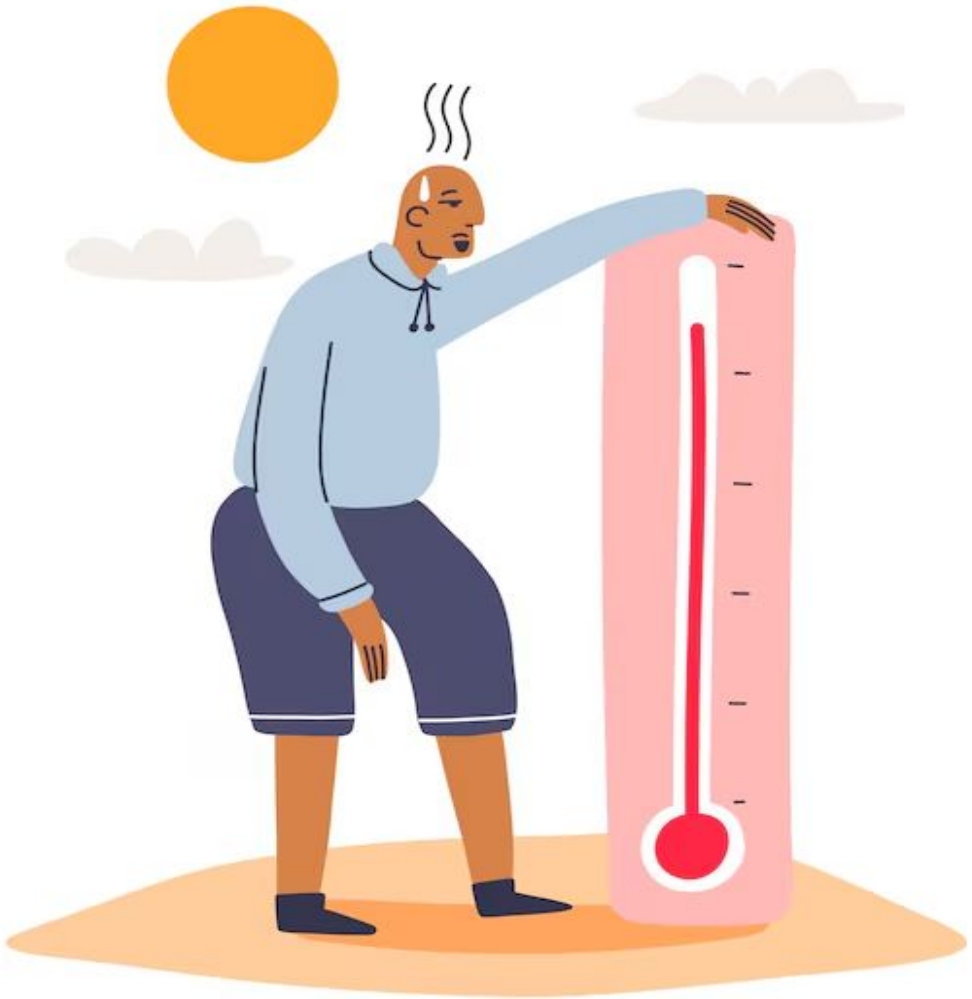

MD Heat Illness Prevention Standard

(COMAR 09.12.32)

Maryland Occupational Safety and Health (MOSH)

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IMPORTANT NOTE

Please note: All parts of this presentation are for informational purposes only. No parts of this presentation are to be construed as OSHA/MOSH required training or legal advice and are not a substitute for training or the advice of legal counsel. Please consult an attorney for advice concerning compliance with laws set out in Code of Maryland Regulations or Code of Federal Regulations.

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Today we will discuss:

- Heat stress definitions
- Factors that affect heat stress
- Heat-related illnesses
- Maryland Heat Stress Regulations

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What is Heat Stress?

The net heat load to which a worker is exposed.

➥ Physical exertion, environmental factors, and clothing worn all contribute to heat stress.

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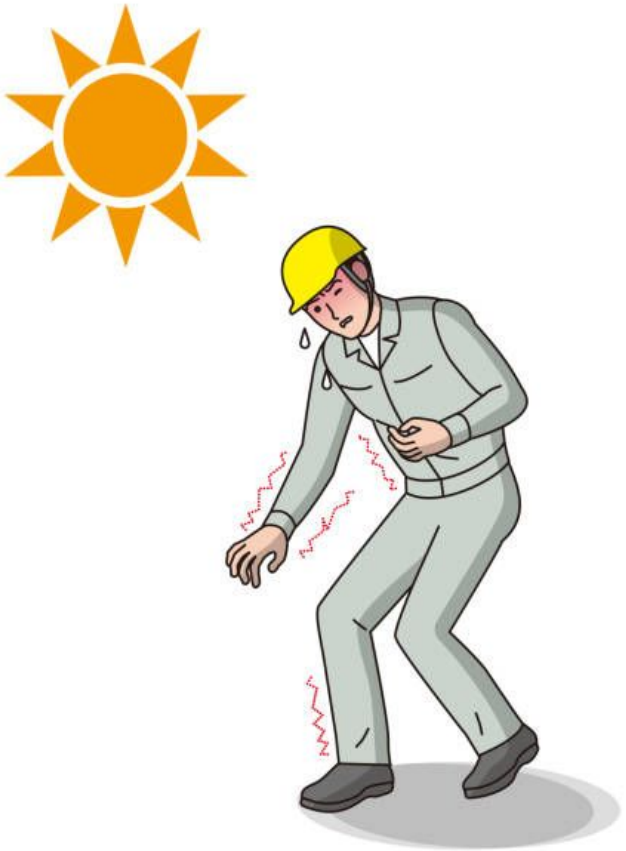
What is a Heat-Related Illness?

A medical condition resulting from the inability of the body to rid itself of excess heat.

➥ Ex: heat rash, heat cramps, heat exhaustion, heat syncope, and heat stroke.



