

Updated American College of Sports Medicine Heat Index Chart

The initial American College of Sports Medicine Heat Guidelines issued in 2007 have long been the accepted protocols for determining at what temperatures runners should modify their race ambitions and at what temperature race directors should cancel their events. These guidelines have been included as the “Event Alert System” in race instructions, in signage a countless events and announced on race day as the “flag conditions” for participants.

EVENT ALERT SYSTEM (EAS)

FLAG COLOR	EVENT CONDITIONS	RECOMMENDED ACTIONS
BLACK	EVENT CANCELED EXTREME AND DANGEROUS CONDITIONS	PARTICIPATION STOPPED Follow event official instructions.
RED	EXTREME CAUTION POTENTIALLY DANGEROUS CONDITIONS	SLOW PACE: CONSIDER NOT PARTICIPATING Observe course changes and follow event official instructions. Drink extra fluids if you are thirsty or sweating heavily. Those with previous heat stress problems or heart disease should not start.
YELLOW	CAUTION LESS THAN IDEAL CONDITIONS	SLOW PACE: BE PREPARED FOR WORSENING CONDITIONS Those with previous heat stress problems or heart disease consider not starting.
GREEN	LOW RISK GOOD CONDITIONS	ENJOY THE EVENT Risk of heat stress is low, but be watchful for symptoms or changing conditions. Be alert.
WHITE (cold weather events only)	RISK OF HYPOTHERMIA	BE PREPARED FOR UNPLEASANT OR WORSENING CONDITIONS Consider stopping and finding warm shelter. Dress for cooler conditions. Take precautions if raining.

The 2007 Guidelines set the following risk ranges:

- WBGT <65°F (<18°C) **Green Flag:** Collapse can still occur. Decreased risk of hyperthermic and hypothermic collapse.
- WBGT 65°F - 72°F (18°C - 22°C) **Yellow Flag:** Recommend participants at increased risk for heat collapse to slow their pace. Warn participants of increased risk of heat collapse.
- WBGT 73°F - 82°F (23°C - 28°C) **Red Flag:** Recommend participants at increased risk for heat collapse withdraw from race and others slow pace to match conditions.
- WBGT >82°F (>28°C) **Black Flag:** Cancel or recommend voluntary withdrawal. (Races that are always held in

these conditions should acknowledge the extreme heat risk to the poorly acclimated and non-resident competitors in the pre-race literature and the pre-race announcements.)

- WBGT <50°F (<10°C) **White Flag:** Increased risk of hypothermic collapse.

The ACSM issued a new set of guidelines in 2023 which should be required reading for all race medical personnel.

They can be accessed at this link: <https://www.ovid.com/jnls/acsm-csmr/fulltext/10.1249/jsr.0000000000001058~acsm-expert-consensus-statement-on-exertional-heat-illness>

The guidelines provide detailed guidance on identifying and treating heat related illness which can be life threatening. The guidelines report the following:

- “Pre hospital management [*Editor’s note:* this means at the race site] is the most critical element of limiting the morbidity and mortality related to an Exertional Heat Illness event.”
- “Marathon running and triathlons report the highest number of hospitalizations due to the extended duration of vigorous exercise.”

The 2023 article contains a new version of the Heat Guidelines chart with two noteworthy updates from the 2007 chart.

- **Differing risk levels for different areas of the country:** The 2023 chart divides the U.S. into three risk zones based on general climate. The three regions are defined as follows: “*Region category 1* primarily includes the most northern regions of the continental United States; *Category 2* includes the middle of the United States while also encompassing some northern and southern areas, *Category 3* is primarily the southeast and southwest.
- **Different risk levels for different types of participants.** There are variations in the risk guidelines for “Non-acclimatized, unfit, high-risk individuals,” and “Acclimatized, fit, low-risk individuals.”

Of course, the challenge for event directors is that their participants may come from both of these categories, making the safest choice adhering to the guidelines for the non-acclimatized individuals.

