

Philmont Advisory on Prevention of Heat Illness

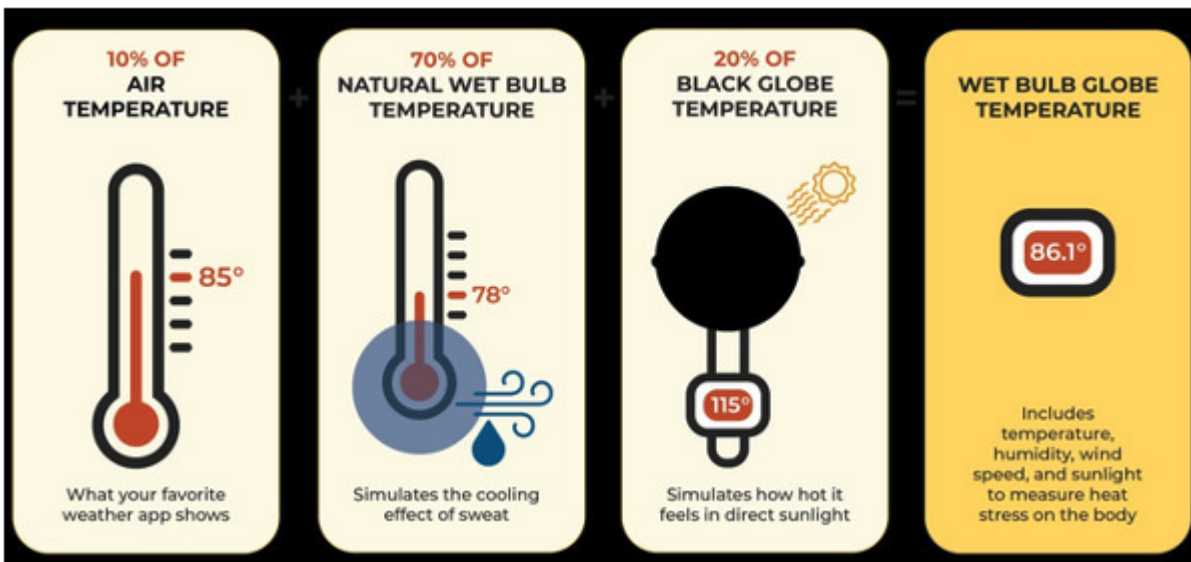
Environmental heat is more than just temperature. Four factors contribute to heat stress:

- Air temperature.
- Humidity. High relative humidity makes it difficult for the body to cool itself through sweating.
- Radiant heat from sunlight and/or other heat sources such as forges or rocks in the sun.
- Air movement. Some worksites are hotter due to structures blocking air flow.

Heat should be measured on site. In addition to distance and elevation errors, weather reports cannot accurately gauge local conditions in direct sun nor account for heat generated by forges, heat-absorbing surfaces such as rocks, wind blockage or reflecting sunlight.

Environmental heat assessment should account for all of these factors, therefore **the use of wet bulb globe temperature (WBGT) monitor to measure workplace environmental heat at the worksite is recommended**. WBGT devices contain three different thermometers:

- A dry bulb thermometer to measure the ambient air temperature.
- A natural wet bulb thermometer to measure the potential for evaporative cooling.
- A black globe thermometer to measure radiant heat.



The device will provide a calculated WBGT temperature and most devices also make a recommendation regarding activity restriction.

A WBGT is placed in the activity site near workers and participants on a tripod 3 feet above the ground in direct sunlight.

Example of a WBGT:



For ease of reference, here is a link to a sample \$35 WBGT:

https://www.amazon.com/BTMETER-Anemometer-Temperature-Activities-BT-881W/dp/B09WMQTFKD/ref=sr_1_1_sspa?crid=N6SANI1YLSPF&dib=eyJ2ljojMSJ9.O4US294LEnZUIhDWZcBik1qRZxLjlrGEH-FOhsJPnQ3GjHj071QN20LucGBJIEps.rKUFMOFf_Kjm3Jx4AwZ_QDuVQ9aes8DDjULrhUwK_M&dib_tag=se&keywords=wgbt&qid=1747060824&sprefix=wgbt%2Caps%2C158&sr=8-1-spons&sp_csd=d2lkZ2V0TmFtZT1zcf9hdGY&psc=1

Heat Index was the previous standard but does not measure worksite heat stress as accurately as WBGT. Heat index uses a thermometer in the shade and does not account for sun intensity, cloud cover, nor wind.

