XPAT Heat Stress Safety Training

Managing Heat Stress

Objectives

- Understand the effects of heat on the body.
- Understand the symptoms of heat illness.
- Understand the required actions for treating heat illness.
- Understand the methods of preventing heat illness.

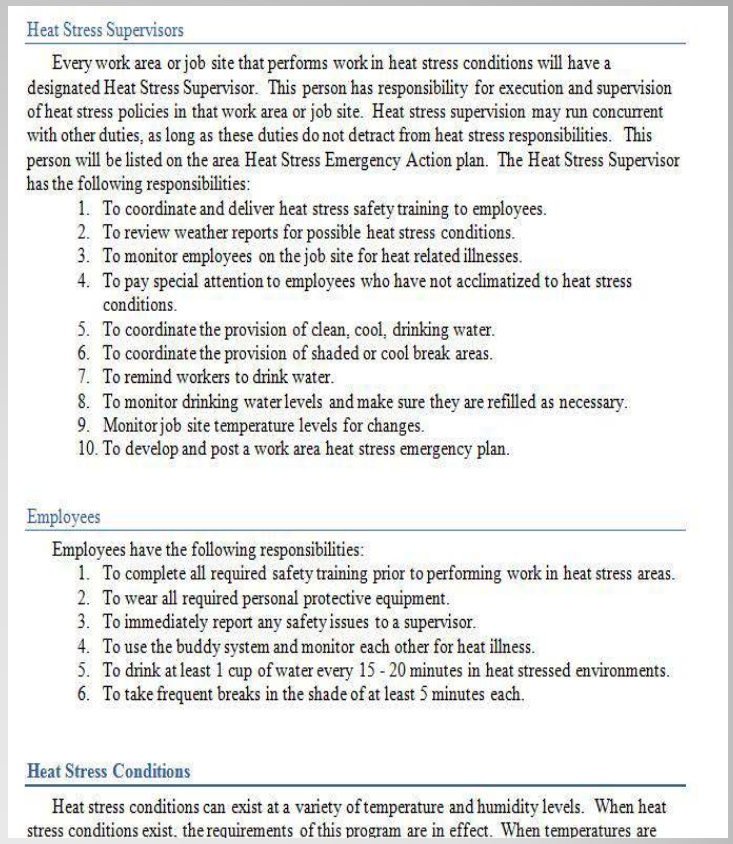
Regulations

- Federal OSHA does not have specific guidelines on managing heat stress.
- However, companies are obligated by the OSHA General Duty Clause to manage heat stress hazards to employees.

OSHA regulations can be found on their website at www.OSHA.gov.

Heat Stress Safety Program

- XPAT has a written heat stress safety plan to manage heat stress hazards.
- All employees must read and follow the policies contained in the Heat Stress plan.



Heat Stress Supervisors

Every work area or job site that performs work in heat stress conditions will have a designated Heat Stress Supervisor. This person has responsibility for execution and supervision of heat stress policies in that work area or job site. Heat stress supervision may run concurrent with other duties, as long as these duties do not detract from heat stress responsibilities. This person will be listed on the area Heat Stress Emergency Action plan. The Heat Stress Supervisor has the following responsibilities:

1. To coordinate and deliver heat stress safety training to employees.
2. To review weather reports for possible heat stress conditions.
3. To monitor employees on the job site for heat related illnesses.
4. To pay special attention to employees who have not acclimatized to heat stress conditions.
5. To coordinate the provision of clean, cool, drinking water.
6. To coordinate the provision of shaded or cool break areas.
7. To remind workers to drink water.
8. To monitor drinking water levels and make sure they are refilled as necessary.
9. Monitor job site temperature levels for changes.
10. To develop and post a work area heat stress emergency plan.

Employees

Employees have the following responsibilities:

1. To complete all required safety training prior to performing work in heat stress areas.
2. To wear all required personal protective equipment.
3. To immediately report any safety issues to a supervisor.
4. To use the buddy system and monitor each other for heat illness.
5. To drink at least 1 cup of water every 15 - 20 minutes in heat stressed environments.
6. To take frequent breaks in the shade of at least 5 minutes each.