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Risk Factors for Heat Illness

Environmental risk factors:

- Air temperature
- Relative humidity
- Radiant heat from the sun and other sources
- Conductive heat sources such as the ground
- Air movement
- Workload severity and duration
- Protective clothing and personal protective equipment worn by employees

Personal risk factors:

- Water consumption
- Alcohol consumption
- Caffeine consumption
- Degree of acclimatization
- Use of prescription medications
- An individual's age

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Medical Emergency!

Vary in degree of severity.

All but heat stroke usually resolve readily without lasting side effects

Heat-Related Illness	Symptoms and Signs
Heat stroke 	• Confusion • Slurred speech • Unconsciousness • Seizures • Heavy sweating or hot, dry skin • Very high body temperature • Rapid heart rate
Heat exhaustion	• Fatigue • Irritability • Thirst • Nausea or vomiting • Dizziness or lightheadedness • Heavy sweating • Elevated body temperature or fast heart rate
Heat cramps	• Muscle spasms or pain • Usually in legs, arms, or trunk
Heat syncope	• Fainting • Dizziness
Heat rash	• Clusters of red bumps on skin • Often appears on neck, upper chest, and skin folds

https://www.osha.gov/heat-exposure/illness-first-aid

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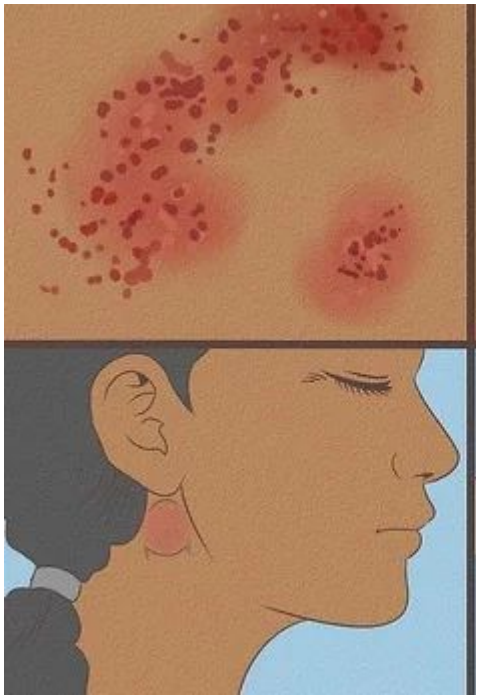
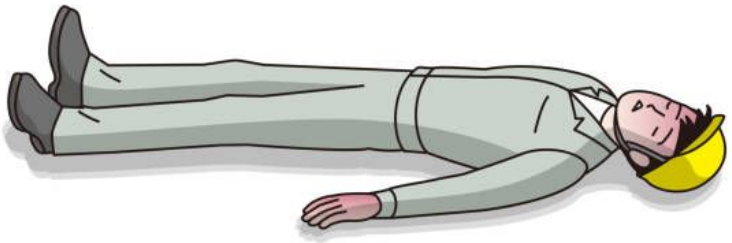
SEVERITY

Less Severe — More Severe

- HEAT RASH
- HEAT CRAMPS
- HEAT SYNCOPE
- HEAT FATIGUE/ EXHAUSTION
- HEAT STROKE

Discomfort — Death





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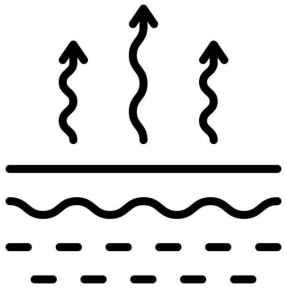
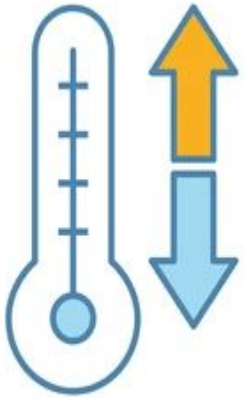
Heat Exchange and Heat Balance



Normal body function requires that the deep body core temperature be maintained within an acceptable range.

37°C (98.6° F) ± 1° C (1.8°F)



*Requires a constant exchange of heat between the body and environment

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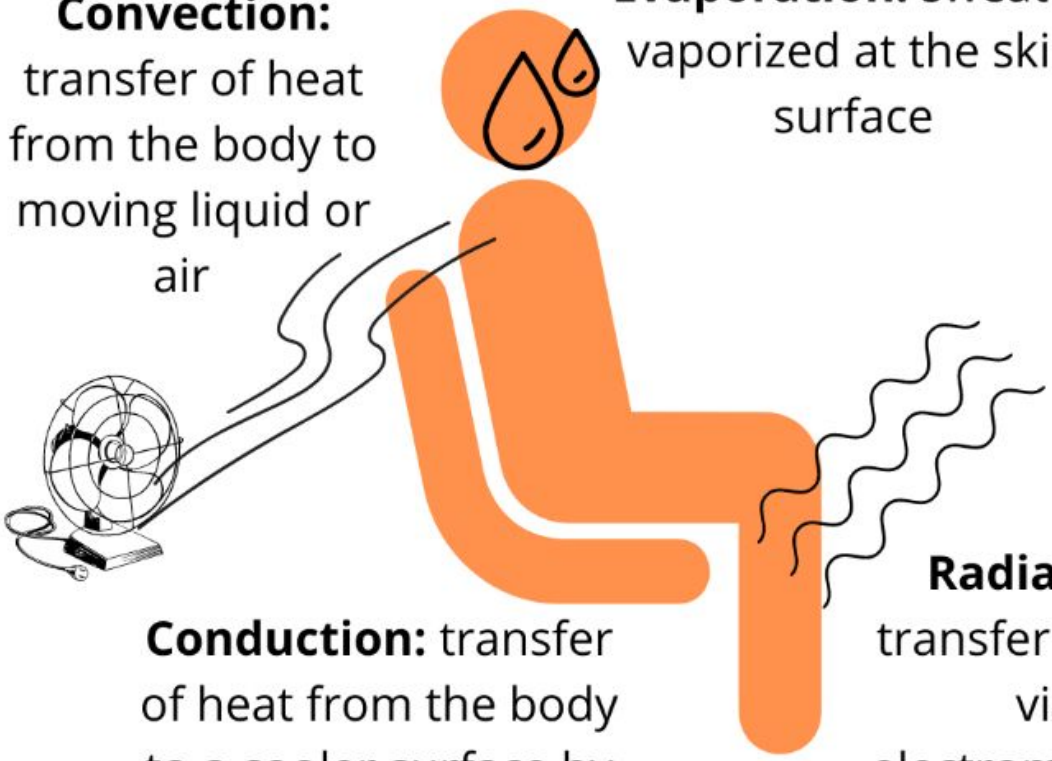
Methods of Heat Loss

