

WBGT Reference Guidelines

The Kestrel 5400 is preloaded with the following WBGT guidelines. These guidelines are provided for reference only. **YOU ARE RESPONSIBLE FOR SELECTING GUIDELINES SUITABLE TO YOUR ACTIVITY, ENVIRONMENT AND PARTICIPANTS.**

Learn more at www.heatstress.com.

TB Med 507

Heat Category	WBGT ^{6,7} Index (°F)	Easy Work (250 W)	Moderate Work (425 W)	Hard Work (600 W)
1 WHITE	78-81.9	No Limit on Work, ½ qt water/hour	No limit on work, ¾ qt water/hour	40/20 Work/ Rest ratio, ¾ qt water/hour
2 GREEN	82-84.9	No limit on work, ½ qt water/hour	50/10 work/ rest ratio, ¾ qt water/hour	30/30 min work/rest ratio, 1 qt water/hour
3 YELLOW	85-87.9	No limit on work, ¾ qt water/hour	40/20 Work/ Rest ratio, ¾ qt water/hour	30/30 min work/rest ratio, 1 qt water/hour
4 RED	88-89.9	No limit on work, ¾ qt water/hour	30/30 work/ rest ratio, ¾ qt water/hour	20/40 work/ rest ratio, 1 qt water/hour
5 BLACK	>90	50/10 work/ rest ratio, 1 qt water/hour	20/40 work/ rest ratio, 1 qt water/hour	10/50 work/ rest ratio, 1 qt water/hour

TB Med 507 Notes

- » The work/rest times and fluid replacement volumes will sustain performance and hydration for at least 4 hours of work in the specified heat category. Fluid needs can vary based on individual differences (±1/4 qt/hr) and exposure to full sun or full shade (±1/4 qt/hr).
- » **No limit:** No limit equals no limit to work time per hour (up to 4 continuous hours).
- » Rest means minimal physical activity (sitting or standing), accomplished in shade if possible.
- » **CAUTION:** Hourly fluid intake should not exceed 1 ½ qt.
- » Daily fluid intake should not exceed 12 qts.
- » Work/rest and water consumption table applies to average sized, heat-acclimated soldier wearing ACU, hot weather. (See TB MED 507 for further guidance.)
- » If wearing body armor, add 5° F to WBGT in humid climates.
- » If wearing NBC clothing (mission-oriented protective posture (MOPP 4)), add 10° F to WBGT index for easy work, and 20°F to WBGT for moderate and hard work.
- » Descriptions of Easy/Moderate/Hard Work can be found in the full guideline, 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, Table 3-1.

Source: 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.

ACGIH Guidelines

Work Load (WBGT °F)			
Work/rest regimen	Light	Moderate	Heavy
Continuous work	86°	80°	77°
75% work, 25% rest, each hour	87°	82°	78°
50% work, 50% rest, each hour	89°	85°	82°
25% work, 75% rest, each hour	90°	88°	86°
WBGT Correction Factors in °C			
Clothing Type	Clo* value	WBGT correction	
Summer lightweight working clothes	0.6	0	
Cotton coveralls	1.0	-2	
Winter work clothing	1.4	-4	
Water barrier, permeable	1.2	-6	

*Clo: insulation value of clothing. One clo = 5.55kcal/m²/hr of heat exchange by radiation and convection for each degree C difference in temp between the skin and the adjusted dry bulb temp. American Conference of Governmental Industrial Hygienists (ACGIH). 1992. 1992-1993 Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices. Cincinnati: American Conference of Governmental Industrial Hygienists.

NATA Guidelines

WBGT (°F)	Activity Guidelines and Rest Break Guidelines
<82.0	Normal activities: provide ≥3 separate rest breaks of minimum duration 3 min each during workout.
82.0-86.9	Use discretion for intense or prolonged exercise. Watch at-risk players carefully. Provide ≥3 separate rest breaks of minimum duration 4 min each.
87.0-89.9	Maximum practice time = 2 h. 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 ≥4 separate rest breaks for minimum duration 4 min each.
90.0-92.0	Maximum length of practice = 1 h. No protective equipment may be worn during practice and there may be no conditioning activities. There must be 20 min of rest breaks provided during the hour of practice.
>92.1	No outdoor workouts, cancel exercise, delay practices until a cooler WBGT reading occurs.