Heat Stress Conditions

Heat stress conditions can exist at a variety of temperature and humidity levels. When heat stress conditions exist, the requirements of this program are in effect. When temperatures are

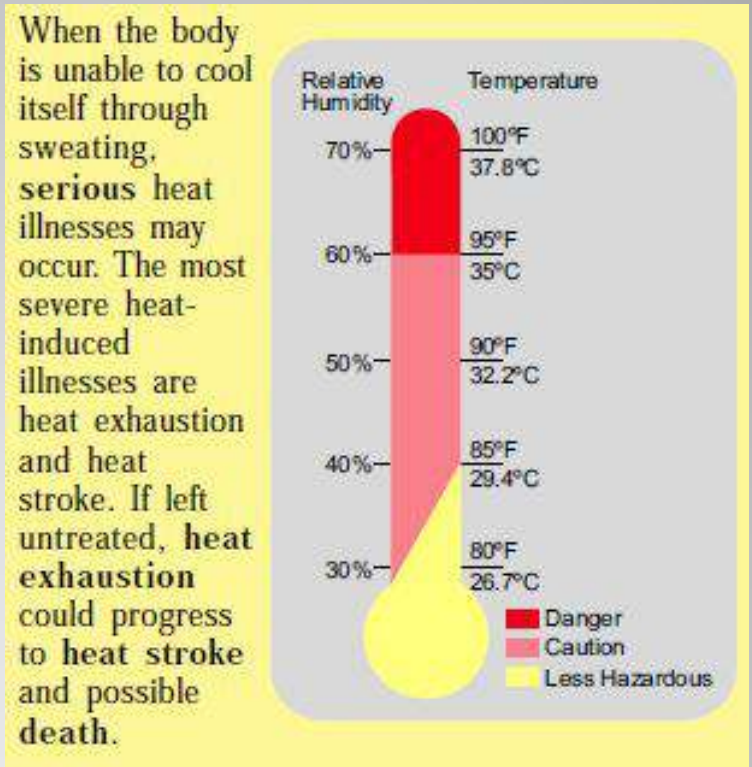
Part I

Introduction to Heat Stress

Heat Stress

- Heat Stress is the heat load a worker is exposed to from:
  1. Environmental conditions.
  2. Internally generated heat.
  3. Cooling restrictions from clothing.

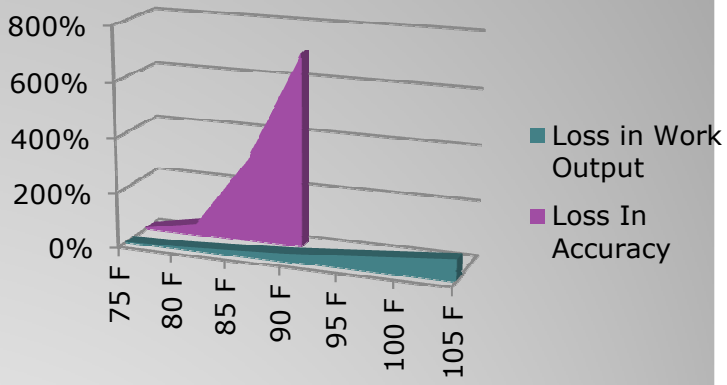
- Heat stress is a concern for all workers, especially ones who do not work in a climate controlled environment.



Heat strain is the response of your body working to dissipate excess heat.

Heat Stress and Work Performance

Temperature (F)	75 F	80 F	85 F	90 F	95 F	100 F	105 F
Loss in Work Output	3%	8%	18%	29%	45%	62%	79%
Loss In Accuracy		5%	40%	300%	700%		



NASA did a heat exposure study, and found that the efficiency and accuracy of workers drastically decreased as they were exposed to higher temperatures.

