process, such as welding and cutting torches or hot asphalt contained in roofing kettles and paving machines. All of these factors can place construction workers at an increased risk for HRIs.

### Types of Heat Related Illnesses (HRIs)<sup>3</sup>

#### Heat Stroke

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Heat stroke is a Medical Emergency. It can be fatal or cause permanent disability. Signs and symptoms of heat stroke include high body temperature; confusion; loss of coordination; hot, dry skin or profuse sweating; throbbing headache; and seizures or coma. Dial 911. Move the worker to a cool, shaded area. Cool the worker quickly with cold water or ice bath if possible. Remove their outer clothing and apply iced bedsheets or cooling packs to their chest, armpits, and groin. Continue cooling the worker until EMS arrives, unless the worker is shivering.

#### Heat Exhaustion

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Heat exhaustion is the body's response to excessive dehydration and loss of electrolytes and can quickly progress to heat stroke. Signs and symptoms include a rapid heart rate; excessive sweating; extreme weakness or fatigue; dizziness; nausea, vomiting, irritability, shallow breathing; and a slightly elevated body temperature. Move the worker to rest in a cool area. Loosen their clothing. Encourage them to drink plenty of water or other cool beverages. Call 911 if the worker's condition worsens or if there is no improvement within 15 minutes.

#### Heat Cramps

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Heat cramps affect workers who sweat a lot during strenuous activity. Symptoms of heat cramps include muscle cramps, pain or spasms in the abdomen, arms, or legs. Have the affected worker stop all activity and sit in a cool place. Encourage them to drink clear juice or a sports beverage, or drink water with food. Avoid salt tablets. Do not allow the worker to engage in strenuous work for a few hours after the cramps subside. Seek medical attention if the worker has heart problems.

# PREVENTING HEAT-RELATED ILLNESS IN CONSTRUCTION

Construction workers are at risk of death, injuries, illness, and reduced productivity resulting from heat exposure on the job. Between 1992 and 2016, 285 construction workers died from heat-related causes, more than a third of all U.S. occupational deaths from heat exposure (Dong et al. 2019). Approximately 75% of these fatalities occurred during the summer months of June, July, and August.<sup>2</sup>

Injuries to construction workers on hot jobs sites can occur from impaired thinking; dizziness; sweaty, slippery hands; slowed response time; muscle fatigue and cramping; and clouded eyewear that blocks vision.<sup>2</sup>

Keeping construction workers safe from heat-related illness requires a well-written Heat Illness Prevention Plan.

**An effective heat illness prevention plan should cover the following key areas:**

- Engineering and work practice controls
- Training and acclimatization (allowing the body to gradually adjust to the heat)
- Measuring and assessing heat stress
- Medical monitoring and heat-protective clothing and personal protective equipment

Implementing some essential strategies will help in mitigating heat-related illness for construction workers, working in challenging weather environments.



### Symptoms of Heat Illness:

- Headache
- Nausea
- Weakness
- Dizziness
- Heavy Sweating
- High Body Temperature
- Extreme Thirst
- Decreased Urine Output



## RECOMMENDATIONS FOR EMPLOYERS<sup>2</sup>

### Assess the Risk

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- Use the Wet Bulb Globe Temperature Index (WBGT) and occupational limits to protect workers
- Screen workers for heat intolerance
  - Identify previous HRIs, low fitness and other factors that can reduce worker's ability to tolerate physical activity in hot environments
  - Educate workers to consult their healthcare provider about medications and underlying medical conditions that may affect their ability to tolerate heat and physical activity

### Limit Exposure

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- Ensure and encourage workers to take appropriate rest breaks to cool down and hydrate
- Encourage workers to wear light-colored, loose fitting, breathable clothing
- Schedule hot jobs for the cooler part of the day, and/or schedule them for alternate (not successive) days
- When possible, schedule hot routine maintenance work for cooler time of the year
- Provide cool shaded or air-conditioned areas for rest and recovery

- Provide a large container of cool water for workers to immerse their hands and forearms, which reduces skin and core temperature
- Add extra workers to the crew to reduce heat exposure to each crew member and allow the job to continue while some crew members rest
- Require a worker to stop working when they feel heat-related discomfort
- Assign new and unacclimated workers lighter work and longer, more frequent rest periods
- Modify work/rest schedule to allow more rest time