Wet-Bulb Globe Temperature vs Heat Index

The **Wet-Bulb Globe Temperature (WBGT)** is a measure of heat stress level on humans in direct sunlight and takes into account many different elements!

VS

Heat index is calculated in the shade and only takes into account temperature and humidity.

| Parameters | WBGT | Heat Index |
|-----------------------|------|------------|
| Measured in the sun | ✓ | ✗ |
| Measured in the shade | ✗ | ✓ |
| Uses Temperature | ✓ | ✓ |
| Uses Humidity | ✓ | ✓ |
| Uses Wind Speed | ✓ | ✗ |
| Uses Sun Angle | ✓ | ✗ |
| Uses Cloud Cover | ✓ | ✗ |

Philmont Workplace Guidelines for Staff

Medical Screening. Those working in potentially hot environments should be screened by the Philmont Infirmary to determine suitability. For example, workers on particular medications (example: anticholinergics, antihistamines, beta-blockers, diuretics, laxatives, lithium, levothyroxine) may be more prone to heat related illness.

Clothing. Workers/participants should wear hats and light weight long sleeves + long pants. Do NOT wear 2 layers of clothing.

Shade. Shade reduces heat related illness.

- Create shade (i.e. construct ramadas) in sites that have no natural shade.
- Participants waiting to engage in activities should be provided shade.
- Work stations should be in shaded areas when possible.

Water. Provide water for workers/participants stored in the shade near the activity area.

Acclimatization. Alter the amount of activity for those workers and participants who are not acclimatized to the heat (see attached).

Rotation. Workers must rotate jobs/positions to reduce potential exposure to any one individual.

Monitor. Record WGBT at the start of activity, 30 minutes after the start, and at the end of the activity.

- Adhere to work/rest schedule during times of high heat and activity restriction.
- Cancel activities when experiencing high temperatures.
- Alter the times when activities are offered to the early morning hours when high temperatures are predicted.

| WET BULB GLOBE TEMPERATURE SCALE | | |
|---|---|--|
| RISK | IMPACTS | ACTIONS |
| LOW (80-85) | BODY STRESSED AFTER 45 MINUTES | AT LEAST 15 MINUTES OF BREAKS FOR EACH HOUR OF WORK IN DIRECT SUN |
| MODERATE (85-88) | BODY STRESSED AFTER 30 MINUTES, HEAT CRAMPS POSSIBLE | AT LEAST 30 MINUTES OF BREAKS FOR EACH HOUR OF WORK IN DIRECT SUN |
| HIGH (88-90) | BODY STRESSED AFTER 20 MINUTES, HEAT EXHAUSTION POSSIBLE | AT LEAST 40 MINUTES OF BREAKS FOR EACH HOUR OF WORK IN DIRECT SUN |
| EXTREME (> 90) | BODY STRESSED AFTER 15 MINUTES, HEAT STROKE POSSIBLE | SUSPEND ALL STRENUOUS OUTDOOR ACTIVITIES |

Activity Level. The level of activity is also a factor in determining restrictions.

Light work heats the body's core very little while heavy work heats up the core body temperature significantly.

- Light work: standing, walking, carrying objects < 5 pounds
- Heavy work: chopping wood, carrying large objects, climbing

Educate. All staff working in potentially hot areas should receive heat training and education.

Signs. Post warning signs in heat stressed areas, warning workers and participants to monitor for symptoms of heat related illness.

Buddy System. Implement a buddy system in which workers and participants are responsible for observing each other for signs of heat intolerance such as weakness, dizziness, irritability, disorientation, changes in skin color, sweating or general malaise.

Culture. Adopt a culture of acceptance of those experiencing heat related symptoms.

Report. Radio the Philmont Infirmary when staff or participants become ill.

Hydration Recommendations:

Before activity: drink 16 oz of water or sports drink

During activity: drink 250 mL of water or sports drink every 15 minutes

After activity: drink at least 16 oz of sports drink

Heat Stress Education

SIGNS AND SYMPTOMS OF HEAT STROKE

- Weakness
- Fatigue
- Nausea
- Dizziness/Light-Headedness
- Altered consciousness
- Collapse, staggering, or sluggish feeling
- Fainting
- Profuse sweating
- Irritability
- Diarrhea
- Chills
- Increase in core body temperature, usually above 104°F/40°C rectal temperature
- Pale complexion
- Decreased muscle coordination
- Hot and wet or dry skin
- Headache
- Sodium Loss
- Hyperventilation
- Rapid Pulse, low blood pressure, quick breathing

* Adapted from Korey Stringer Institute: <http://ksi.uconn.edu>

DIFFERENT TYPES OF HEAT STRESS

Heat Stroke

Heat stroke is caused by just being in a hot environment, which leads to a rise in body temperature. Exertional heat stroke is caused by intense physical activity, which leads to an increase in body temperature. Working or exercising in hot or humid weather can lead to exertional heat stroke.