A copy of the 2023 risk guidelines appears on the following page:

Continuous Activity and Competition for Individuals Who Are Highly Fit and Fully Acclimatized to High Heat Conditions ^{a,b}						Training and Noncontinuous Activity	
WBGT (°C)							
Region category ^c							
Category 3	Category 2	Category 1		Nonacclimatized, unfit, high-risk individuals ^b		Acclimatized, fit, low-risk individuals ^{d,e}	
≤10.0	<8.7	<6.7	Generally safe; EHS can occur associated with individual factors	Normal activity		Normal activity	
10.1 to 18.3	8.8 to 17.0	6.8 to 15.0	Generally safe. EHS can occur in individuals who are not acclimatized or have risk factors	Normal activity		Normal activity	
18.4 to 22.2	17.1 to 20.9	15.1 to 18.9	Generally safe. Risk of EHS and other heat illness begins to rise; high-risk individuals should be monitored	Increased risk. Increase the rest/work ratio. Monitor fluid intake.		Normal activity	
22.3 to 25.6	21.0 to 24.3	19.0 to 22.3	Risk for all active individuals is increased	Moderate risk. Increase the rest/work ratio and decrease total duration of activity. American rules football restrict equipment to helmet, shoulder pads, and shorts.		Normal activity. Monitor fluid intake. Limit protective equipment.	
25.7 to 27.8	24.4 to 26.5	22.4 to 24.5	Risk for unfit, nonacclimatized individuals is high	Moderate high risk. Increase the rest:work ratio; decrease intensity and total duration of activity. No protective equipment during practice and no conditioning activities.		Normal activity. Increase rest breaks. Monitor fluid intake. Consider removing protective equipment. Provide at least three rest breaks per hour with a minimum duration of 4 min each.	
27.9 to 30.0	26.6 to 28.7	24.6 to 26.7	Very high risk ^e Cancel exercise or competition.	Very high risk. ^e Increase the rest:work ratio to 1:1, decrease intensity and total duration of activity. Limit intense exercise. Watch at risk individuals carefully.		Increase the rest:work ratio and decrease total duration of activity (<2 h). Plan intense or prolonged exercise with discretion, watch at-risk individuals carefully. No protective equipment during practice and no conditioning activities. Provide at least four rest breaks with a minimum duration of 4 min each.	
30.1 to 32.2	28.8 to 30.9	26.8 to 28.9		Very high risk ^e Cancel or stop practice and competition.		Limit exercise time to ≤1 h, no conditioning activities, 20 min of rest breaks distributed throughout exercise time, no protective equipment, watch for early signs and symptoms	
>32.3	>31.0	>29.0		Extremely high risk. ^e Cancel exercise.		Extremely high risk. ^e Cancel exercise	

These guidelines do not account for the effects of a uniform, clothing, and protective equipment (*i.e.*, American football) which increase sweat losses and elevate body temperature; these factors should be considered when determining competition or practice limitations based on the WBGT. It is best practice to use activity modification thresholds that account for local or regional climate conditions. Use on-site WBGT devices to measure or access estimated WBGT readings for your area. WBGT forecast information is available at <https://digital.mdl.nws.noaa.gov/use-drop-down-menu-to-access-WBGT> to help inform next day decisions or use WBGT calculations at <https://www.osha.gov/otm/section-3-health-hazards/chapter-4#wbgt> that also includes a link to estimate current local WBGT conditions.

^a High-level athletes who have been acclimatized ≥12 wk, not applicable to events with unacclimatized participants.

^b While wearing shorts, t-shirt, socks, and sneakers.

^c Region category 1 primarily includes the most northern regions of the contiguous United States, category 2 includes the middle of the United States while also encompassing some northern and southern areas, category 3 is primarily the southeast and southwest. Use of the map within the original reference is recommended for clinicians to determine which category to use when developing the heat modification policies and procedures. Outside the United States, humid subtropical and hot desert climates best fit in category 3 and marine cooler climates in category 1 but using historical data to calculate appropriate thresholds for each region as described previously is the best risk reduction strategy. (103,120–124).

^d At least 3 wk in the heat.

^e Risk of EHS and EHE.

WBGT, wet bulb globe temperature.

The spreadsheet below provides the [Wet Bulb Globe Temperature](#) ranges in Fahrenheit.

Category 3 in Fahrenheit		Category 2 in Fahrenheit		Category 1 in Fahrenheit	
Low	High	Low	High	Low	High
<50		<48		<44	
50.18	64.94	47.84	62.6	44.24	59
65.12	71.96	62.78	69.62	66.2	72.14
72.14	78.08	69.8	75.74	66.2	72.14
78.26	82.04	75.92	79.7	72.32	76.1
82.22	86	79.88	83.66	76.28	80.06
86.18	89.96	83.84	87.62	80.24	84.02
	>90.14		>87.8		>84.2
Temperature range primarily the southeast and southwest United States in Fahrenheit		Temperature range includes the middle of the United States while also encompassing some northern and southern areas in Fahrenheit		Temperature range primarily includes the most northerly regions of the contiguous United States in Fahrenheit	