

# Kestrel Heat Stress Trackers WBGT Reference Guide

GUIDANCE FOR HIGH SCHOOL ATHLETICS	
WBGT READING	ACTIVITY GUIDELINES & REST BREAK GUIDELINES
UNDER 82.0	Normal activities - Provide at least three separate rest breaks each hour of minimum duration of 3 minutes each during workout.
82.0 - 86.9	Use discretion for intense or prolonged exercise; watch at-risk players carefully; Provide at least three separate rest breaks each hour of a minimum of four minutes duration each.
87.0 - 89.9	Maximum practice time is two hours! For football: players restricted to helmet, shoulder pads and shorts during practice. All protective equipment must be removed for conditioning activities. For all sports: Provide at least four separate rest breaks each hour of a minimum of four minutes each.
90.0 - 92.0	Maximum length of practice is one hour, no protective equipment may be worn during practice and there may be no conditioning activities. There must be 20 minutes of rest breaks provided during the hour of practice.
OVER 92	NO OUTDOOR WORKOUTS! Cancel exercise; delay practice until a cooler WBGT reading occurs.

GHSa Heat Index Record Sheet. Georgia High School Athletic Association Heat Index Measurement and Record. 2012:1.

GUIDANCE FOR HEAT-ACCLIMATED SOLDIERS								
Work/Rest and Water Consumption Table								
Applies to average sized, heat-acclimated Soldier wearing ACU, hot weather. (See TB MED 507 for further guidance.)								
Easy Work		Moderate Work			Hard Work			<ul style="list-style-type: none"> <li>The work/rest times and fluid replacement volumes will sustain performance and hydration for at least 4 hrs of work in the specified heat category. Fluid needs can vary based on individual differences (± ¼ qt/hr) and exposure to full sun or full shade (± ¼ qt/hr).</li> <li>NL = no limit to work time per hr.</li> <li>Rest = minimal physical activity (sitting or standing) accomplished in shade if possible.</li> <li>CAUTION: Hourly fluid intake should not exceed 1½ qts.</li> <li>Daily fluid intake should not exceed 12 qts.</li> <li>If wearing body armor, add 5°F to WBGT index in humid climates.</li> <li>If doing Easy Work and wearing NBC (MOPP 4) clothing, add 10°F to WBGT index.</li> <li>If doing Moderate or Hard Work and wearing NBC (MOPP 4) clothing, add 20°F to WBGT index.</li> </ul>
<ul style="list-style-type: none"> <li>Weapon Maintenance</li> <li>Walking Hard Surface at 2.5 mph, &lt; 30 lb Load</li> <li>Marksmanship Training</li> <li>Drill and Ceremony</li> <li>Manual of Arms</li> </ul>	<ul style="list-style-type: none"> <li>Walking Loose Sand at 2.5 mph, No Load</li> <li>Walking Hard Surface at 3.5 mph, &lt; 40 lb Load</li> <li>Calisthenics</li> <li>Patrolling</li> <li>Individual Movement Techniques, i.e., Low Crawl or High Crawl</li> <li>Defensive Position Construction</li> </ul>	<ul style="list-style-type: none"> <li>Walking Hard Surface at 3.5 mph, ≥ 40 lb Load</li> <li>Walking Loose Sand at 2.5 mph with Load</li> <li>Field Assaults</li> </ul>						
Heat Category	WBGT Index, F°	Easy Work		Moderate Work		Hard Work		
		Work/Rest (min)	Water Intake (qt/hr)	Work/Rest (min)	Water Intake (qt/hr)	Work/Rest (min)	Water Intake (qt/hr)	
1	78° - 81.9°	NL	½	NL	¾	40/20 min	¾	
2 (green)	82° - 84.9°	NL	¾	50/10 min	¾	30/30 min	1	
3 (yellow)	85° - 87.9°	NL	¾	40/20 min	¾	30/30 min	1	
4 (red)	88° - 89.9°	NL	¾	30/30 min	¾	20/40 min	1	
5 (black)	> 90°	50/10 min	1	20/40 min	1	10/50 min	1	

For additional copies, contact: U.S. Army Public Health Command Health Information Operations Division at (800) 222-9698 or USAPHPC - Health Information Operations@sga.army.mil. For electronic versions, see <http://c3pim-www.sagepub.com/heat>. Distribution unlimited. Local reproduction is authorized. CP-023-0811



Departments of The Army, The Navy and The Air Force, Occupational and Environmental Health: Prevention, Treatment and Control of Heat Injury. Technical Bulletin MED No. 507. 1980:1-21.

In addition to utilizing the guidance that is applicable to your environment and/or event, please refer to YOUR SPECIFIC STATE'S REQUIREMENTS for measuring WBGT and heat acclimatization guidelines.

GUIDANCE FOR ATHLETIC TRAINERS			
WBGT	FLAG COLOR	LEVEL OF RISK	COMMENTS
<18°C (<65°F)	Green	Low	Risk low but still exists on the basis of risk factors.
18-23°C (65-73°F)	Yellow	Moderate	Risk level increases as event progresses through the day.
23-28°C (73-82°F)	Red	High	Everyone should be aware of injury potential; individuals at risk should not compete.
>28°C (82°F)	Black	Extreme or Hazardous	Consider rescheduling or delaying the event until safer conditions prevail; if the event must take place, be on high alert.

Roberts WO. Medical management and administration manual for long distance road racing. In: Brown CH, Gudjonsson B, eds. *IAAF Medical Manual for Athletics and Road Racing Competitions: A Practical Guide*. Monaco: International Amateur Athletic Federation Publications; 1998:39-75.

