



# U.S. Soccer Heat Guidelines

**GOAL:** This document is intended as a guide for coaches, referees, and players for training in warmer climates. Additionally, this document is intended to also serve as a guide for match play, hydration breaks and participant safety during extreme temperature conditions. The information provided herein is not substitute for medical or professional care, and you should not use the information in place of a visit, consultation or the advice of your physician or other health care provider. For specific questions and concerns, please consult your health care provider or physician.

## Exertional Heat Illness

- Spectrum of conditions ranging from heat cramps and heat exhaustion to a potentially life threatening condition called exertional heat stroke (EHS)
- The ability to recognize early signs and symptoms of heat illness (including headache, nausea, and dizziness) allows for proper treatment with hydration and more rapid cooling of the body.
- Exertional heat stroke has two key components:
  1. Altered mental status (confusion, irritability, aggressive behavior, dizziness, or collapse)
  2. A rectal temperature  $>104^{\circ}\text{F}$ .

## Prevention

- Develop and implement a heat policy (heat acclimatization guidelines, activity modification guidelines based on environmental conditions, and management of heat-related illness) as part of your emergency action plan (EAP)
- Frequently monitor environmental conditions using Wet Bulb Globe Temperature (WBGT) device or Heat Index and make practice modifications (e.g., increase in the number and duration of hydration breaks, shortening practice, postponing practice/competition until cooler parts of the day)
- Follow heat acclimatization guidelines (below) during preseason practices and conditioning
- Ensure appropriate hydration policies are in place with athletes having unlimited access to water during practice and competition, especially in warm climates.
- Educate staff on the signs and symptoms of heat related illness and early management
- Consider an on-site health care provider such as an athletic trainer be onsite for all practices and competitions

## Resources/Equipment

- WBGT monitor
- Hydration capabilities- water bottles, coolers, hoses, etc.
- National Weather Service – [www.weather.gov](http://www.weather.gov)
- Phone App for WBGT - WeatherFX (iTunes or Android store)
- Ice
- Ice immersion tub or kiddie pools
- Towels and cooler
- Tent or other artificial shade if none available



Examples of WBGT monitors

## Management

### Heat Illness (Heat Exhaustion, Heat Cramps)

- Remove from training and source of heat
- Cool in a shaded area using ice towels
- Provide access to fluids/electrolytes and encourage rehydration

### Exertional Heat Stroke

- Is a medical emergency
- Immediately call EMS (911) and prepare hospital for heat related emergency
- Athlete may have confusion or altered mental status and a rectal temperature  $>104^{\circ}\text{F}$
- Remove excess clothing/equipment and immediately begin cooling the athlete by placing them in an ice-water-tub.
  - If no tub is present, rotate cold wet ice towels (every 2-3 minutes over the entire surface of the body or as much as possible)



## Acclimatization

- Acclimatization is the body's natural adaptation to exercising in the heat
- This process typically takes 10-14 days
- The protocol should require a gradual graded progression of exercise in the heat. This typically applies at the start of pre-season (summer months) where athletes are beginning fitness training and progressive training exposure in heat is recommended

## Guide for Acclimatization

- **Avoid** the hottest part of the day for training sessions (11am-4pm)
- Days 1-5
  - One formal practice a day
  - Maximum 3 hours of training time (this includes warm up, stretches and cool down)
- Days 6-14
  - Double practice days can begin on day 6 and not exceed 5 hours in total practice time between the two practices.
  - There should be a minimum of a 3 hours rest period between each training session during double practice days. The 3 hour rest period should take place in a cool environment to allow the body to fully recover
  - Each double practice day should be followed by a single practice day in which practice time on single practice days not exceeding 3 hours
  - Athletes should receive one day rest following 6 days continuous practice

## WBGT (Heat Stress Monitoring) & Region Specific Guidelines/Heat Index

- Recommend using WBGT on-site at time of training and check as often as possible.
- If on-site WBGT measures are not available, on-site measures of temperature and humidity can be used to predict WBGT using the chart below. (NOTE: Heat Index is not ideal because it doesn't factor the heat from the sun).
- If no on-site temperature measures are available, use temperature and humidity from local weather station measures and use the chart below to predict WBGT.

### Step 1: Find the WBGT

- Measure the temperature and humidity at your site
- Find the estimated WBGT corresponding below.

