

# Psychrometrics of Cooling

## Turbine Inlet Cooling:

ASME Turbo Expo 2011

**Presented by:**

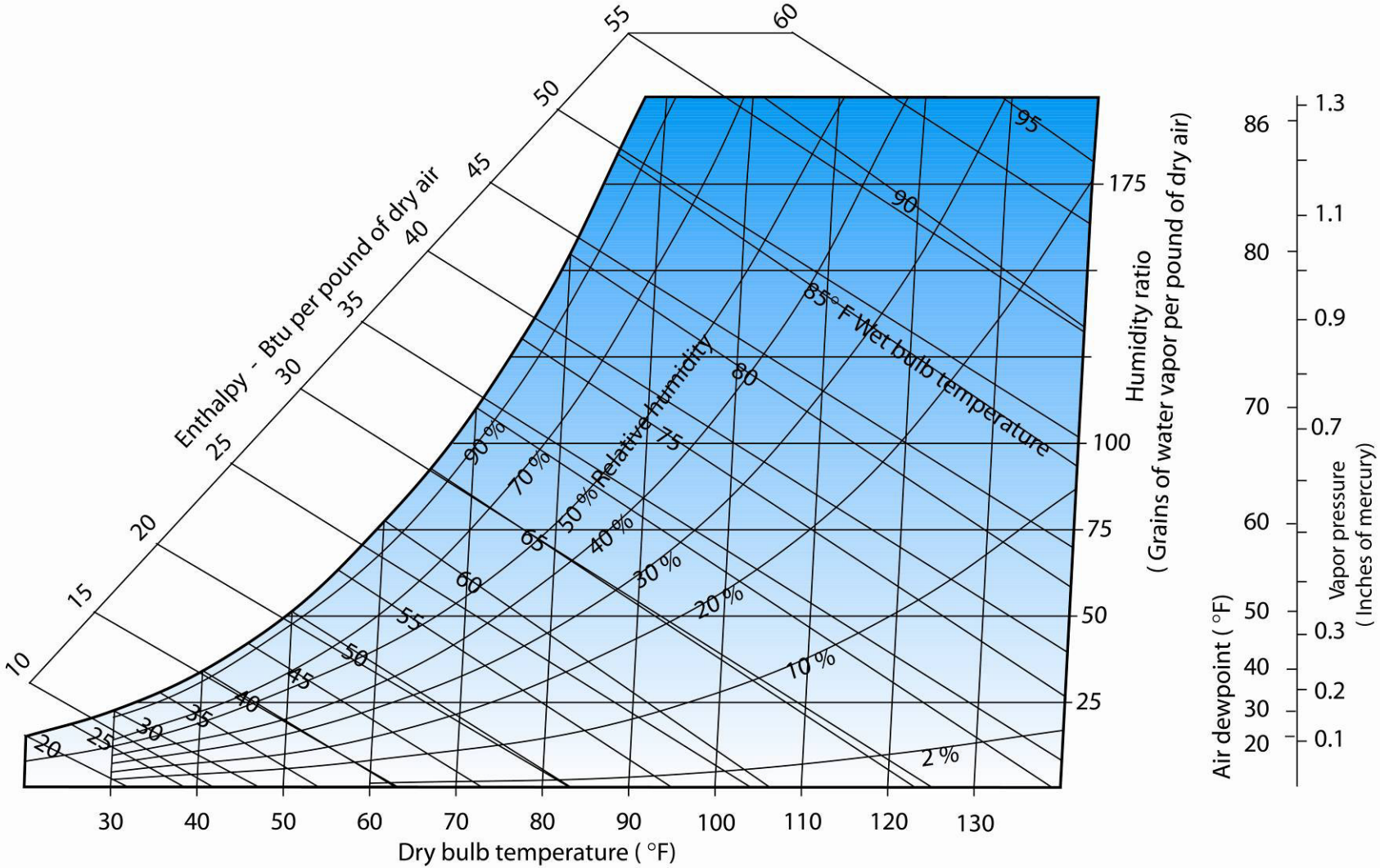
**Annette Dwyer**

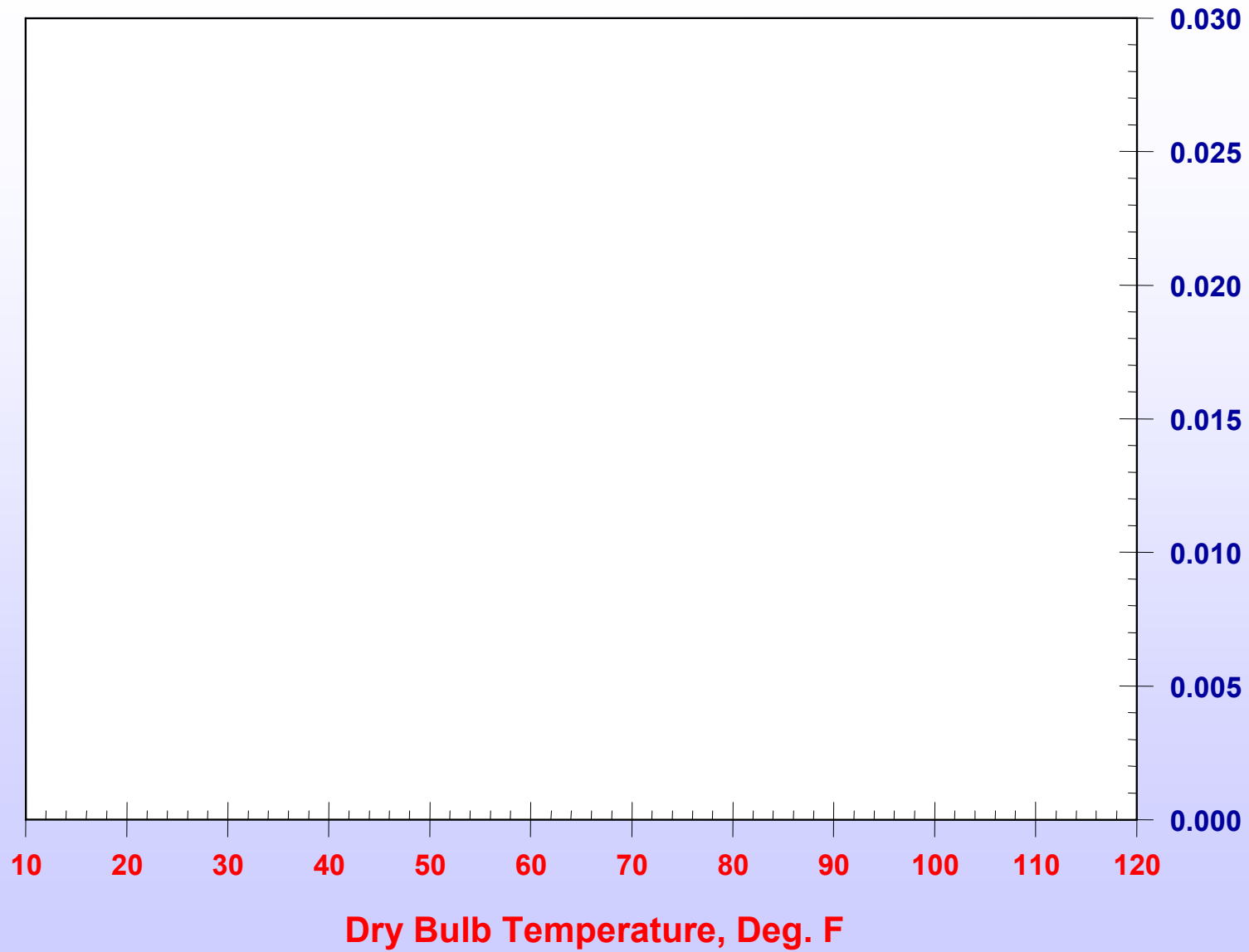