GUIDANCE FOR CHILDREN'S SPORTS PRACTICE		
MODIFYING PRACTICE SESSIONS FOR EXERCISING CHILDREN		
WBGT	RESTRAINTS ON ACTIVITIES	
	°F	°C
<75.0	<24.0	All activities allowed, but be alert for the prodromes of heat-related illness in prolonged events.
75.0-78.6	24.0-25.9	Longer rest periods in the shade; enforce drinking every 15 min.
79.0-84.0	26.0-29.0	Stop activity of unacclimatized persons and high-risk persons; limit activities of all others (disallow long-distance races, cut the duration of other activities).
>85.0	>29.0	Cancel all athletic activities.

Notes:  
 1. Source: reference (7).  
 2. These guidelines do not account for clothing. Although the effects of the uniform clothing and protective equipment (i.e., American football) on sweating and body temperature in younger athletes are unknown, uniforms should be considered when determining playing/practice limitations based on the WBGT.  
 3. Eight to 10 practices are recommended for heat acclimatization (30-45 min each; one per day or one every other day).  
 4. Differences of local climate and individual heat acclimatization status may allow activity at higher levels than outlined in the table, but athletes and coaches should consult with sports medicine staff and should be cautious when exceeding these limits.

American Academy of Pediatrics. Climatic heat stress and the exercising child and adolescent. *Pediatrics* 106(1):158-159, 2000.

WORK-REST REGIMEN	ISO 7243 THRESHOLD LIMIT VALUES FOR WORK ENVIROMENTS					
	WORK LOAD					
	LIGHT		MODERATE		HEAVY	
	°C	°F	°C	°F	°C	°F
Continuous work	30.0	86.0	26.7	80.1	25.0	77.0
75% work + 25% rest; each hour	30.6	87.1	28.0	82.4	25.9	78.6
50% work + 50% rest; each hour	31.4	88.5	29.4	84.9	27.9	82.2
25% work + 75% rest; each hour	32.2	90.0	31.1	88.0	30.0	86.0

Parsons, Ken. Heat Stress Standard ISO 7243 and Its Global Application. *Industrial Health* 2006(44):368-379.

**PLEASE NOTE: THESE INSTRUCTIONS SUPERCEDE THE INSTRUCTIONS RELATED TO WET BULB GLOBE TEMPERATURE LOCATED ON PAGES 13 AND 14 OF THE INSTRUCTION MANUAL.**

The Kestrel Heat Stress Trackers allow you to customize the settings of your heat-related warning zones based on your specific needs.

**SIX USER-SETTABLE WARNING ZONES**

- White** No risk
- Green** Low risk
- Yellow** Moderate risk
- Orange** Moderate risk
- Red** High risk
- Black** Extreme risk

Your Kestrel Heat Stress Tracker allows you to activate and set up to six customized heat stress warning zone thresholds to trigger warnings identified by color names on screen. The warnings are in increasing order of severity of risk of heat injury as shown.

**SET OUTDOOR/INDOOR MODE AND TURN ON THE WARNING**

- Navigate to the WBGT Screen.
- Press **⏏** to enter the Settings Screen.
- Use **⏏** or **⏏** to change the "Type" setting between outdoor and indoor.
- Use **⏏** to highlight "Warnings," then use **⏏** or **⏏** to turn on or off.

**PRESS WHILE ON THE WBGT SCREEN.**

- Use **⏏** to highlight "Warning setup" and press **⏏**.
- Use **⏏** or **⏏** to scroll to different warnings zones identified by color names.
- Press **⏏** to enter the selected warning zone.
- On the selected warning zone screen, press **⏏** to turn the "Warning" on or off.
- Press **⏏** to highlight "Temp." Use **⏏** or **⏏** to adjust the temperature value. Refer to the "WBGT Reference Guidelines" on the reverse side of this insert for suggested settings.

When a warning zone is turned "On," the WBGT screen will display the appropriate warning color (i.e. Warning: White) related to the specified temperature.

*Note: The Red Warning Zone is further identified by a reverse flash of the warning. The Black Warning Zone will reverse flash the WBGT value to alert the user. See below screenshots for examples of the screen reverse flash.*

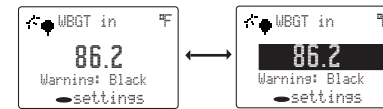
**!! WARNING !!**

These WBGT Reference Guidelines are summarized from well-regarded published papers, policies and position statements relating to preventing heat injury. These guidelines are provided for reference only and do not constitute medical advice.

These guidelines, and your Kestrel 4400 + 4600 Heat Stress Trackers, must be employed with care and good judgment. Please remember that certain individuals are more susceptible to exertional heat stress and the Kestrel 4400 + 4600 Heat Stress Trackers are environmental meters, not medical devices. For more information on heat stress injury prevention, visit [HeatStress.com](http://HeatStress.com).

**When in doubt, set your Zone Thresholds lower, reduce work time and increase rest and hydration.**

WBGT measurement screen with active warning. The WBGT value will reverse flash when a black warning is activated, indicating extreme risk.



In partnership with the Korey Stringer Institute, an organization dedicated to preventing sudden death in sport, Nielsen-Kellerman provides more information related to heat stress at [Heatstress.com](http://Heatstress.com).

Please visit the site for materials related to:

- Types of Heat Illness
- Prevention of Heat Stress
- Signs and Symptoms of Heat-Related Illness
- Treatment of Heat Stress
- Heat Acclimatization
- Hydration
- Wet Bulb Globe Temperature
- Thermal Work Limit