Convection: transfer of heat from the body to moving liquid or air

Evaporation: sweat is vaporized at the skin surface



Conduction: transfer of heat from the body to a cooler surface by direct contact

Radiation: transfer of heat via electromagnetic waves

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Hypothalamus– Primary Seat of Control

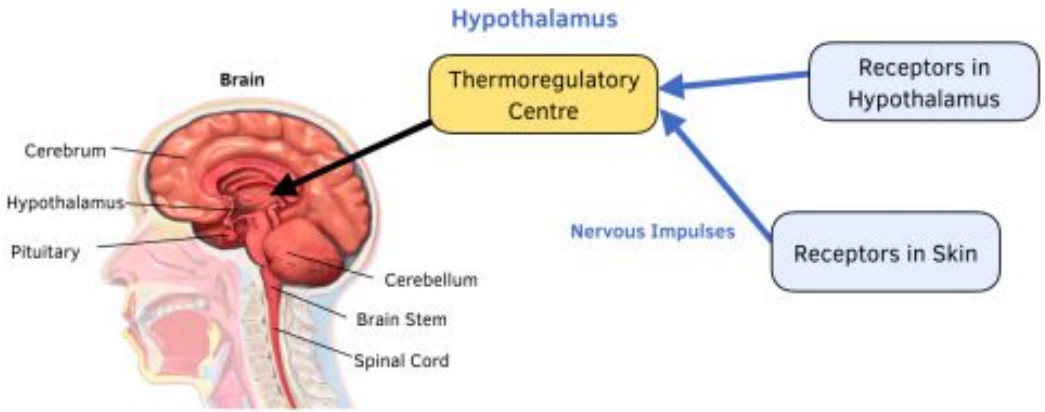

Fig 1. Thermoregulation. Receptors send feedback to the hypothalamus.

<u>Posterior Hypothalamus</u> provides a "set point" of core temperature and initiates physiologic responses to maintain the core temperature as it increases

<u>Anterior Hypothalamus</u> receives information from receptors sensitive to temperature fluctuations

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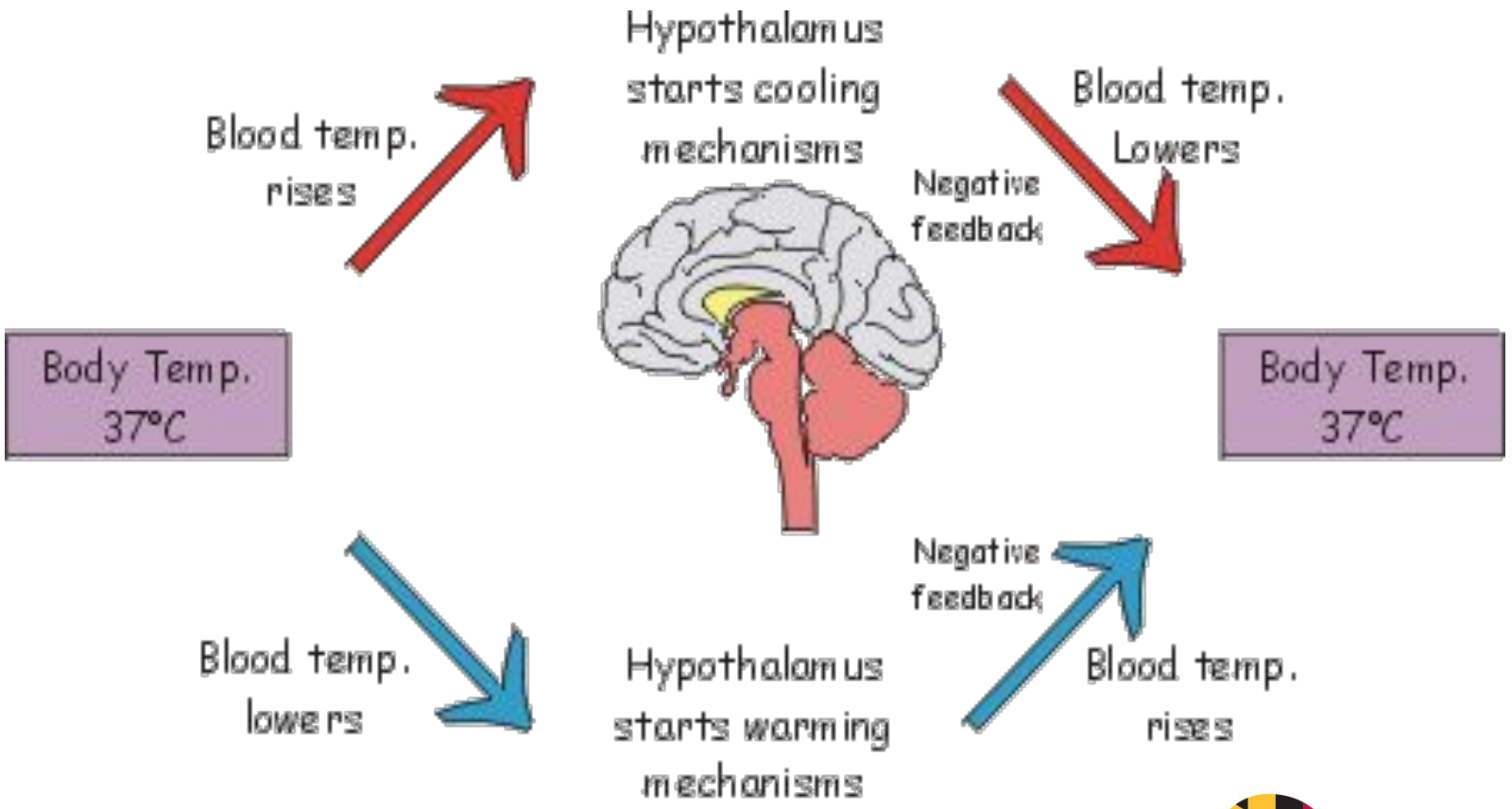
How the Body Controls Temperature