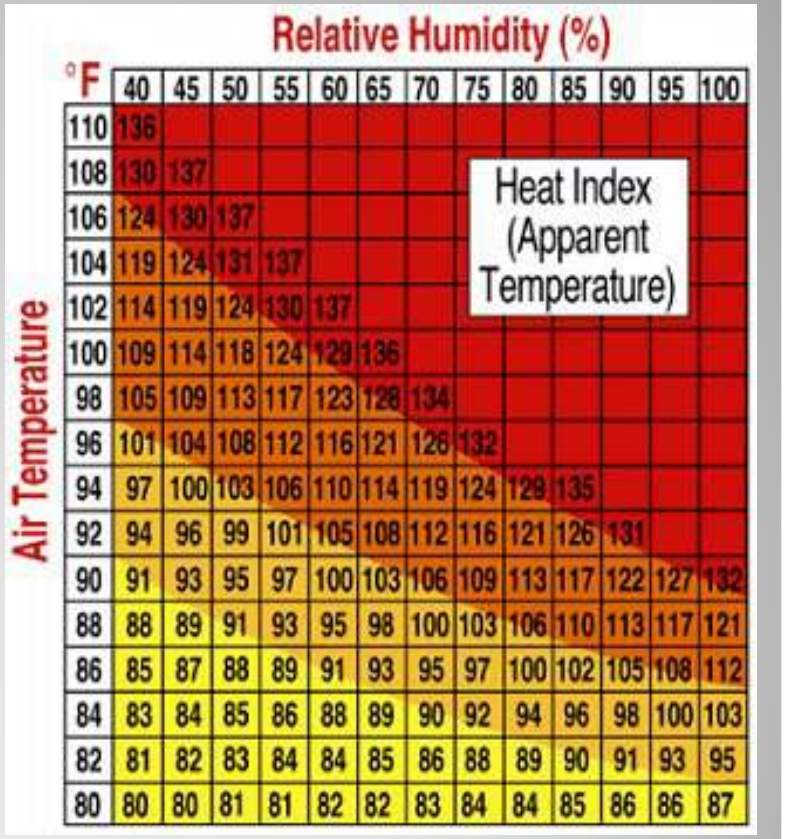
Internal Heat

- The human body maintains an average core temperature of 98.6 degrees.
- Performing work will cause the body to generate more heat.
- The more intense the work, the more heat the body will generate.

During heavy work, a body can lose 1-2 liters of water per hour.

Environmental Heat Stress Factors

- Temperature
  - Heat stress increases as the temperature goes up.
- Humidity
  - High humidity makes it more difficult to cool the body and increases heat stress.
- Wind
  - Moving air improves body cooling and lowers heat stress.
- Sunlight
  - Direct exposure to radiant heat, such as sunlight, will increase heat stress.



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

As humidity increases, the heat felt by the body increases.

Heat Removal

- The body's heat is carried in blood, which is pumped to the skin surface.
- The heat from the blood will transfer to the cooler environment.
- If heat needs to be removed faster, the body will release it in sweat, which will evaporate and cool the body more.

The Effect of Clothing on Heat Stress

- Clothing limits the ability of the body to remove heat.
- It interrupts the body's convection and evaporation heat removal processes.
- Clothing should be appropriate for both safety and the level of heat stress in the work area.

Loose clothing allows for better heat removal.

Individual Heat Removal Factors

- The ability remove body heat varies from person to person.
- Factors Include:
  - Age
  - Weight
  - Fitness
  - If the person is used to working in heat.
- Drugs, alcohol, and prescription medications can affect heat removal.
- Medical conditions, such as high blood pressure, can also affect heat removal.

One person managing heat stress well does not mean that all workers will be able to.