Heat Exhaustion

Heat exhaustion occurs when your body cannot continue exercise due to heat stress. Often this is accompanied by dehydration. There are two kinds of heat exhaustion; water depletion and salt depletion. Signs of water depletion can include excessive thirst, weakness, headache, and loss of consciousness. For salt depletion, signs can include nausea and vomiting, muscle cramps, and dizziness.

Heat Syncope

Syncope is the medical term for fainting. Heat syncope is fainting due to overheating and occurs alongside a sudden change in posture or sudden stop in exercise. It occurs when water is evaporated from the blood, lowering the blood pressure further. Dehydration is a factor that contributes to heat syncope.

Heat Cramps

Heat cramps are muscle spasms that result from a large amount of salt and water loss during strenuous activity. Often they do not occur until after the activity, such as at night or when relaxing. Heavy sweating can cause heat cramps, particularly when water is replaced, but not salt or potassium.

Heat Rash

Heat rash is a skin irritation that can be caused by excessive sweat. A heat rash happens when sweat ducts become clogged, and the sweat cannot be released on the skin's surface. It becomes trapped beneath the skin's surface, causing a rash or a mild inflammation. Heat rash can also be called prickly heat or miliaria.

Wet Bulb Globe Temperature Category Work/Rest and Water Intake

08/07/15

Unacclimated and Acclimated Work/Rest and Water Intake Chart

| Heat Risk Category | Wet Bulb Globe Temp | Light Work | | Moderate Work | | Heavy Work | |
|--------------------|---------------------|------------|-------------------------|---------------|-------------------------|------------|-------------------------|
| | | Work/Rest | Water Intake (quart/hr) | Work/Rest | Water Intake (quart/hr) | Work/Rest | Water Intake (quart/hr) |
| No Risk | 78 – 79.9 | 50/10 min | 1/2 | 40/20 min | 3/4 | 30/30 min | 3/4 |
| | 78 – 79.9 | continuous | 1/2 | continuous | 3/4 | 50/10 min | 3/4 |
| Low | 80 – 84.9 | 40/20 min | 1/2 | 30/30 min | 3/4 | 20/40 min | 1 |
| | 80 – 84.9 | continuous | 1/2 | 50/10 min | 3/4 | 40/20 min | 1 |
| Moderate | 85 – 87.9 | 30/30 min | 3/4 | 20/40 min | 3/4 | 10/50 min | 1 |
| | 85 – 87.9 | continuous | 3/4 | 40/20 min | 3/4 | 30/30 min | 1 |
| High | 88 – 90 | 20/40 min | 3/4 | 10/50 min | 3/4 | avoid | 1 |
| | 88 – 90 | continuous | 3/4 | 30/30 min | 3/4 | 20/40 min | 1 |
| Extreme | > 90 | 10/50 min | 1 | avoid | 1 | avoid | 1 |
| | > 90 | 50/10 min | 1 | 20/40 min | 1 | 10/50 min | 1 |

Adapted from: 1) USGS Survey Manual, Management of Occupational Heat Stress, Chapter 45, Appendix A. 2) Manual of Naval Preventive Medicine, Chapter 3: Prevention of Heat and Cold Stress Injuries. 3) OSHA Technical Manual Section III: Chapter 4 Heat Stress. 4) National Weather Service Tulsa Forecast Office, Wet Bulb Globe Temperature.

Summary of acceptance of WBGT::

