

Heat Injury and Illness Prevention in Outdoor and Indoor Work Settings

Regulatory Framework

This document is meant to provide an outline of potential options for the various elements of a proposed rule. OSHA envisions a programmatic standard that could require employers to create a plan to evaluate and control heat hazards in their workplace. The standard could allow for flexibility for employers to customize the plan to their workplace. The standard could also include some elements that set specifications related to heat exposure levels.

In developing this outline, OSHA has identified several options for effective control measures that reflect best practices and guidance. These options are based on the National Institute for Occupational Safety and Health (NIOSH) Criteria for a Recommended Standard (i.e., Criteria Document), existing state standards, and stakeholder comments. This approach is different from past SBREFA panels where OSHA designated a preferred option and alternatives. During SBREFA, the Agency is looking for input from Small Entity Representatives (SERs) on which options would be the least burdensome and most feasible ways for small businesses to adequately protect workers from dangerous heat while achieving OSHA's statutory and regulatory objectives. OSHA will use feedback on these elements and options to develop a rule that is protective, feasible, and as flexible as practical.

Scope and Application

This standard could cover indoor and outdoor work in any/all General Industry, Construction, Maritime, and Agriculture sectors where OSHA has jurisdiction.

OSHA could consider exempting:

- Short duration exposures, such as 15 minutes of work in hazardous heat conditions every 60 minutes
- Emergency operations such as those already covered under 29 CFR 1910.156 or 29 CFR 1910.120 (Note: OSHA is currently engaged in rulemaking on emergency response and there are elements of on scene rehabilitation that address the same issues covered in this standard.)
- Work in spaces where mechanical ventilation keeps working areas below certain conditions (e.g., ambient temperature of 80°F) with possible administrative controls required if the mechanical ventilation is not operable
- Work done from home (e.g., telework, remote, and hybrid employees)
- Sedentary or light activities performed indoors, if these are the only activities performed during the work shift

Heat Injury and Illness Prevention Program

The standard could require that employers create a written Heat Injury and Illness Prevention Program (HIIPP), with the input of employees, and include the following elements:

- Procedures to identify when heat hazards exist for employees, including procedures for environmental monitoring and the identification of work processes and external factors that increase the likelihood of heat-related injury and illness
- Procedures for implementing engineering controls
- Procedures for implementing administrative controls, including the provisions of drinking water, rest breaks in a cool and/or shaded area, acclimatization protocols for new and returning employees, and supervision of employees for signs and symptoms of heat-related illness
- High-heat procedures
- Procedures for when employees are exhibiting symptoms of heat-related illness and emergency response procedures
- Training of employees and supervisors
- Selection of a designated individual(s) to oversee and implement the HIIPP, including environmental monitoring

Exemption: Very small employers (e.g., those with 10 or fewer employees) could receive exemptions from requirements to have a written Heat Injury and Illness Prevention Program.

The standard could require employers to make the HIIPP available at the work site to employees and governmental representatives and to review and update the HIIPP periodically. Options for frequency for reviewing and updating the HIIPP include:

- **Option:** Whenever necessary to ensure its ongoing effectiveness
- **Option:** Whenever a heat-related illness or injury occurs
- **Option:** Annually
- **Option:** Whenever a heat-related illness or injury occurs, but no less than annually

Hazard Identification and Assessment

The standard could require employers to identify if and when heat hazards exist for their employees.

Outdoor Work Sites

For outdoor work sites, the standard could require that employers **monitor weather conditions to determine when there is a heat hazard**. Options could include:

- **Track local forecasts** of ambient temperature and humidity provided by the National Weather Service (or others) to determine daily maximum heat index
 - **Optional to account for dry climates:** For low forecasted relative humidity (e.g., below 30%), the employer could rely on ambient temperature alone.
- **Measure work area heat conditions** every day or when local forecasted conditions meet or exceed relevant triggers (see forecast heat triggers in Table 1)
 - **Option:** Employers measure heat index or ambient temperature and humidity to calculate heat index (employers could use the [OSHA-NIOSH Heat Safety Tool App](#) as a calculator or the [online calculator available from the National Weather Service](#)) at or as close as feasible to the work area at some periodic interval (e.g., hourly)