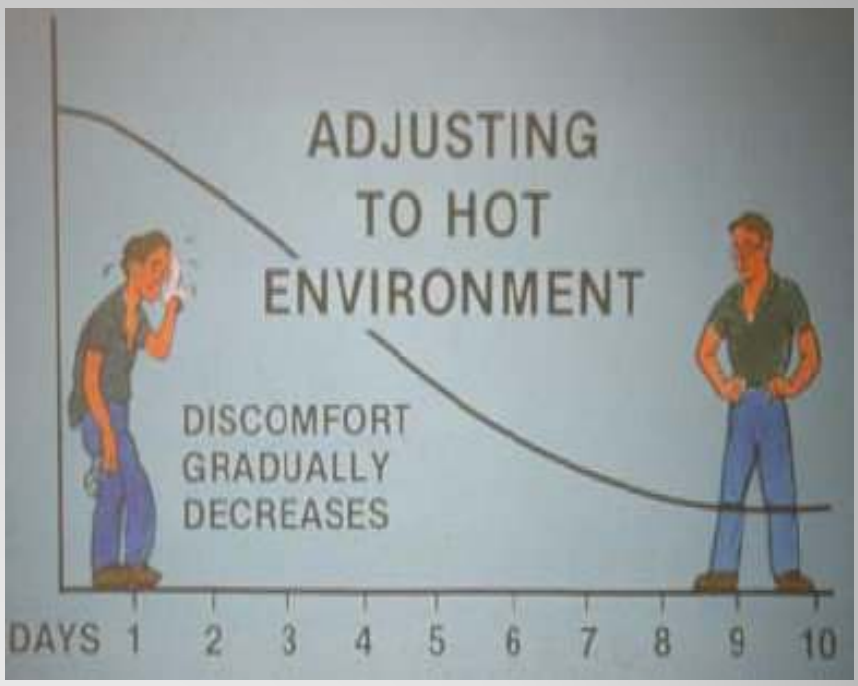
The Importance of Water

- Water is important for cooling the body and managing heat stress.
- The more water lost to sweat, the less cooling ability the body has.
- After 3 hours, a dehydrated worker may experience:
  - Fatigue
  - Headaches
  - Cramps
  - Reduced alertness
  - Nausea

Water must be replaced when it is lost due to sweating

Heat Acclimatization

- It usually takes the body about 10 days to get used to working in a hot environment.
- Elevated body temperature and discomfort will occur, but will usually gradually decrease as the body gets used to the environment.



Workers should be gradually exposed to hot work environments.

Part II

Heat Illnesses

Heat Rashes

- People who work in high heat stress environments can sometimes develop heat rash.
- Red splotches and prickly skin usually indicate a heat rash.
- Heat rashes usually clear up when the worker returns to a cool environment.

Treat heat rash by keeping the skin clean and dry.

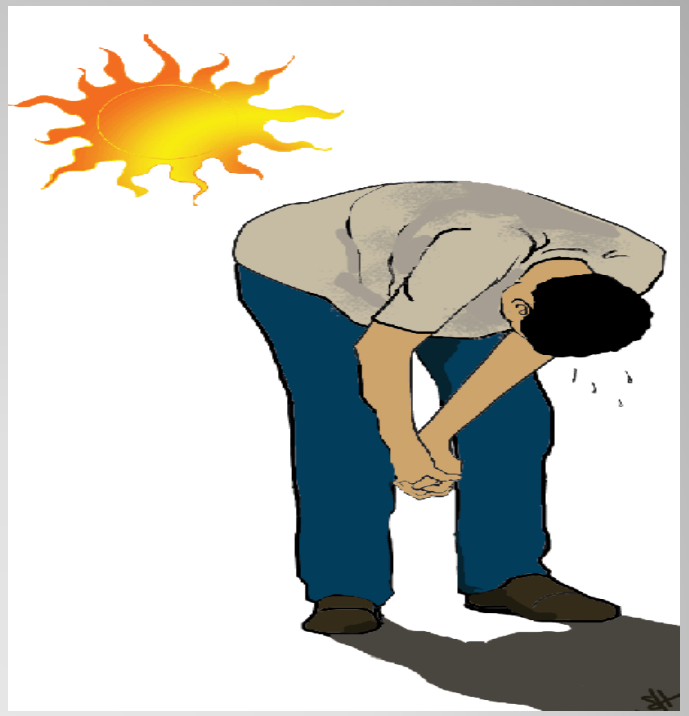
Heat Cramps

- Heat cramps are caused by performing hard physical labor in a hot environment.
- Usually seen as muscle spasms in the arms, legs, or abdomen.
- Rest and increased intake of water will treat heat cramps.