Source: NATA Position Statement: Exertional Heat Illness, Journal of Athletic Training volume 50, number 9 2015, Table 5

HIGH SCHOOL STATE GUIDELINES

The following states have their own WBGT guidelines for high school athletics:

- » Georgia
- » Illinois
- » Kentucky
- » Minnesota
- » North Carolina
- » Vermont

For printed copies, please visit our website www.heatstress.com.

Kestrel Heat Stress WBGT Reference Information and Product Recommendations



Heat Illness and What to Do

Heat Cramps: Painful, involuntary muscle spasms (usually occurring in the legs) associated with exercise in the heat when athletes have been sweating profusely.

+ **What to do:** Stop activity and rest in cool area. Rehydrate.

Heat Exhaustion: Inability to sustain exercise in the heat due to cardiovascular strain. Signs and symptoms include: fatigue, weakness, nausea, light-headedness, headache, heavy sweating, dehydration, decreased muscle coordination, and chills. Improvement is seen usually within 10-15 minutes.

+ **What to do:** Stop activity and rest in cool area. Rehydrate. Remove excess clothing and cool the athlete with ice-wet towels. If exertional heat stroke is suspected, take rectal temperature for differential diagnosis.

Exertional Heat Stroke: Occurs when (1) the rectal temperature is $\geq 104^{\circ}\text{F}$ and (2) there are signs/symptoms of central nervous system dysfunction. Signs and symptoms include: high body temperature ($\geq 104^{\circ}\text{F}$), irrational behavior, emotional instability, confusion, nausea, diarrhea, loss of muscle coordination, collapse, dehydration, rapid pulse, low blood pressure, heavy sweating. This is a medical emergency.

+ **What to do:** Stop activity and aggressively cool the patient using cold water tub. Activate emergency medical service, but always cool first and transport second. Remove excess clothes. Continuously monitor the rectal temperature until it is cooled down to 102°F .



Information provided by the Korey Stringer Institute www.ksi.uconn.edu



WARNING

To reduce the risk of injury or death to persons, read and follow these guidelines!

Your Kestrel Heat Stress Tracker may provide one or more of these measurements relating to estimation of danger of injury to people or animals from heat or cold: Heat Stress Index, Wind Chill, Wet Bulb Globe Temperature (WBGT), Thermal Work Limit (TWL).

NOTE that guidance tables based on these values are based on typical physiological response. Certain individuals or animals may be more susceptible to harm relating to environmental conditions and require additional precautions.

- » **Know yourself** and the individuals and items you are responsible for
- » Where appropriate, **seek the guidance of a medical professional**
- » **Know what to do** in the event of heat or cold injury and be prepared with supplies
- » In the case of heat illness, remember the rule- **“Cool first, transport second.”**

An inexpensive ice bath can mean the difference between life and death.

YOUR KESTREL HEAT STRESS TRACKER IS NOT A MEDICAL DEVICE. IT IS ONLY ONE SOURCE OF INFORMATION AND MUST BE EMPLOYED WITH CARE AND GOOD JUDGMENT.

Tips for taking accurate measurements

- » When changing environments (such as moving from an air conditioned room to outdoors), the **unit requires between 8-15 minutes to equilibrate** to its surroundings before taking readings.
- » **Take measurements at least 3 feet off the ground** and in the same wind or air flow conditions as the people you are monitoring.
- » Ensure the Kestrel is oriented into the wind and able to measure the full wind value. **A tripod and Kestrel Rotating Vane Mount are ideal for ensuring accurate measurements.**
- » Differences in the reflectivity of ground surfaces, such as grass or asphalt, will impact measurements.
- » Be sure to take measurements in the same solar/radiant heat environment as the people you are monitoring. **WBGT is intended to be taken in direct sunlight.**



Configuring WBGT settings

1. Scroll to the WBGT Current Measurement Screen and press select
2. Set **Type** to either **Indoor** or **Outdoor**
3. To use the colored WBGT zones (also known as Flag Settings), scroll to **Zones** and set to **On**.
4. To access one of the pre-loaded WBGT guidelines, scroll to **Zones** and press select, then scroll to **Guide** and press select. Follow the menu options to review the available WBGT guidelines. These guidelines are provided for reference only. Remember, you are responsible for selecting guidelines and thresholds suitable to your activity, environment and participants.
5. To receive light or buzzer alerts, scroll to and select **Alerts** in the WBGT settings menu.



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