- **Optional to account for dry climates:** For low forecasted relative humidity (e.g., below 30%), the employer could rely on ambient temperature alone.
- **Optional for employees in vapor-impermeable PPE:** Employers could rely on ambient temperature triggers when employees are wearing vapor- impermeable protection.
- **Option:** Employers measure wet bulb globe temperature at or as close as feasible to the work area (i.e., area where one or more employees are working within the work site) at some periodic interval (e.g., hourly)

Exception: OSHA is considering permitting an employer to assume that a work area meets or exceeds both heat triggers (Table 1) instead of tracking forecasts or conducting onsite monitoring. Employers that use this exception would be required to comply with the relevant control measures outlined in this document whenever employees are on site.

Indoor Work Sites

The standard could require employers to conduct a hazard assessment to identify the work areas or processes where there is the potential for employees to be exposed to heat hazards, including a determination of whether and when outdoor heat affects indoor temperature/heat index at the work site. When information gathered during the hazard assessment indicates that any employee's exposure may equal or exceed the initial heat trigger (see Table 1 below), the employer could be required to develop a monitoring program to identify when employees are exposed to heat at or above the relevant triggers. Employers could be required to conduct additional monitoring or a new hazard assessment whenever a change in production, process, equipment, or controls has the potential to increase heat exposure.

Monitoring options could include:

- **Option:** Employers measure heat index or ambient temperature and humidity to calculate heat index (employers could use the [OSHA-NIOSH Heat Safety Tool App](#) as a calculator or the [online calculator available from the National Weather Service](#)) at or as close as feasible to the work area
 - **Optional to account for dry work sites:** If the indoor relative humidity is below a certain threshold (e.g., 30%), the employer could rely on ambient temperature alone.
 - **Optional for employees in vapor-impermeable PPE:** Employers could rely on ambient temperature triggers when employees are wearing vapor- impermeable protection.
- **Option:** Employers measure wet bulb globe temperature at or as close as feasible to the work area

Exception: OSHA is considering permitting an employer to assume that a work area meets or exceeds both heat triggers (Table 1) instead of monitoring. Employers that use this exception would be required to comply with the relevant control measures outlined in this document whenever employees are on site.

Heat Triggers

The standard could specify that certain control measures be required at a temperature-based “initial heat trigger”. Additional measures (referred to as “high-heat procedures”) could be required at a “high-heat trigger”. Forecasts and onsite monitoring could have different triggers due to the anticipated variability between forecasted conditions and onsite conditions.

Table 1. Options for initial heat trigger and high-heat trigger

	Initial Heat Trigger			High-Heat Trigger		
	Ambient	Heat Index	WBGT	Ambient	Heat Index	WBGT
When using a forecast	78°F or higher	76°F or higher	N/A	86°F or higher	83°F or higher	N/A
When measuring on-site	82°F or higher	80°F or higher	ACGIH AL or NIOSH RAL	90°F or higher	87°F or higher	ACGIH TLV or NIOSH REL

The values in this table represent the minimum value currently being considered.

- When employers are relying on forecasts alone, OSHA is considering requiring controls to be implemented for the whole day when the forecasted daily maximum heat index or ambient temperature is at or above the forecast heat triggers (see Table 1)
- When employers are relying on on-site monitoring, OSHA is considering requiring that controls be implemented only for the hours of the day when the monitored heat index or ambient temperature is at or above the heat triggers (see Table 1)
- Control provisions put in place at or above the high-heat trigger could be referred to as “**high-heat procedures**”
- When employees are required to wear vapor barrier clothing or an additional layer (e.g., coveralls), OSHA is considering requiring “high-heat procedures” be used when temperatures are at or above a specific trigger
- If employers are using wet bulb globe thermometer measurements and the ACGIH or NIOSH approach to calculate the Threshold Limit Value (TLV)/Recommended Exposure Limit (REL) and Action Limit (AL)/Recommended Alert Limit (RAL), OSHA is considering allowing these employers to treat these limits as the high-heat trigger and initial heat trigger, respectively. This would need to be outlined in the employer’s HIIPP and any assumptions made in calculating these limits would need to be justified.
- OSHA is considering the following options for the definition of a heat wave:
 - **Option:** When the National Weather Service issues a heat advisory or a heat warning for the local area
 - **Option:** When the daily maximum temperature exceeds 90°F and is 9°F or more above the maximum reached on the preceding days

Hazard Prevention and Control Measures

OSHA is considering requiring some combination of engineering and administrative controls.