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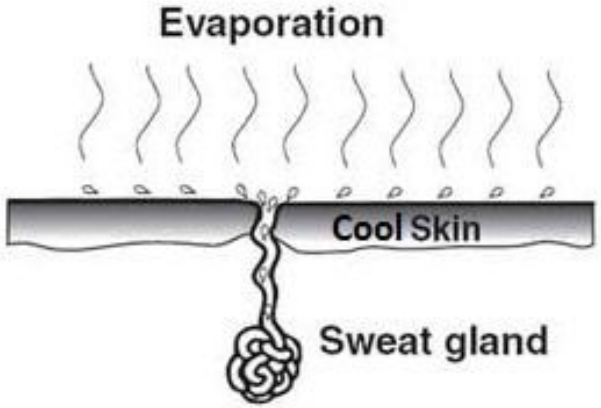
SWEAT MECHANISM

- Sweat glands found in the outer layers of the skin
- May sweat as much as 1 liter/hour (.3 gal/hr)
  - 8-10 liters/day (2-2.5 gal/day) is the upper limit
- Large losses of water and electrolytes, through sweating, adversely affect thermoregulation



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Rate of Evaporation of Sweat

Hot, humid environments limit the amount of sweat that can be evaporated

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WATER & ELECTROLYTES BALANCE

- Imperative to replace water lost in sweat
- Should drink 5-7 ounces of <u>cool</u> water every 15-20 minutes
- Do not rely on thirst as an indication to drink; by the time you're thirsty you're already dehydrated!

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Engineering controls that may reduce heat stress:

- Use air conditioning
- Increase general ventilation
- Local exhaust ventilation (e.g. laundry vents)
- Provide cooling fans
- Use reflective shields to block radiant heat
- Insulate hot surfaces (e.g. furnace walls)
- Provide shade for outdoor work sites

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Administrative controls that may reduce heat stress:

- Acclimatize workers starting the first day working in the heat
- Re-acclimatize workers after extended absences
- Schedule work earlier or later in the day
- Use work/rest schedules
- Limit strenuous work (e.g., carrying heavy loads)
- Use relief workers when needed

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Jobsite Safety

- Know the atmospheric conditions
- Wear loose, breathable clothing
- Reduce the physical demands of work
- Take frequent breaks in shade and air conditioning
- Drink at least one cup of cool water every 15-20 minutes
- Recognize and report the signs and symptoms of heat-related illnesses

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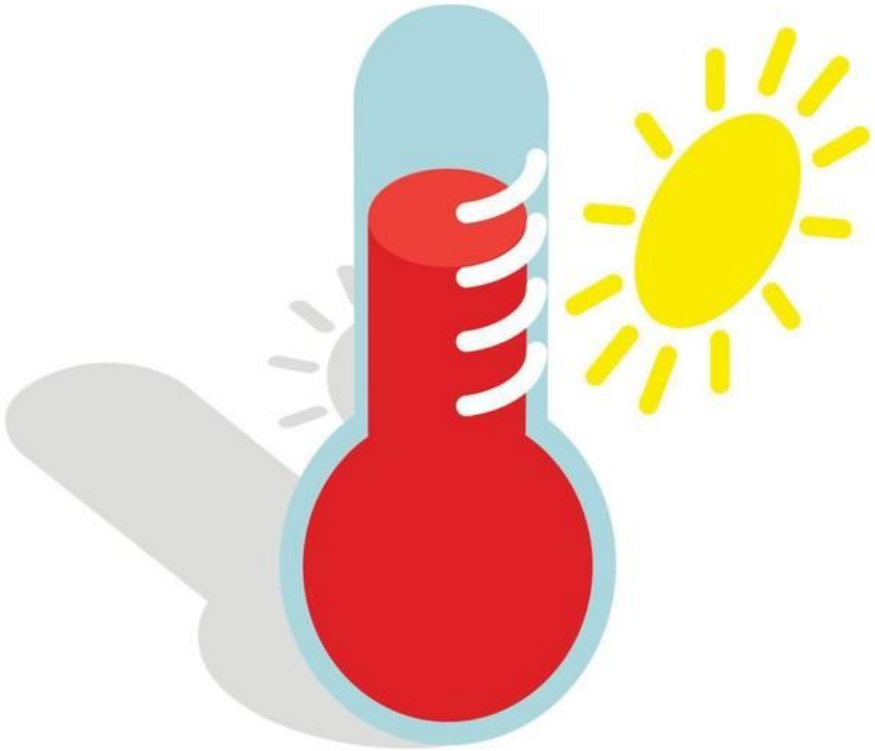
How Do We Measure Heat?