Salt tablets should not be used to treat heat cramps.

Heat Exhaustion

- Heat exhaustion occurs when the body cannot cool itself sufficiently.
- Symptoms of Heat exhaustion include:
  - Dizziness.
  - Mood changes.
  - Confusion.
  - Upset stomach.
  - Unusual urination.
  - Fainting.
  - Pale, clammy skin.



Heat exhaustion is dangerous, but can be easily corrected with prompt attention.

Treating Heat Exhaustion

- Move the person to a cool, shaded area.
- Loosen or remove heavy clothing.
- Have the person drink a cup of cool water every 15 minutes.
- Cool the body by fanning it or apply cool water.
- Call 911 if the person does not feel better in a few minutes.

Never leave a person with heat exhaustion alone.

Heat Stroke

- Heat stroke is a medical emergency! It can be fatal.
- It is cause by a failure of the body cooling system, which will cause core temperature to rise to dangerous levels.
- Symptoms include:
  - Dry, pale skin with no sweating.
  - Hot, red skin.
  - Mood changes.
  - Confusion.
  - Seizures.
  - Unconsciousness.

A lack of sweating is a good way to tell heat stroke from heat exhaustion. When heat stroke occurs, the body's cooling mechanism fails, and sweating stops.

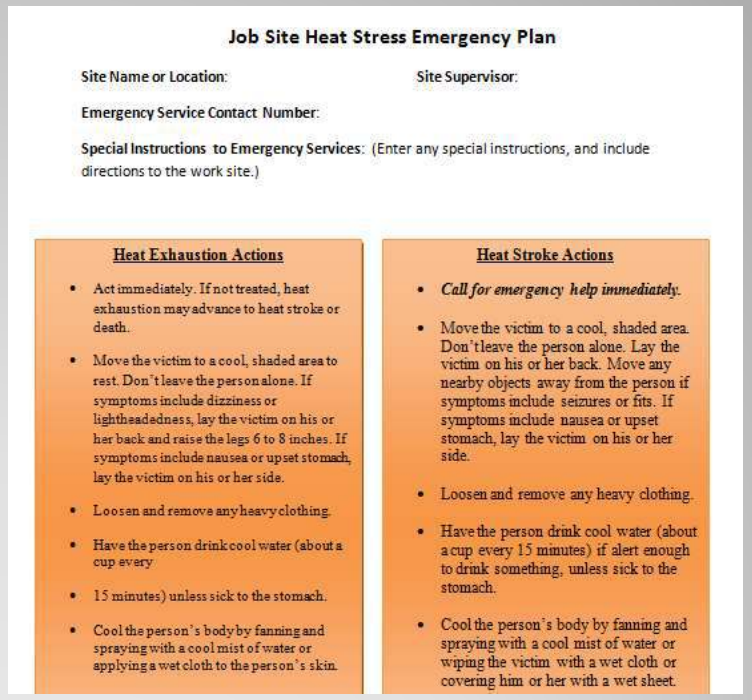
Treating Heat Stroke

- **<u>Call 911 immediately!</u>**
- Move the person to a cool, shaded area.
- Lay the person on their back, or on their side if nauseous.
- Move any nearby objects away from the person.
- Loosen or remove heavy clothing.
- Have the person drink a cup of cool water every 15 minutes.
- Cool the body by fanning it or apply cool water.
- Place ice packs under the armpits and in the groin area.

Heat stroke is potentially fatal. Call for help immediately!

Emergency Action Plan

- The company should have an emergency action plan for dealing with heat illness.
- It is critical that employees immediately report heat illness symptoms to a supervisor. Every second you wait increases the danger to the worker.
- Job sites must have specific contact information for emergency services.



Job Site Heat Stress Emergency Plan

Site Name or Location: Site Supervisor:

Emergency Service Contact Number:

Special Instructions to Emergency Services: (Enter any special instructions, and include directions to the work site.)