Engineering Controls

The standard could require employers to implement engineering controls when the temperature is at or above the initial heat trigger (see Table 1).

OSHA has identified the following possible options for engineering controls for **outdoor** work sites:

- Provision of a **cool-down area**:

- **Option:** Cooling measures (e.g., cooling fans/misting machines), if employer can demonstrate that they are at least as protective as shade
- **Option:** Shade (artificial shade [e.g., tent, pavilion] or natural shade [e.g., trees, but not equipment]) that provides complete blockage of sunlight, is open to the outside air or uses mechanical ventilation for cooling, can accommodate the number of employees on break, and is located as close as practical to the work area
- **Option:** Air-conditioned space (e.g., trailers, vehicles, structures) that can accommodate the number of employees on break, and is located as close as practical to the work area
- **Option:** Any combination of the above controls

OSHA has identified the following possible options for engineering controls for **indoor** work sites:

- Provision of a **cool-down area** (e.g., break room or trailer) that is air-conditioned or has some combination of air movement and humidity control, can accommodate the number of employees on break, and is located as close as practical to the work area
- Provision of **work area controls**:
 - **Option:** Increased air movement (except where it would increase exposure to contaminants). Increased air movement could include fans at individual work areas or the entire work site (when temperature is cool enough) or natural ventilation (e.g., open windows).
 - **Option:** Some combination of increased air movement (except where it would increase exposure to contaminants) and humidity control (depending on temperature and humidity status of work area).
 - **Option:** When feasible, air-conditioned work areas or control booths (if applicable)
- When **fixed heat-generating sources** are present in the work area:
 - When possible, employers could be required to reduce exposure to heat generated by fixed sources of radiant heat. Some possible options could include:
 - Installing local exhaust ventilation at heat-generating sources
 - Shielding or barriers that are radiant-reflecting or heat-absorbing
 - Isolating the source of radiant heat
 - Increasing the distance between employees and the heat source
 - Modifying the hot process or operation
 - Installing waste heat recovery technology
 - Adding thermal insulation on hot surfaces (e.g., steam pipes)

OSHA is considering the following possible options for engineering controls for employer-provided **vehicles**:

- Air conditioning or other cooling mechanisms in cabs of vehicles (e.g., delivery trucks)
 - **Option:** Only where temperatures are regularly above the high-heat trigger (see Table 1)
 - **Option:** Only required when employees spend the majority of their shift working in or from vehicles

Administrative Controls

OSHA has identified the following options for administrative controls:

- There are existing OSHA requirements for employers to provide **drinking water** to employees. OSHA is considering specifying additional requirements for location, temperature, and quantity, such as:
 - Drinking water must be located as close as practical to work areas
 - Drinking water should be suitably cool
 - Employees should have access to 1 quart (32 fluid ounces) of drinking water per employee per hour for the entire shift, provided by the employer (can be refilled throughout the shift)
 - Employees should have ample opportunity to drink water and must be encouraged to frequently consume water or other acceptable beverages
 - Employers are allowed to provide other beverages (e.g., non-caffeinated electrolyte solutions) if they are provided in addition to minimum water requirements, not in place of
- OSHA could consider requiring employers to adopt protections for new and returning employees who may not be **acclimatized** to working in the heat at or above the initial heat trigger. Options could include:
 - **New employees:**
 - **Option:** Employer-developed plan that includes heat hazard awareness training before work begins in addition to increased monitoring and communication by supervisor or designee for the first week
 - **Option:** Employer-developed acclimatization protocol based on the work tasks performed by employees, clothing/personal protective equipment (PPE) worn, and environmental risk factors. The standard could specify a minimum protocol for this option.
 - **Option:** Follow high-heat procedures at the initial heat trigger (see Table 1) for the first week
 - **Option:** Gradual acclimatization to heat:
 - First day – heat exposure restricted to 20 percent of a normal duration
 - Second day – heat exposure restricted to 40 percent of a normal duration
 - Third day – heat exposure restricted to 60 percent of a normal duration
 - Fourth day – heat exposure restricted to 80 percent of a normal duration
 - Fifth day – normal duration of heat exposure
 - **Exemption:** Newly hired employees who report recently (e.g., in the prior week) performing the same work tasks in similar heat conditions could be exempted
 - **Returning employees who have previous experience with the job but have been away from the job for some period (e.g., 7, 14, or 30 days)**
 - **Option:** Employer-developed plan that includes heat hazard awareness training before work begins in addition to increased monitoring and communication by supervisor or designee for the first week
 - **Option:** Employer-developed acclimatization protocol based on the work tasks performed by employees, clothing/PPE worn, and environmental risk factors. The standard could specify a minimum protocol for this option.
 - **Option:** Follow high-heat procedures at the initial heat trigger (see Table 1) for the first week