- Temperature
- Heat Index
- Wet Bulb Globe Temperature

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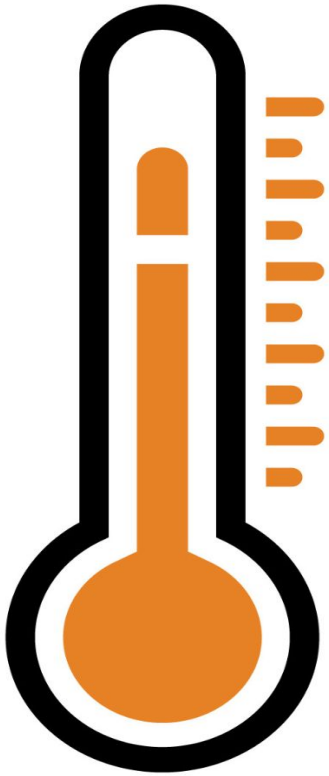
Temp vs HI vs WBGT

Temp. (dry-bulb): ambient air temperature; does not take into account radiation or moisture

Temp. (wet-bulb): the lowest temperature to which air can be cooled by evaporation; a measure of humidity

Heat Index (HI): The apparent "real feel" temperature; air temperature + humidity

WBGT (wet bulb globe temp.): a measure of heat stress; takes into account temperature, humidity, wind speed, sun angle and cloud cover (solar radiation)



Maryland Heat Stress Regulations

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PURPOSE

Establish minimum requirements for employers to protect employees from *heat-related illness* caused by *heat stress*.

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SCOPE

Applies ✅

Employers with…

- employees working (indoor or outdoor) and exposed to a *heat index** equal or greater than 80° F in working area.

** Heat index tells you how it feels outside in the shade. It does NOT take into account radiant heat from the sun.*

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SCOPE

*Work in connection with an emergency that requires the involvement of: a) law enforcement b) emergency medical services c) firefighting d) rescue and evacuation operations e) emergency restoration of essential utilities or telecommunications

Does NOT Apply ❌

- Emergency operations and essential services* 🚨
- Incidental exposures (working < 15 *consecutive* min/hr.)
- Entities with a mechanical ventilation system or fan *(must maintain the heat index below 80°F)*

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Prevention and Management Plan

- **Heat index monitoring** by employer
  - Throughout the work shift in working areas
- **Measure**
  - Temp. & humidity simultaneously/directly
  - Local weather data ⛅
  - OSHA-NIOSH Heat Safety Tool App
- **Plan** ✏
  - For heat illness prevention and management
  - Develop, implement, and maintain (in writing)

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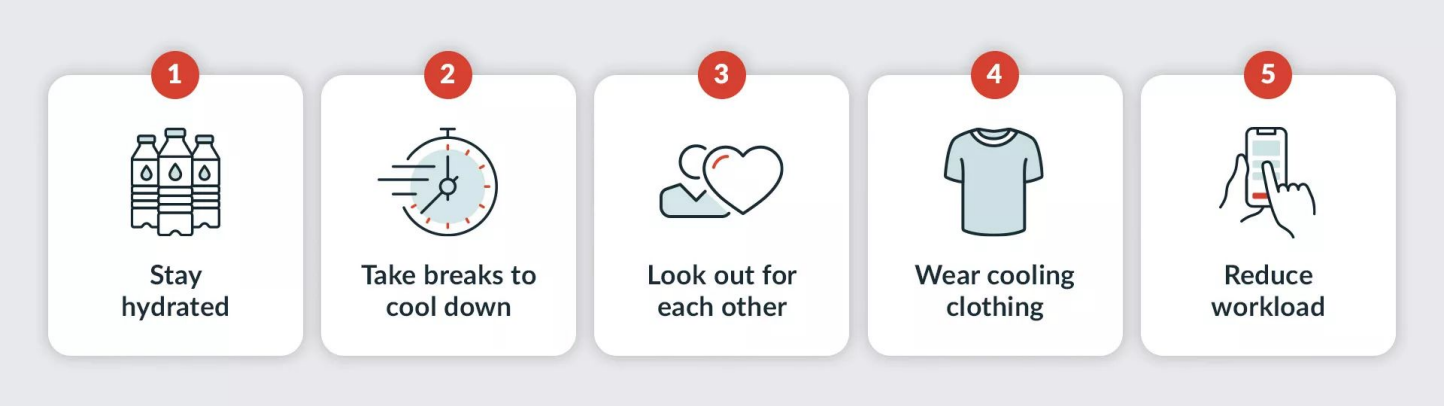
Prevention and Management Plan

Include the following elements:

- Acclimatization
- Shade access
  - Alternative cooling methods
- Drinking Water 🚰
- High heat procedures 🌞
- Emergency response
  - Heat-related illnesses
- Training 📓



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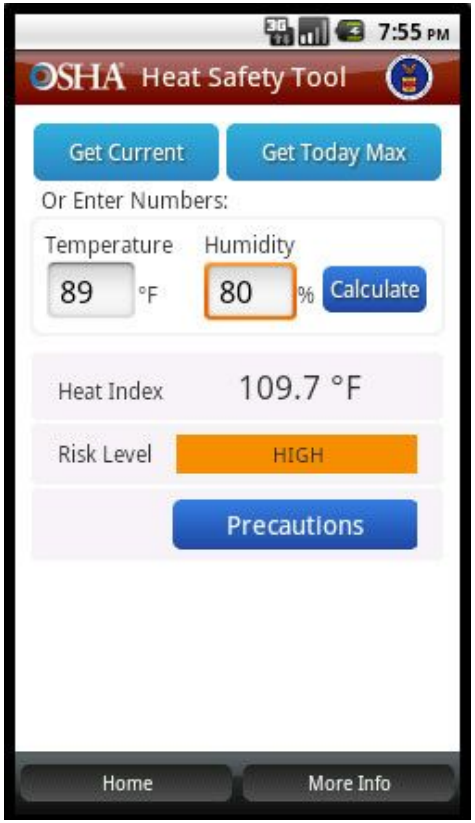
Monitor the Heat Index



The App indicates the hazard levels as:

- Caution (less than 80°F HI)
- Warning (80°F – 94°F HI)
- Danger (95°F HI or higher)

Offers recommended actions to protect workers.

https://www.osha.gov/heat-exposure/hazards

https://www.osha.gov/otm/section-3-health-hazards/chapter-4

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MONITOR THE HEAT INDEX

NOAA's National Weather Service

Heat Index

Temperature (°F)