| Sport | International Federation | Venue | Heat stress risk | Heat policy | Parameter measurement | Thermal index | Commitment |
|-----------------------|--|---------|------------------|-------------|-----------------------|-------------------------|----------------|
| Athletics | World Athletics | Outdoor | Extreme | Yes | Calculation | WBGT | Requirement |
| Cycling Road | International Cycling Union | Outdoor | Extreme | Yes | Calculation* | WBGT | Recommendation |
| Triathlon | World Triathlon | Outdoor | Extreme | Yes | Calculation | WBGT † | Requirement |
| Cycling Mountain Bike | International Cycling Union | Outdoor | Very high | Yes | No or unspecified | – | Recommendation |
| Hockey | International Hockey Federation | Outdoor | Very high | Yes | Multiple | Air T° and rh% | Requirement |
| Marathon Swimming | World Aquatics | Outdoor | Very high | Yes | Single | Water T° | Requirement |
| Rugby Sevens | World Rugby | Outdoor | Very high | Yes | Calculation | Heat Stress Index | Recommendation |
| Sailing | World Sailing | Outdoor | Very high | Yes | No or unspecified | – | Recommendation |
| Tennis | International Tennis Federation | Outdoor | Very high | Yes | Calculation | WBGT | Requirement |
| Basketball 3x3 | International Basketball Federation | Outdoor | High | No | – | – | – |
| Beach Volleyball | International Volleyball Federation | Outdoor | High | Yes | Calculation | WBGT | Requirement |
| Cycling BMX Racing | International Cycling Union | Outdoor | High | Yes | No or unspecified | – | Recommendation |
| Football | International Federation of Football Association | Outdoor | High | Yes | Calculation | WBGT | Requirement |
| Modern Pentathlon | World Pentathlon | Outdoor | High | Yes | Multiple | Air T° and rh% | Recommendation |
| Rowing | World Rowing | Outdoor | High | Yes | Calculation | WBGT | Recommendation |
| Canoe Flatwater | International Canoe Federation | Outdoor | Moderate | Yes | No or unspecified | – | Requirement |
| Canoe Slalom | International Canoe Federation | Outdoor | Moderate | Yes | Multiple | Air T° and air movement | Requirement |
| Cycling BMX Freestyle | International Cycling Union | Outdoor | Moderate | Yes | No or unspecified | – | Recommendation |
| Cycling Track | International Cycling Union | Indoor | Moderate | No | – | – | – |
| Equestrian | Fédération Equestre Internationale | Outdoor | Moderate | Yes | Calculation | WBGT | Recommendation |
| Golf | International Golf Federation | Outdoor | Moderate | Yes | Calculation | WBGT | Recommendation |
| Skateboarding | World Skate | Outdoor | Moderate | Yes | No or unspecified | – | Recommendation |
| Sport Climbing | International Federation of Sport Climbing | Outdoor | Moderate | No | – | – | – |
| Surfing | International Surfing Association | Outdoor | Moderate | Yes | No or unspecified | – | Recommendation |
| Archery | World Archery Federation | Outdoor | Low | Yes | No or unspecified | – | Recommendation |
| Artistic Gymnastics | International Gymnastics Association | Indoor | Low | Yes | Calculation | Humidex | Recommendation |
| Artistic Swimming | World Aquatics | Indoor | Low | Yes | Single | Water T° | Recommendation |
| Badminton | Badminton World Federation | Indoor | Low | Yes | Multiple | Air T° and air movement | Requirement |
| Basketball | International Basketball Federation | Indoor | Low | Yes | Single | Air T° | Requirement |
| Boxing | Athlete 365 Boxing | Indoor | Low | Yes | No or unspecified | – | Requirement |
| Breaking | World DanceSport Federation | Outdoor | Low | Yes | No or unspecified | – | Recommendation |
| Diving | World Aquatics | Indoor | Low | Yes | Single | Water T° | Recommendation |
| Fencing | International Fencing Federation | Indoor | Low | Yes | Single | Air T° | Requirement |
| Handball | International Handball Federation | Indoor | Low | Yes | Single | Air T° | Requirement |
| Judo | International Judo Federation | Indoor | Low | Yes | Single | Air T° | Requirement |
| Rhythmic Gymnastics | International Gymnastics Association | Indoor | Low | Yes | Calculation | Humidex | Recommendation |
| Shooting | International Shooting Sport Federation | Indoor | Low | No | – | – | – |
| Swimming | World Aquatics | Indoor | Low | Yes | Single | Water T° | Recommendation |
| Table Tennis | International Table Tennis Federation | Indoor | Low | No | – | – | – |
| Taekwondo | World Taekwondo | Indoor | Low | No | – | – | – |
| Trampoline | International Gymnastics Association | Indoor | Low | Yes | Calculation | Humidex | Recommendation |
| Volleyball | International Volleyball Federation | Indoor | Low | Yes | Single | Air T° | Recommendation |
| Water Polo | World Aquatics | Indoor | Low | Yes | Single | Water T° | Recommendation |
| Weightlifting | International Weightlifting Federation | Indoor | Low | No | – | – | – |
| Wrestling | United World Wrestling | Indoor | Low | Yes | Single | Air T° | Requirement |

Policy employed by the International Federations (IFs) of the 45 sports engaged in Paris 2024 Olympic Games to protect athletes from heat stress in the competitive environment