Wet Bulb Globe Temperature (WBGT) from Temperature and Relative Humidity																															
Temperature in Degrees Fahrenheit																															
	68.0	69.8	71.6	73.4	75.2	77.0	78.8	80.6	82.4	84.2	86.0	87.8	89.6	91.4	93.2	95.0	96.8	98.6	100.4	102.2	104.0	105.8	107.6	109.4	111.2	113.0	114.8	116.6	118.4	120.2	122.0
0	59.0	60.8	60.8	62.6	64.4	64.4	66.2	66.2	68.0	68.0	69.8	71.6	71.6	73.4	73.4	75.2	75.2	77.0	77.0	78.8	80.6	80.6	82.4	82.4	84.2	84.2	86.0	87.8	87.8	89.6	89.6
5	60.8	60.8	62.6	64.4	64.4	66.2	66.2	68.0	69.8	69.8	71.6	71.6	73.4	75.2	75.2	77.0	78.8	78.8	80.6	80.6	82.4	84.2	84.2	86.0	87.8	87.8	89.6	91.4	91.4	93.2	95.0
10	60.8	62.6	62.6	64.4	66.2	66.2	68.0	69.8	69.8	71.6	73.4	73.4	75.2	77.0	77.0	78.8	80.6	80.6	82.4	84.2	84.2	86.0	87.8	89.6	89.6	91.4	93.2	95.0	96.8	96.8	98.6
15	62.6	62.6	64.4	66.2	66.2	68.0	69.8	69.8	71.6	73.4	73.4	75.2	77.0	78.8	78.8	80.6	82.4	84.2	84.2	86.0	87.8	89.6	89.6	91.4	93.2	95.0	96.8	98.6	100.4	102.2	
20	62.6	64.4	64.4	66.2	68.0	69.8	69.8	71.6	73.4	75.2	75.2	77.0	78.8	80.6	80.6	82.4	84.2	86.0	87.8	89.6	89.6	91.4	93.2	95.0	96.8	98.6	100.4	102.2			
25	64.4	64.4	66.2	68.0	68.0	69.8	71.6	73.4	75.2	75.2	77.0	78.8	80.6	82.4	84.2	84.2	86.0	87.8	89.6	91.4	93.2	95.0	96.8	98.6	100.4	102.2					
30	64.4	66.2	68.0	68.0	69.8	71.6	73.4	73.4	75.2	77.0	78.8	80.6	82.4	84.2	84.2	86.0	87.8	89.6	91.4	93.2	95.0	96.8	98.6	100.4							
35	64.4	66.2	68.0	69.8	71.6	73.4	73.4	75.2	77.0	78.8	80.6	82.4	84.2	86.0	87.8	89.6	91.4	93.2	95.0	96.8	98.6	100.4									
40	66.2	68.0	69.8	69.8	71.6	73.4	75.2	77.0	78.8	80.6	82.4	84.2	86.0	87.8	89.6	91.4	93.2	95.0	96.8	98.6	100.4										
45	66.2	68.0	69.8	71.6	73.4	75.2	77.0	78.8	80.6	80.6	82.4	84.2	86.0	89.6	91.4	93.2	95.0	96.8	100.4												
50	68.0	69.8	71.6	73.4	73.4	75.2	77.0	78.8	80.6	82.4	84.2	86.0	87.8	91.4	93.2	95.0	96.8	98.6	102.2												
55	68.0	69.8	71.6	73.4	75.2	77.0	78.8	80.6	82.4	84.2	86.0	87.8	89.6	93.2	95.0	96.8	98.6	100.4													
60	69.8	71.6	73.4	75.2	77.0	78.8	80.6	82.4	84.2	86.0	87.8	89.6	91.4	95.0	96.8	98.6	100.4														
65	69.8	71.6	73.4	75.2	77.0	78.8	80.6	82.4	84.2	87.8	89.6	91.4	93.2	96.8	98.6	100.4															
70	71.6	73.4	75.2	77.0	78.8	80.6	82.4	84.2	86.0	87.8	91.4	93.2	95.0	96.8	100.4	102.2															
75	71.6	73.4	75.2	77.0	78.8	80.6	84.2	86.0	87.8	89.6	91.4	95.0	96.8	98.6	102.2																
80	73.4	75.2	77.0	78.8	80.6	82.4	84.2	86.0	89.6	91.4	93.2	96.8	98.6	100.4																	
85	73.4	75.2	77.0	78.8	82.4	84.2	86.0	87.8	89.6	93.2	95.0	98.6	100.4	102.2																	
90	75.2	77.0	78.8	80.6	82.4	84.2	87.8	89.6	91.4	95.0	96.8	98.6	102.2																		
95	75.2	77.0	78.8	80.6	84.2	86.0	87.8	91.4	93.2	95.0	98.6	100.4																			
100	75.2	78.8	80.6	82.4	84.2	87.8	89.6	91.4	95.0	96.8	100.4	102.2																			

NOTE: This table is compiled from an approximat formula which only depends on temperature and humidity. The formula is valid for full sunshine and a light wind. Table adapted from Bureau of Meteorology

### Step 2: Find your Regional Category

- Determine which region category you are in based on the map below, to determine which WBGT guidelines in the table you should follow.