Relative Humidity (%)	80	82	84	86	88	90	92	94	96	98	100	102	104	106	108	110
40	80	81	83	85	88	91	94	97	101	105	109	114	119	124	130	136
45	80	82	84	87	89	93	96	100	104	109	114	119	124	130	137	
50	81	83	85	88	91	95	99	103	108	113	118	124	131	137		
55	81	84	86	89	93	97	101	106	112	117	124	130	137			
60	82	84	88	91	95	100	105	110	116	123	129	137				
65	82	85	89	93	98	103	108	114	121	128	136					
70	83	86	90	95	100	105	112	119	126	134						
75	84	88	92	97	103	109	116	124	132							
80	84	89	94	100	106	113	121	129								
85	85	90	96	102	110	117	126	135								
90	86	91	98	105	113	122	131									
95	86	93	100	108	117	127										
100	87	95	103	112	121	132										

Likelihood of Heat Disorders with Prolonged Exposure or Strenuous Activity

Caution | Extreme Caution | Danger | Extreme Danger

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Acclimatization

The physiologic changes which occur in response to a succession of days of exposure to environmental heat stress that reduce the strain caused by the heat stress of the environment

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Acclimatization

- Develops in 1-3 weeks
  - Mere exposure to heat does not confer acclimatization
  - Elevated metabolic rates are required for at least 2 hours per day
  - Acclimatization to one heat stress level does not confer full acclimatization to higher level of heat stress
- Acclimatization can be lost quickly if exposure is discontinued
  - Loss is transitory and can be made up

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Acclimatization Benefits

- More efficient sweating
  - Increase sweat production, reduce electrolyte loss
- Blood flow to the skin is reduced; more blood is available to muscles
- More stable and better regulated blood pressure with lower pulse rates
- Improved productivity and safety

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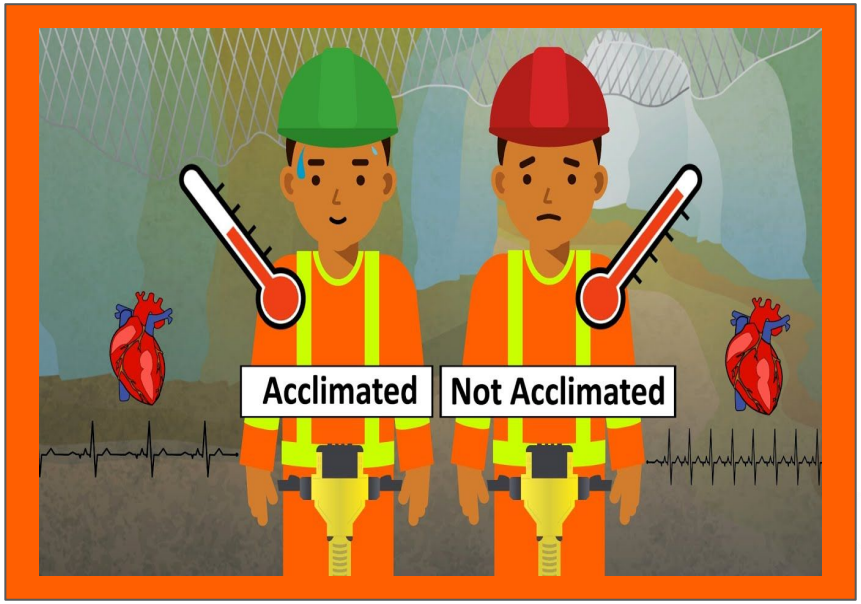
Acclimatization Requirements

Exposed employees

- Acclimatization period of up to 14 days. 📅
  - Newly exposed
  - Returning employees (after 7+ consecutive days of absence)

- Monitoring by employer
  - Signs of heat-related illnesses
  - Via regular communication
    - Phone or radio 📱
    - Buddy system
    - Other observation



Acclimatization Requirements

Employer shall develop/implement schedule

- Gradual increase of exposure time 📈
  - 5-14 day period (max 20% increase each day)
- NIOSH recommendations
- Combination with *alternative cooling/control measures**

* *creating other controls to manage heat (ex: job rotation, cooling garments, mechanical ventilation systems, etc.)*

Schedule shall be in writing.

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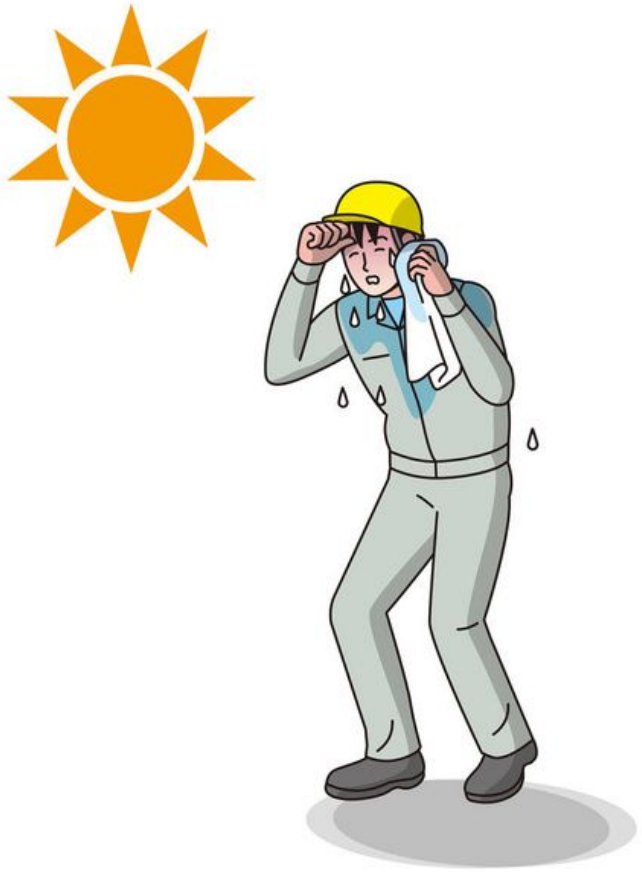
Things to consider:

1. Acclimated vs. Unacclimated employees
2. Environmental conditions and anticipated workload
3. Impact of clothing/PPE
4. Personal risk factors
5. Re-acclimatizing as necessary
6. Alternative cooling/control methods



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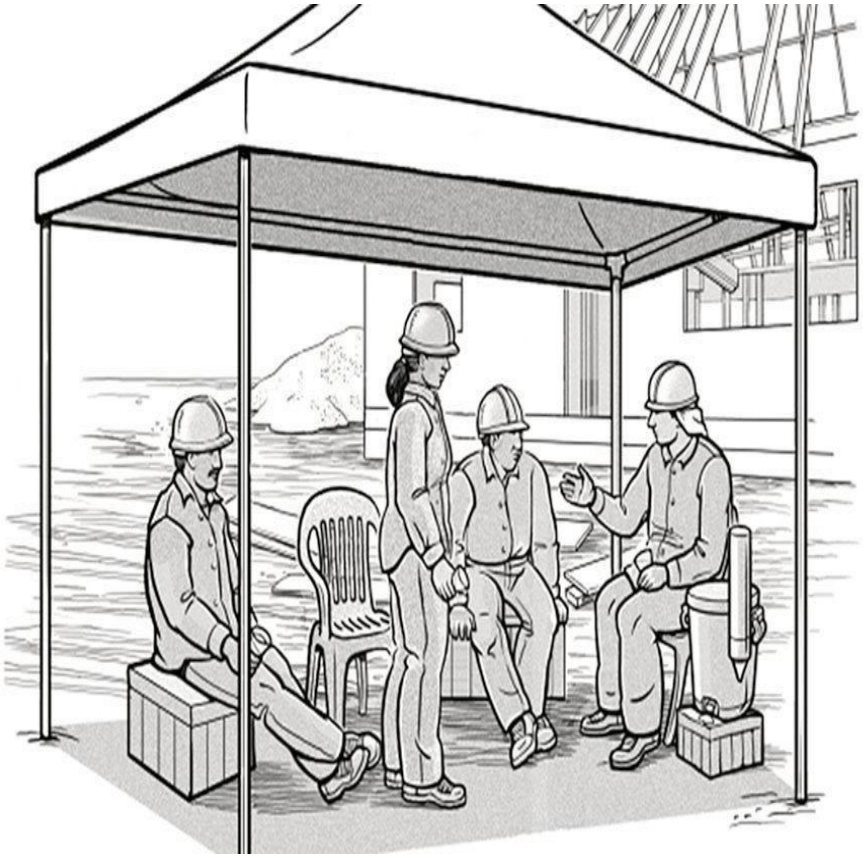
SHADE ACCESS

Shaded area = blockage of direct sunlight

- Sufficient blockage = objects do NOT cast a shadow in the area of blocked sunlight.
- Shade is adequate only when it completely blocks the direct sunlight and allows the body to cool.
- Effective access to shade does not deter or discourage access or use.



SHADED AREAS

Requirements:

1. Close to work area as practicable
2. Outside, open, and exposed to air on at least three sides
3. Prevent contributing heat sources from reducing effectiveness 🔥
4. Sufficient size for the number of employees utilizing the shaded area
5. Allow for normal sitting posture
6. Accommodate removal/storage of PPE during use

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WHAT IF...

...creating outdoor shade is infeasible or unsafe in the work area?

Employer ***must*** implement alternative cooling and control measures that provide at minimum ***equivalent*** protection to shade.

Employer may provide cooling with an indoor mechanical ventilation system as an alternative (**must satisfy requirements 2-5 from previous slide*)

Alternative cooling measures include, but are not limited to, cooling employees by:

- Putting them in an air-conditioned environment, if available
- Using misting machines
- Using cooling vests (e.g., commercially available ice vests)
- Using battery operated, portable cooling devices
- Using air cooled garments (e.g., suits or hoods)

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Industrial Portable Misting Fan System

Cooling Vests

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DRINKING WATER

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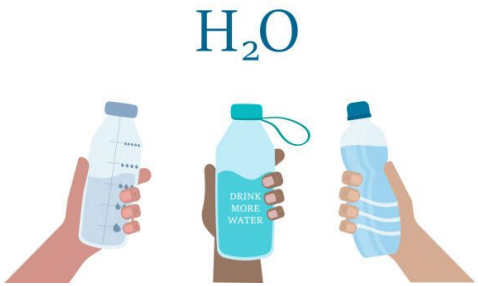
DRINKING WATER

Employer shall provide ***drinking water.***

- No cost to exposed employees
- Close to work area
- At least 32oz/worker/hour*

Potable, cool water that is safe to drink

*Employer is not required to provide the entire water supply at the start of an employee's shift, but must be available at all times while work is being performed.



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Opportunities and encouragement?

Sufficient amounts of water?

