Wet Bulb Globe Temperature Category Work/Rest and Water Intake

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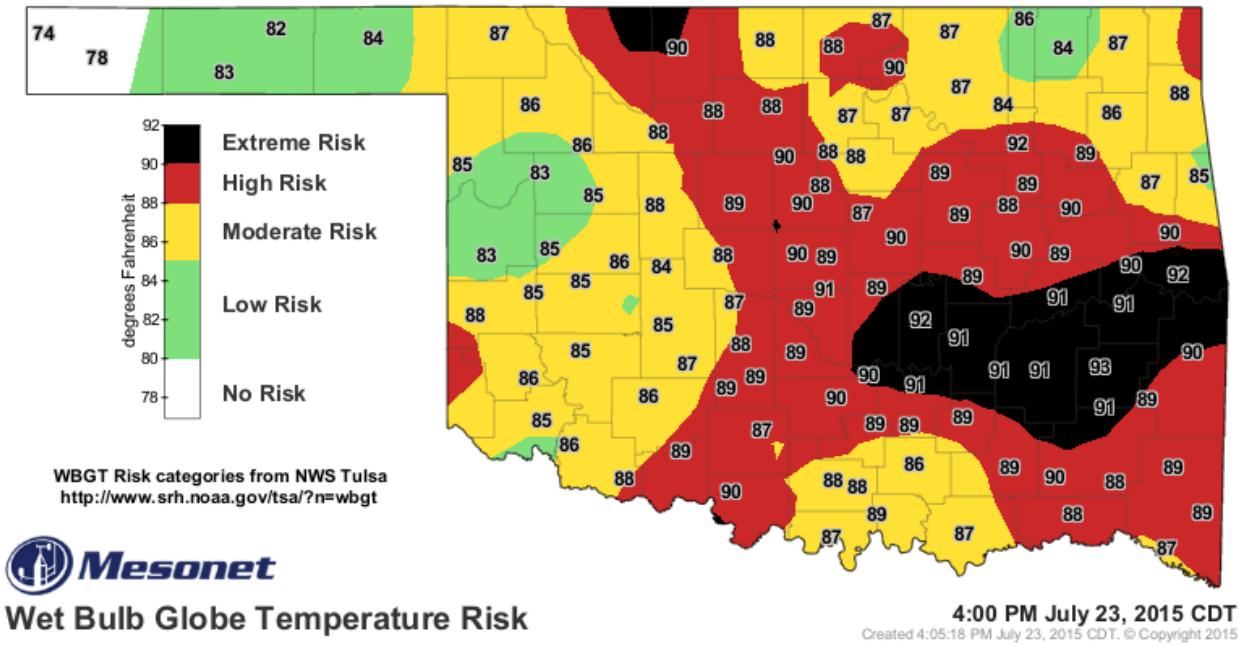
Available on mesonet.org and Mesonet mobile apps – under Air Temperature

Wet bulb globe temperature is a more comprehensive human heat stress index that includes air temperature, relative humidity, wind speed, and sunlight weather variables. The traditional human heat stress index is based on just air temperature and relative humidity. Wet bulb globe temperature is a better human heat stress index, because it includes sunlight, which increases heat stress, and wind speed, that decreases heat stress. Although it is not a well-known heat index, wet bulb globe temperature is not new. It was developed by the U.S. Marine Corps in the late 1950s to give drill instructors and officers a tool to avoid recruit activity that could lead to heat exhaustion or heatstroke.



Unacclimated and Acclimated Work/Rest and Water Intake Chart

Heat Risk Category		Wet Bulb Globe Temp	Light Work		Moderate Work		Heavy Work	
			Work/Rest	Water Intake (quart/hr)	Work/Rest	Water Intake (quart/hr)	Work/Rest	Water Intake (quart/hr)
No Risk	Unacclimated	78 – 79.9	50/10 min	½	40/20 min	¾	30/30 min	¾
	Acclimated	78 – 79.9	continuous	½	continuous	¾	50/10 min	¾
Low	Unacclimated	80 – 84.9	40/20 min	½	30/30 min	¾	20/40 min	1
	Acclimated	80 – 84.9	continuous	½	50/10 min	¾	40/20 min	1
Moderate	Unacclimated	85 – 87.9	30/30 min	¾	20/40 min	¾	10/50 min	1
	Acclimated	85 – 87.9	continuous	¾	40/20 min	¾	30/30 min	1
High	Unacclimated	88 – 90	20/40 min	¾	10/50 min	¾	avoid	1
	Acclimated	88 – 90	continuous	¾	30/30 min	¾	20/40 min	1
Extreme	Unacclimated	> 90	10/50 min	1	avoid	1	avoid	1
	Acclimated	> 90	50/10 min	1	20/40 min	1	10/50 min	1

Adapted from: 1) USGS Survey Manual, Management of Occupational Heat Stress, Chapter 45, Appendix A. 2) Manual of Naval Preventive Medicine, Chapter 3: Prevention of Heat and Cold Stress Injuries. 3) OSHA Technical Manual Section III: Chapter 4 Heat Stress. 4) National Weather Service Tulsa Forecast Office, Wet Bulb Globe Temperature.

Heat acclimation typically takes 5 days of heat exposure. Start at 20% of full exposure on day one and increase by 20% each day. Rest period times assume that a person is in the same outdoor conditions. Persons should shade themselves during rest breaks, if possible. Fluid differences can vary for individuals (+/– ¼ quart/hr) and exposure to full sun or full shade (+/– ¼ quart/hr).

Recommendations above are for healthy, hydrated humans fully clothed with lightweight summer working clothes. **Increase Wet Bulb Globe Temperature (WBGT) by 2** units, when wearing cotton coveralls. **Increase WBGT by 4** units, when wearing heavy winter-type clothing. **Increase WBGT by 6** units, when wearing permeable, water barrier clothing. When wearing full-body, impermeable, protective clothing (e.g. Tyvek coveralls and hood), **increase WBGT by 10** units while conducting "Light Work" and **increase WBGT by 20** units for "Moderate to Hard Work" tasks. Heat tolerance can be impacted by hydration, overall health, medications, and level of acclimation.

Work Level	Activity examples
Rest	Sitting or standing
Light	Sitting with light manual work Driving on paved surface Walking 2 mph on hard surface
Moderate	Painting with brush Lawn mowing with walk behind power mower on flat area Pushing light wheelbarrow Weeding or hoeing Walking 3.5 mph on hard surface
Heavy	Digging or shoveling Hand sawing wood Chopping wood Walking 4 mph on hard surface or 2.5 mph in sand

Adapted from: USGS Survey Manual, Management of Occupational Heat Stress, Chapter 45, Appendix A. OSHA Water.Rest.Shade. Estimating Work Rates or Loads, 2015, osha.gov/SLTC/heatillness/heat_index/work_rates_loads.html

Oklahoma Mesonet weather variables used to calculate wet bulb globe temperature include:
air temperature 1.5 meters; wind speed 2 meters; relative humidity 1.5 meters; and solar radiation.