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| --- | --- | --- | --- | --- |
| Variable | Original Variables Used in Estimation | Final Equation(s) | Explanation | Reference(s) |
| Wet Bulb Temperature (Simple Calculation) | T, RH | WBT = T \* arctan(0.151977 \* (RH + 8.313659)\*\*0.5) + arctan(T + RH) - arctan(RH - 1.676331) + 0.00391838 \* RH\*\*1.5 \* arctan(0.023101 \* RH) - 4.686035 | Simple empirical estimate of WBT. | https://www.nature.com/articles/s41597-021-01010-w |
| Psychrometer Wet Bulb Temperature | T, RH | Tpwb=0.376+5.79ea+(0.388−0.0465ea)T  Where ea is ambient vapor pressure (calculated from Ta and RH) | WBT that is “measured” by an instrument called a psychrometer but can be estimated. | https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7240860/ |
| Natural Wet Bulb Temperature | T, RH, SR, V | Tnwb=T−C(Ta−Tpwb)  C=0.85 for V<0.03ms,  C=1.0 for V>3.0ms,  C=0.96+0.069log10V for 0.03≤V≤3.0ms.  If Tg – T >= 4,  Tnwb=Tpwb+0.25(Tg−T)+e,  e=1.1 for V<0.1ms,  e=−0.1 for V=1.0ms,  e=0.10/V1.1−0.2 for 0.1≤V≤1.0ms  where Tg is globe temperature (empirically estimated from T, RH, and SR) | Based on PWBGT but corrects for influences of wind and solar radiation. | <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7240860/>  https://rmets.onlinelibrary.wiley.com/doi/full/10.1002/met.1631 |
| Heat Index | T, RH | HI = -42.379 + 2.04901523\*T + 10.14333127\*RH - .22475541\*T\*RH - .00683783\*T\*T - .05481717\*RH\*RH + .00122874\*T\*T\*RH + .00085282\*T\*RH\*RH - .00000199\*T\*T\*RH\*RH  For RH < 13% and 80 < T < 112 °F, subtract [(13-RH)/4]\*SQRT{[17-ABS(T-95.)]/17}  For RH> 85% and 80 < T < 87 °F, add [(RH-85)/10] \* [(87-T)/5]  For HI < 80 °F, HI = 0.5 \* {T + 61.0 + [(T-68.0)\*1.2] + (RH\*0.094)} | Assumes shade and is commonly known as the “feels like” temperature. Empirically estimated. | https://www.wpc.ncep.noaa.gov/html/heatindex\_equation.shtml |
| Wet Bulb Globe Temperature (Simple Calculation) | T, RH | WBGT = 0.567 \* T + 0.393 \* e + 3.94  Where e is water vapor pressure (calculated from RH) | Assumes direct sunlight. This calculation is an empirical estimate. | https://www.nature.com/articles/s41597-021-01010-w |
| Indoor Wet Bulb Globe Temperature | T, RH, SR, V |  | A more comprehensive estimate of WBGT, from NWBT and globe temperature (latter estimated empirically). This is to be used in all cases except when outside in direct sunlight. | <https://rmets.onlinelibrary.wiley.com/doi/full/10.1002/met.1631>  <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7240860/>  https://www.sciencedirect.com/science/article/pii/S0378778819310965 |
| Outdoor Wet Bulb Temperature | T, RH, SR, V |  | This version of WBGT is a correction to the indoor WBGT, now incorporating dry bulb temperature to minimize the influence of the globe temperature. This is done because the indoor WBGT equation overestimates WBGT when applied outdoors. | <https://rmets.onlinelibrary.wiley.com/doi/full/10.1002/met.1631>  https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7240860/ |