- **Option:** Gradual acclimatization to heat:
 - First day – heat exposure restricted to 50 percent of a normal duration
 - Second day – heat exposure restricted to 60 percent of a normal duration
 - Third day – heat exposure restricted to 80 percent of a normal duration
 - Fourth day – normal duration of heat exposure
 - **During local heat waves:**
 - **Option:** Employers follow the options for returning employees (see above)
- The standard could require the provision of **rest breaks in a cool and/or shaded area**. Options could include:
 - **Location** requirements for rest breaks:
 - **Option:** Near drinking water supplies
 - **Option:** Near drinking water supplies and restroom facilities
 - **At or above the initial heat trigger (see Table 1):**
 - **Option:** Employees are allowed and encouraged to take rest breaks as needed to prevent overheating
 - **Option:** A minimum 10-minute rest break at least every 2 hours
 - **At or above the high-heat trigger (see Table 1):**
 - **Option:** A minimum 15-minute rest break at least every two hours
 - **Option:** Employer-developed rest schedules, with a minimum of 15 minutes every two hours and increasing break duration and/or frequency as temperatures increase
 - For all options above, OSHA is also considering the following:
 - Periods during which employees are donning and doffing PPE (e.g., coveralls) should not count towards the total time provided for rest breaks
 - The time for employees to walk to the cool and/or shaded area is not included in the time provided for rest breaks
 - Employers do not need to pay for rest breaks taken during an unpaid bona fide meal break
- The standard could require the **supervision** of employees for signs and symptoms of heat-related illness. Options could include:
 - **At or above the initial heat trigger (see Table 1):** employers maintain effective communication with employees by voice, observation, or electronic means (such as a handheld transceiver, phone, or radio) and provide regular communication
 - **At or above the high-heat trigger (see Table 1) or for new or returning workers who may not be acclimatized or during heat waves:**
 - **Option:** Observation of employees for signs and symptoms by coworkers, also called a buddy system (using either visual or verbal communication)
 - **Option:** Observation of employees for signs and symptoms by supervisor, with no more than 20 employees supervised per supervisor or designee
- Additional administrative control options could include:
 - Altering work schedules (i.e., scheduling outside of the typical workday or season)
 - When the high-heat trigger (see Table 1) is met or exceeded, holding a pre-shift meeting or notifying employees of the following:
 - High-heat procedures are in effect
 - Encouraging employees to drink plenty of water

- Reminding employees of their rights to take rest breaks as needed
 - Location of shade and/or cool-down areas, breaks, and water for mobile work sites
 - Designating employees to call 9-1-1 in a medical emergency
- In indoor environments, restricting access to excessively high heat areas (e.g., those with ambient temperatures at or above 120°F) by only allowing employees that have been trained to access these areas and placing warning signs outside or near these areas

Personal Protective Equipment (PPE)

- The standard could require that employers consider the contributions of PPE to heat stress. Potential options could include:
 - **Option:** Many forms of PPE for protecting against non-heat hazards may contribute to heat stress. Employers must take this into account in assessing risks to employees posed by heat.
 - **Option:** When employees are required to wear vapor barrier clothing or an additional layer (e.g., protective suits or coveralls), additional precautions (such as high-heat procedures) should be implemented when a specific trigger is met or exceeded
- The standard could require employers to consider heat hazards specific to their work site and evaluate the potential use of cooling PPE (such as cooling vests and wetted garments):
 - Based on the heat hazard assessment, employers should determine whether the use of PPE is necessary to protect employees from the hazards identified
 - Cooling properties of PPE must be maintained at all times during use