Heat Exhaustion Actions

- Act immediately. If not treated, heat exhaustion may advance to heat stroke or death.
- Move the victim to a cool, shaded area to rest. Don't leave the person alone. If symptoms include dizziness or lightheadedness, lay the victim on his or her back and raise the legs 6 to 8 inches. If symptoms include nausea or upset stomach, lay the victim on his or her side.
- Loosen and remove any heavy clothing.
- Have the person drink cool water (about a cup every
- 15 minutes) unless sick to the stomach.
- Cool the person's body by fanning and spraying with a cool mist of water or applying a wet cloth to the person's skin.

Heat Stroke Actions

- *Call for emergency help immediately.*
- Move the victim to a cool, shaded area. Don't leave the person alone. Lay the victim on his or her back. Move any nearby objects away from the person if symptoms include seizures or fits. If symptoms include nausea or upset stomach, lay the victim on his or her side.
- Loosen and remove any heavy clothing.
- Have the person drink cool water (about a cup every 15 minutes) if alert enough to drink something, unless sick to the stomach.
- Cool the person's body by fanning and spraying with a cool mist of water or wiping the victim with a wet cloth or covering him or her with a wet sheet.

Workers must have a means to contact supervisors and emergency personnel, such as a radio or phones.

Part III

Managing Heat Stress

Managing Heat Stress

- Like other safety hazards in the workplace, heat hazards must be identified and managed.
- Heat should be included in the job hazard analysis that the company performs for each job task.

Include heat stress factors in the company hazard analysis process.

Protecting Yourself From Heat Illness

- Wear loose fitting, breathable clothing, such as cotton.
- Drink plenty of water, at least one cup every 15 to 20 minutes.
- Take frequent breaks in cool areas.
- Avoid alcohol or caffeine, which reduces the bodies cooling ability.

Workers should also avoid eating large meals before working in hot areas.

Preventing Heat Stress with Engineering Controls

- If possible, heat sources should be removed from the work area or job task.
- This can be done by:
  - Eliminating heat sources.
  - Installing heat shields.
  - Installing cooling systems.
  - Use of fans.

Eliminating the heat risk with engineering controls is the best way to manage heat hazards.

Administrative Controls

- If the heat hazards cannot be engineered out, administrative controls must be used to manage heat hazards.
- This controls include:
  - Changing work procedures.
  - Providing water.
  - Providing shade.
  - Mandatory work breaks.

Working at night or in the early morning can reduce heat hazards.

Changing Work Procedures

- Heat hazards can be minimized by changing work procedures.
- Maximize the amount of work that can be done in air-conditioned environments.
- Schedule heavy work to be performed during the cool times of the day.
- Have workers switch strenuous tasks with easier ones, so they are not doing hard labor all day.
- Change work processes so that workers are not near heat sources.
- Have workers use the buddy system, and monitor each other for heat illness.

Providing Water

- Access to plenty of cool drinking water is the best way to manage heat stress.
- The company should provide at least one quart of cool drinking water per employee per hour.
- Designate a person to check water levels and specify how often the containers should be checked.

Cool water is important PPE – It should be provided at no cost to the employee.

Providing Water

- Employees should routinely drink water as part of their job task.
- Do not wait until you are thirsty! If you are thirsty, you are already overheated.
- Heat illnesses can occur suddenly, before a worker even feels thirsty.

Workers should drink a cup of cool water every 15 to 20 minutes.

Providing Shade

- Employees must be provided with a resting place to escape the heat.
- The shaded or cool area should be as close as possible to the work area.
- Employees should take frequent shade breaks, for at least 5 minutes at a time.

Summary

- Heat exposure will reduce the productivity and work accuracy of employees.
- The body cools itself by sweating. Water lost due to sweating must be replaced.
- Workers experiencing heat exhaustion should rest in a cool place and drink water.
- Workers with heat stroke must receive immediate medical attention. Give them water and cool them until medical professionals arrive.
- Companies should use engineering or administrative controls to eliminate heat hazards.
- Cool drinking water must be provided to employees.
- Workers in hot areas should drink one cup of water every 15 to 20 minutes.
- Shade or cool rest areas must be provided to employees.

Questions?