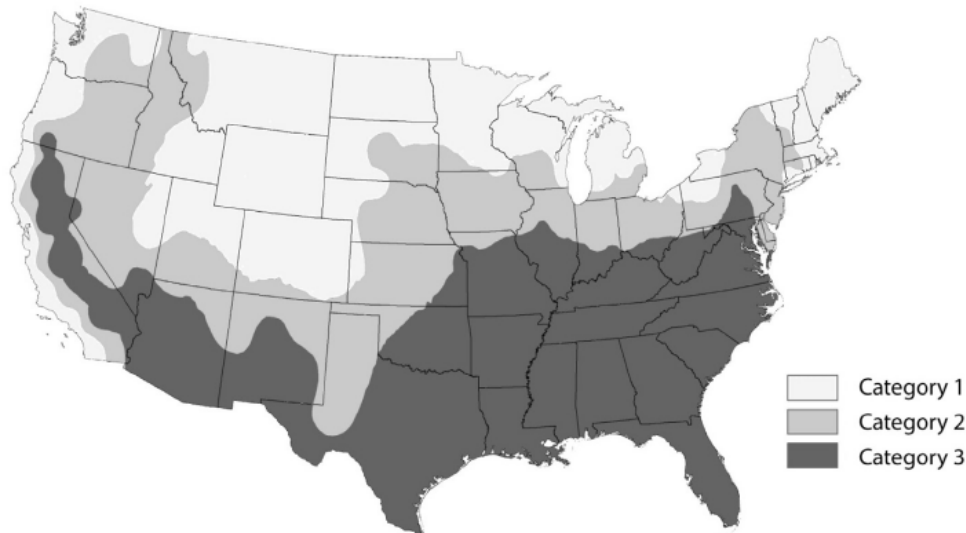


Figure: Regional Heat Category. Reprinted from "Regional heat safety thresholds for athletics in the contiguous United States", A. Grundstein, C. Williams, M. Phan, and E. Cooper, 2015, Applied Geography, Vol 56, p55-60.

### Step 3: Determine Your Conditions, Alert Level, and Recommendations

- Determine which region category you are in based on the map above, to determine which WBGT guidelines in the table you should follow.

Alert Level	WBGT by Region (°F)			Event Conditions	Recommended Actions & Breaks
	Cat 1	Cat 2	Cat 3		
Black	>86.2°	>89.8°	>92.0°	Extreme Conditions	<ul style="list-style-type: none"> <li>No Outdoor Training, delay training until cooler, or Cancel Training</li> </ul>
Red	84.2-86.1°	87.8-89.7°	90.1-91.9°	High Risk for Heat Related Illness	<ul style="list-style-type: none"> <li>Maximum of 1 hour of training with 4 by 4 minute breaks within the hour.</li> <li>No additional conditioning allowed.</li> </ul>
Orange	81.1-84.1°	84.7-87.7°	87.1-90.0°	Moderate Risk for Heat Related Illness	<ul style="list-style-type: none"> <li>Maximum of 2 hours of training with 4 by 4 minute breaks each hour, OR a 10 minute break every 30 minutes of training</li> </ul>
Yellow	76.3-81.0°	79.9-84.6°	82.2-87.0°	Less than Ideal Conditions	<ul style="list-style-type: none"> <li>3 Separate 4 minute breaks each hour, OR a 12 minute break every 40 minutes of training</li> </ul>
Green	<76.1°	<79.8°	<82.1°	Good Conditions	<ul style="list-style-type: none"> <li>Normal Activities</li> <li>3 Separate 3 minute breaks each hour of training, OR a 10 minute break every 40 minutes</li> </ul>

### Cancelation of Training

- Depending on your region category, recommend cancelation of training or delay until cooler when WBGT for Cat 1 >86.2°F; for Cat 2 >89.9°F; Cat 3 >92.0°F

### Step 4: Determine the Work to Rest Ratios – Modifications in Training

- Alert Level Green – Normal Activities, provide 3 separate 3 minute breaks each hour of training, or a 10 minute break every 40 minutes.
- Alert Level Yellow – Use discretion, provide 3 separate 4 minute breaks each hour, or a 12 minute break every 40 minutes of continuous training
- Alert Level Orange – Maximum 2 hours of training time with 4 separate 4 minute breaks each hour, or a 10 minute break after 30 minutes of continuous training
- Alert Level Red – Maximum of 1 hour of training with 4 separate 4 minute breaks within the hour. No additional conditioning allowed.
- Alert Level Black – No outdoor training, delay training until cooler or cancel

## Match Play Hydration Breaks

- WBGT of 89.6°F
- Provide hydration breaks of 4 minutes for each 30 minutes of continuous play (i.e., minute 30 and 75 of 90 minute match)

## Communication

- Provide adequate communication of environmental conditions, cooling modalities and other resources to players and staff including
  - Planned breaks for hydration
  - Duration and time of training
  - During warmer conditions, plan ahead for matches and trainings
- Ensure unlimited access to water and other fluids

Follow your Emergency Action Plan

**This guideline was developed by U.S. Soccer's Sports Medicine Department in collaboration with the Korey Stringer Institute**