Medical Treatment and Heat-Related Emergency Response

The standard could require employers to:

- Have written medical treatment and emergency response procedures, which should include at least the following:
 - Descriptions of how communication is maintained with employees at the work site, so that they can contact a supervisor or emergency medical services (9-1-1) as soon as possible
 - A designated person to ensure that emergency procedures are invoked when appropriate
 - A description of how to transport employees to a place where they can be reached by an emergency medical provider
 - Clear and precise directions to the work site, which can be provided to emergency dispatchers
- Respond to reported or observed signs and symptoms of heat illness. The supervisor must take immediate action appropriate to the severity of the illness.
 - If an employee exhibits symptoms of heat illness, they should be relieved from duty, monitored and not left alone, not sent home without being offered on-site first aid or medical services, and be given the means to reduce their body temperature.
 - For suspected heat stroke, the employer should take immediate actions to reduce the employee's body temperature (e.g., pouring water and ice directly onto the individual, placing them in a cold-water tub). Emergency medical services should be

contacted immediately but affected employees should be cooled down before transport.

Worker Training

The standard could require employers to institute a training program that is provided to supervisors and employees.

- The training program for employees could be required to cover the following topics:
 - o Heat stress hazards
 - o Different types of heat injury and illness
 - o Risk factors for heat injury or illness, including the contributions of physical exertion, clothing, PPE, and a lack of acclimatization, as well as the effects of therapeutic drugs, over-the-counter medications, and alcohol
 - o Common signs and symptoms of heat-related injury and illness and which symptoms require immediate emergency action
 - o Work site-specific first aid and emergency response procedures for heat-related injuries and illnesses
 - o Proper precautions for work in hot areas
 - o The location of shaded/cool-down areas, procedures for ensuring effective observation and communication with employees, and how emergency medical services will be provided in the event of an emergency
 - o Importance of frequent consumption of small quantities of water when the work environment is hot
 - o Importance of taking rest breaks to prevent heat-related illness or injury
 - o Proper use of PPE, and the importance of removing PPE that may impair cooling during breaks
 - o Description of employer's acclimatization procedures and the importance of acclimatization
 - o Employees' responsibilities for following proper work practices and control procedures, including the importance of reporting symptoms of heat-related illness
 - o A description of the environmental monitoring program at the work site
 - o Perceptions toward heat stress and common misperceptions
 - o The location of written training materials
- A separate training for supervisors could be required to include the following topics:
 - o The topics listed above
 - o The procedures for implementing the applicable provisions of the rule
 - o The procedures the supervisor must follow if an employee exhibits signs or symptoms of heat-related illness
 - o The procedures for environmental monitoring at the work site
- The standard could require that training be conducted in a language and at a literacy level that the employee(s) and/or supervisor understands
- This training program could be required at certain frequencies, such as:
 - o **Option:** Upon hiring and annually after that

- o **Option:** Upon hiring, annually after that, and a refresher course as necessary (e.g., following a heat-related injury or illness at the work site)
 - For indoor employees, prior to any work in hot environments or near heat-generating processes, annually after that, and a refresher course as necessary (e.g., following a heat-related injury or illness at the work site)
- Employers could be required to document attendance at heat-related trainings

Recordkeeping

The standard could require employers to maintain any or all of the following records:

- Environmental monitoring data (maintained for a certain period of time)
- A record of any heat-related illness or injury (including those that only require first aid) and the environmental and work conditions at the time of the illness or injury
- An accurate record of all heat acclimatization for new and returning employees

Communication on Multi-Employer Sites

The standard could require employers to have procedures to effectively communicate and coordinate with other employers at the same work site. OSHA could consider requiring the following:

- Host employers could be required to include a description of procedures to protect all employees on-site (e.g., contractors, vendors, staffing agencies, and licensed independent practitioners with privileges) from heat-related hazards
- The host employer could be required to establish and implement procedures to facilitate communication regarding the implementation of the HIIPP between the host employer and other employers on-site
- Other employers on a multi-employer work site could be required to include a description of how their HIIPP coordinates with that of the host employer