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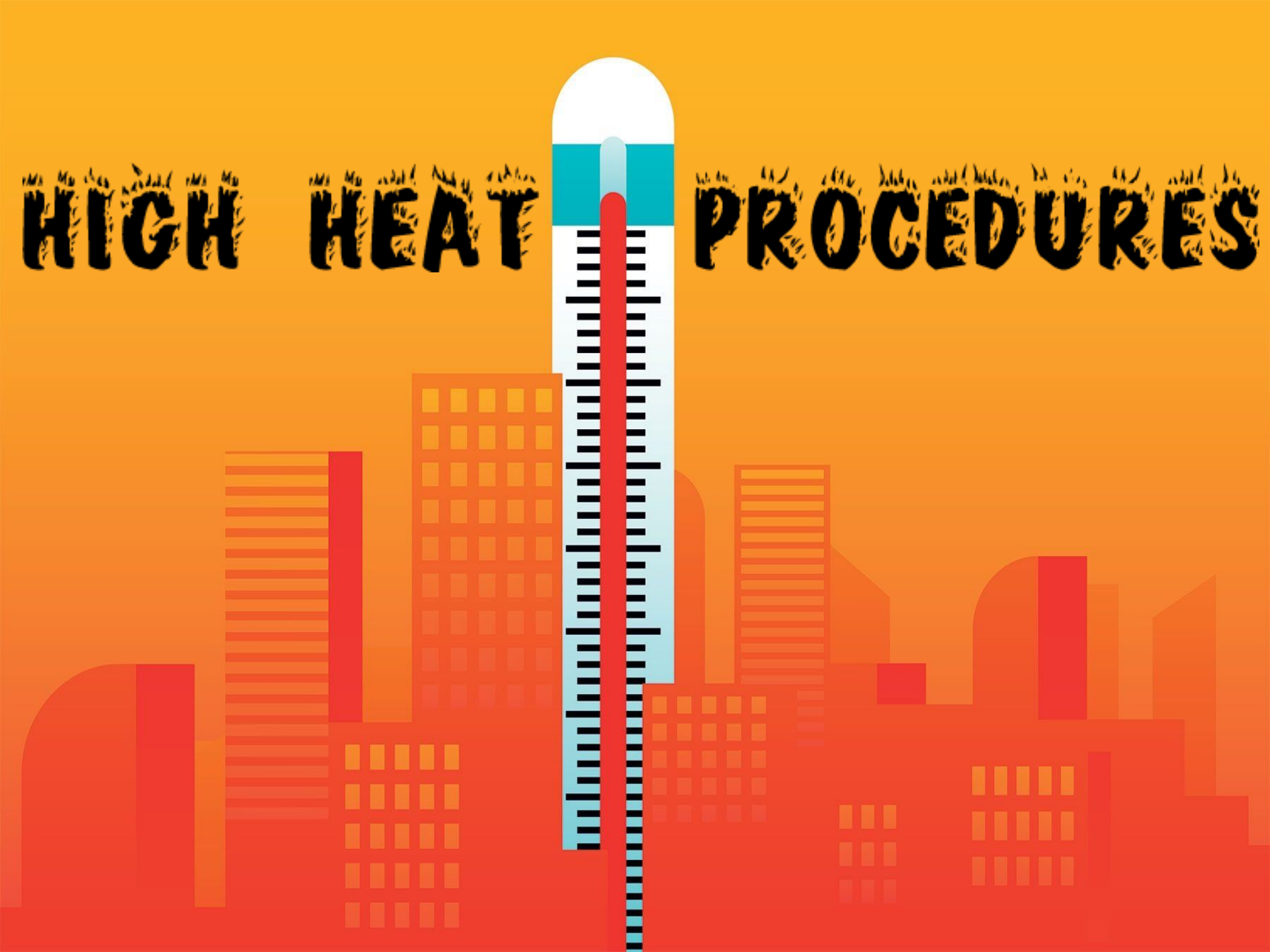
HIGH HEAT PROCEDURES

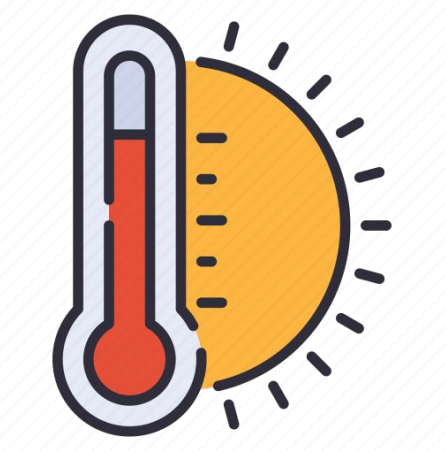


High Heat Procedures

Implement when heat index ≥ 90°F in work area

Include a work and rest schedule to protect employees from heat illness that is adjusted for:

- environmental conditions
- workload
- impact of required PPE/clothing



When in effect, employer shall monitor exposed employees for signs of heat-related illness with regular communication

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High Heat Procedures cont'd

- Heat index **90°-100°F**
  - minimum rest period of 10 mins/2 hrs worked
- Heat index above **100°F**
  - minimum rest period of 15 mins/1 hr worked
- Alternative measures/schedules (NIOSH)

*If employer can demonstrate effective heat management through *alternative cooling and control measures*, schedule outlined above may not be required.

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Alternative Cooling and Control Measures

1. Must be readily available and accessible to employees at all times work is being performed
2. Must be documented in writing
3. Do not supersede any other requirements of the chapter

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Rest Periods

- May coincide with a meal period
- Shall NOT be discouraged by employers
- Shall be taken as needed to prevent heat-related illness
- Shall be taken in the SHADE

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Emergency Response

Emergency Response Plan

Effective and accessible communication at all times at the worksite

➥Contacting supervisor or *emergency services*

➥Transporting employees to a location accessible to emergency personnel

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When your body can't keep itself cool

Ex. heat cramps, heat exhaustion, heat stroke.

Heat-related illness

signs/symptoms

- ➥ recognize/respond
- ➥ monitoring/caring for

Training

- Prior to first exposure to heat
- Re-train employees & supervisors *at least:*
  - annually prior to exposure
  - immediately following any heat-related illness incident *(suspected or confirmed)*

- Understandable language for all employees and supervisors

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🔑 Key points to include:

- Work/environmental conditions that affect heat illness
- Personal risk factors that affect heat illness
- Acclimatization (concept, methods, etc.)
- Importance of water/rest breaks
- Signs/symptoms/types of heat-related illnesses
  - First aid & emergency response measures
- Reporting procedures for heat illnesses
- Employer's compliance procedures/requirements

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Training Records 📓

Maintain for <u>one year</u> from training date

To include:

- Names of trainees
- Dates of training sessions
- Summary/outline of training sessions

👉*Training records shall be made available to MOSH upon request.*

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FAQs?

MOSH Reference Materials

- FAQ Guide

- Do employers have the option to use WBGT?
- Are cooldown rest periods paid?
- When is water suitably cool?
- How should the training be presented?
- Are there specific requirements for reporting heat-related illnesses?

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Questions?

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