### Enhance Heat Tolerance

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- Develop a plan to acclimatize workers to heat
- Gradually increase the time spent in hot environments over 7 - 14 days
- New workers should be limited to 20% of the time in the heat on the first day and no more than 20% increase of time in the heat on each subsequent day
- Experienced workers should be limited to 50% heat exposure on the first day, 60% on day two, 80% on day three. Beginning on the fourth day, full time work in the heat can be permitted
- Closely supervise new employees for the first 14 days or until fully acclimatized



# RECOMMENDATIONS FOR EMPLOYERS *continued*

### Encourage Hydration

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- Estimate how much water will be needed and decide who will obtain and check on water supplies
- Workers in heat less than 2-hours and involved in moderate work activities should drink 1 cup (8oz) of water every 15 – 20 minutes, but during prolonged sweating lasting several hours, they should drink sports drink containing balanced electrolytes
- Individual, not communal, drinking cups should be provided
- Provide adequate, convenient toilet facilities so workers do not avoid hydration to delay bathroom use

### Create a Heat Alert Program

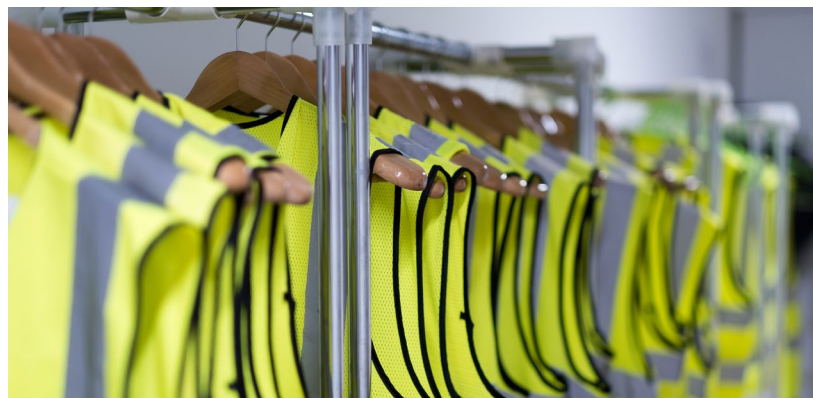
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- Establish a Heat Alert Committee each year by mid-April that includes representatives of management, labor, and a qualified health care provider or health safety professional

- Train everyone involved in the program on the steps to take when the National Weather Service issues an Excessive Heat Watch. Focus on injury and illness prevention, recognition of symptoms of HRIs and first aid procedures
- Instruct managers and supervisors, in writing, to ensure that adequate supplies of cool liquids, first aid supplies, and equipment (such as ice packs and ice bed sheets, or a child wading pool that can be quickly filled with cool water) and cool rest areas are ready at each site
- Have procedures in place to deal with a heat alert such as postponing non-urgent work, increasing crew size at each site; increasing rest times; reminding workers to hydrate; monitoring heat at each site, including work and rest areas; monitoring workers core temperatures; taking additional precautions on the first day of a shift change to account for loss of acclimatization; sending worker who show signs of HRI's for medical evaluation and requiring written permission to return to work; and restricting overtime

## ROLE OF CLOTHING TO MANAGE HEAT-RELATED ILLNESS<sup>2</sup>

The clothing worn by construction workers can have a significant impact when working in hot environments and help keep the body cool and comfortable. Clothing which protects against exposure to sun can also limit or prevent sweat evaporation and convective cooling (Davis and Bishop 2013). In general, the thicker or less permeable the clothing is, the more it hampers heat exchange (NIOSH 2016). Cool, dry air moving freely over exposed skin effectively removes heat from the body and some types of clothing can interfere with that mechanism, even in cool ambient conditions (ACGIH 2017). Clothing and personal protective equipment (PPE) such as impermeable coveralls, can also reduce sweat evaporation. Adjustments to exposure limits and work-rest schedules are required based on the type of clothing and PPE worn and the physical demands of the work being performed. Employers must recognize this and take appropriate steps to address those circumstances on their worksites.



NIOSH has traditionally encouraged construction workers to wear clothing made of breathable fabrics like cotton and avoid wearing non-breathable synthetic fabrics (NIOSH 2010). Synthetic sports apparel has become popular in recent years and is often advertised to keep athletes cooler, drier and more comfortable.

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