

# NC WBGT Tool

Wet Bulb Globe Temperature Tool

## What is WBGT?

The Wet Bulb Globe Temperature (WBGT) is a way to measure heat stress on the body. WBGT takes into account:

- temperature
- wind speed
- humidity
- intensity of the sunlight

This differs from heat index, which only considers temperature and humidity and is measured in shady areas. This is important because wind speed and sun intensity have an impact on how a person processes heat.

As the air temperature and humidity increase, there is an increase in the heat stress that is placed on an individual who is exercising. When athletes exercise in the heat, they rely on the evaporation of sweat from their skin to cool down. As the humidity increases, the ability to cool the body through evaporation is more difficult, causing an increase in body temperature and an increase in risk for heat-related illness.

In the 1950s the United State military developed the Wet Bulb Globe Temperature index. In response to a large number of heat illness cases, the military made changes to their existing policy, which used the heat index to evaluate the risk to soldiers working and training in high heat situations.

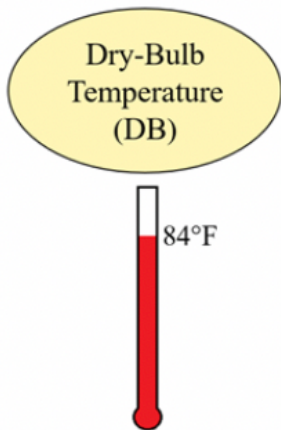
## Did you know?

To better represent risk, wind speed, sun angle, and cloud cover were incorporated, forming the Wet Bulb Globe Temperature. After implementing new policies based on the WBGT measures, there was a drastic reduction in heat illness during basic training.

# WBGT has 3 components

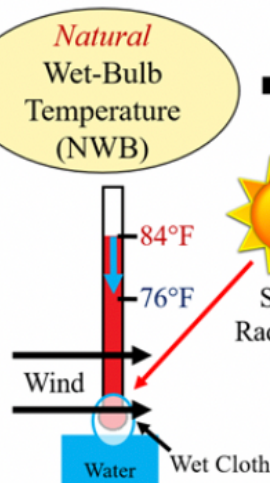
## Dry Bulb Temperature

Air Temperature

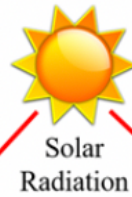


## Natural Wet Bulb Temperature

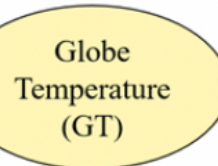
Humidity + Wind + Radiation



Radiation + Wind



Solar Radiation



Globe Thermometer

## Black Globe Temperature

WBGT

$$\text{WBGT} = 0.1 * \text{DB} + 0.7 * \text{NWB} + 0.2 * \text{GT}$$

The **Dry Bulb Temperature (DB)** is also known as air temperature. The **Natural Wet Bulb Temperature (NWB)** is an old fashioned thermometer, wrapped in a wet cloth. As water evaporates from the wet cloth, evaporation cools the thermometer, meant to represent how the body cools itself with sweat. The **Black Globe Temperature (GT)** measures solar radiation and wind speed, representing the role that wind plays in cooling the body. The temperature of each of these components are added together to arrive at the Wet Bulb Globe value.

## Tips for measuring WBGT

- Allow the WBGT device at least 15 minutes to adjust to conditions when beginning measurement.
- WBGT changes quickly, so it is best to average reading over at least 10-15 minutes.
- If weather conditions change from when WBGT is first measured (e.g. clouds clear, breeze stops), new WBGT measurements should be taken.
- WBGT will be different above different surfaces (grass field, turf, tennis courts), so measure WBGT at the same place as the outdoor activity (before and during).
- The WBGT device should be 5 feet above the ground.