**Munters Corporation**

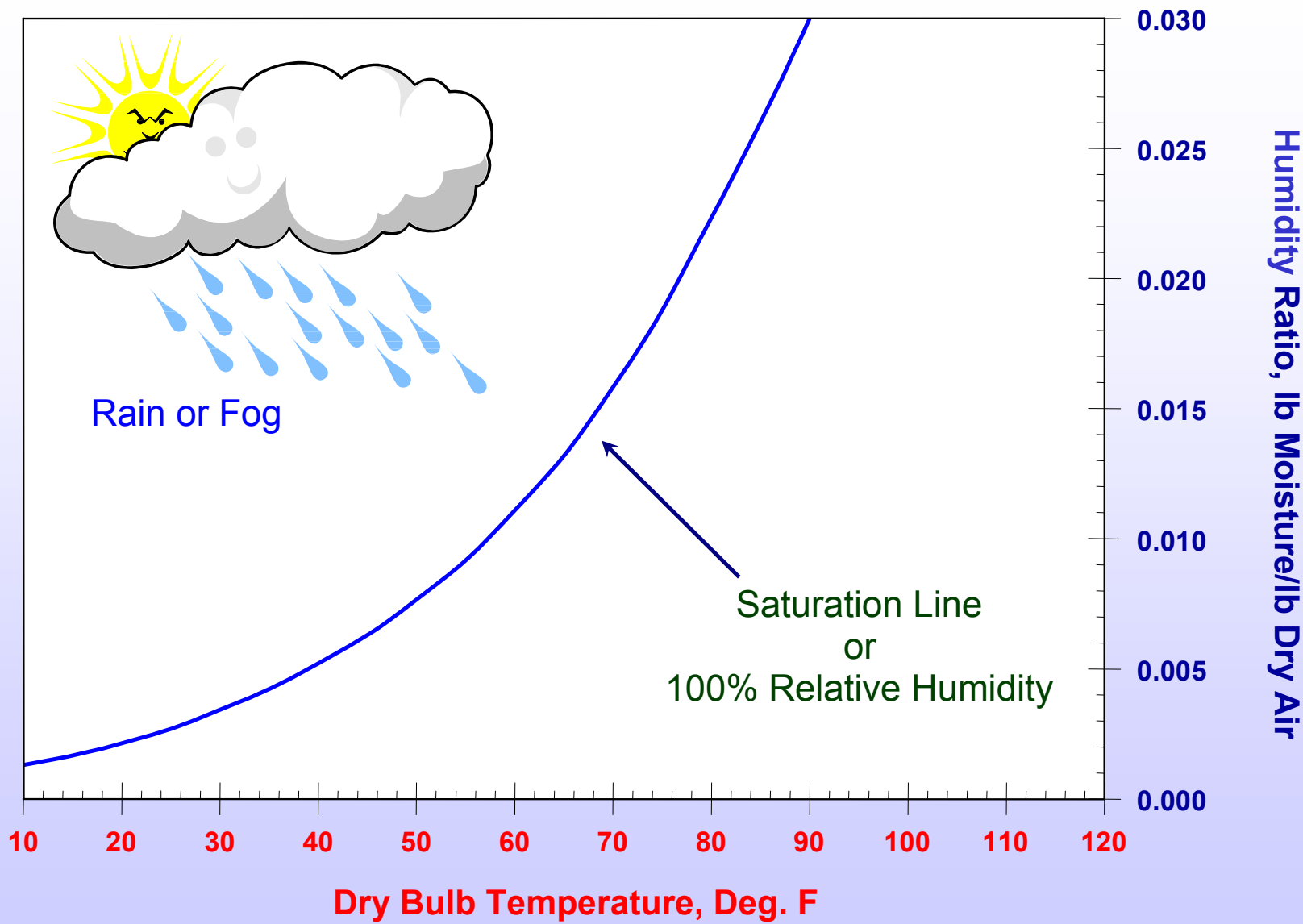


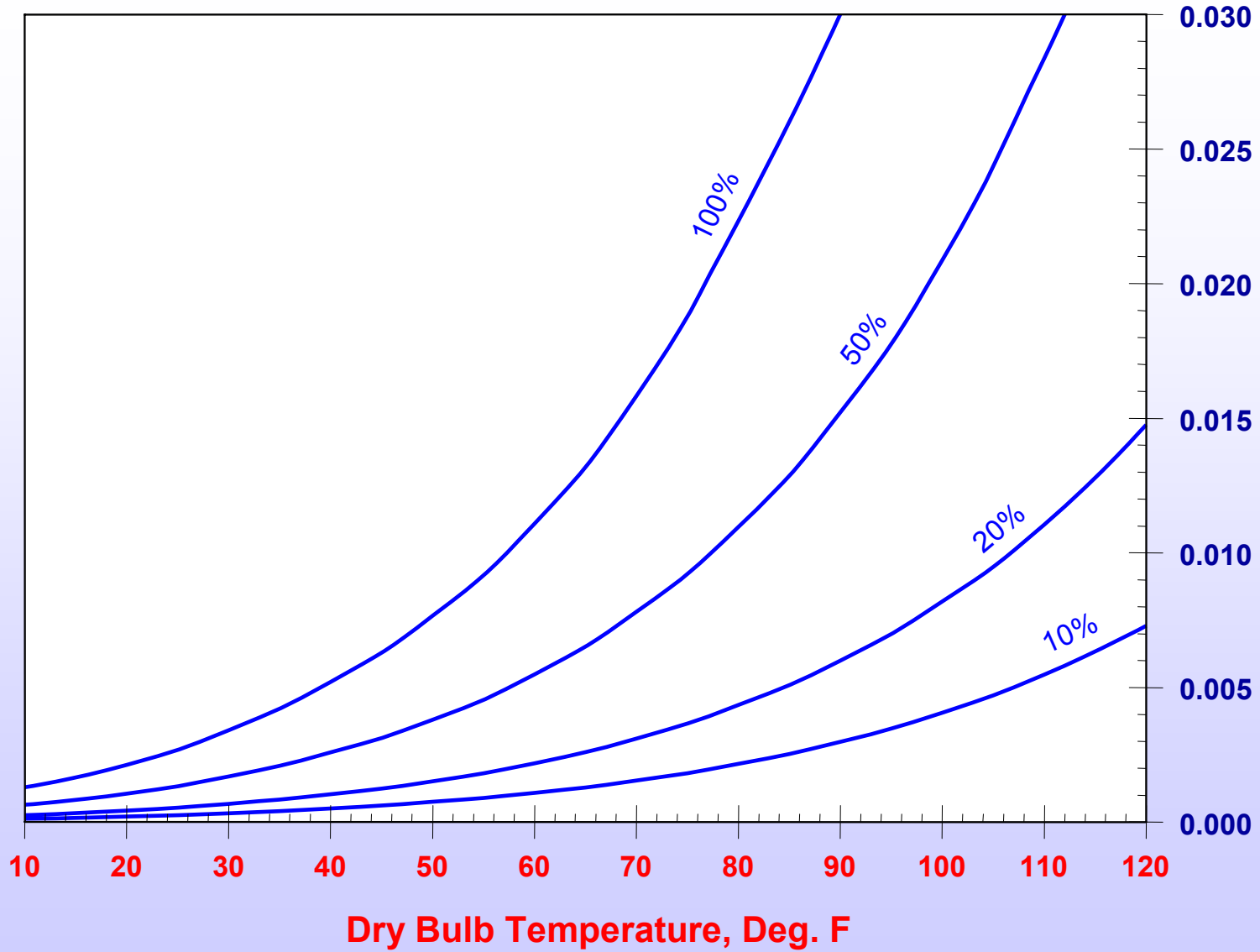
**TURBINE INLET COOLING**  
**ASSOCIATION** [turbineinletcooling.org](http://turbineinletcooling.org)

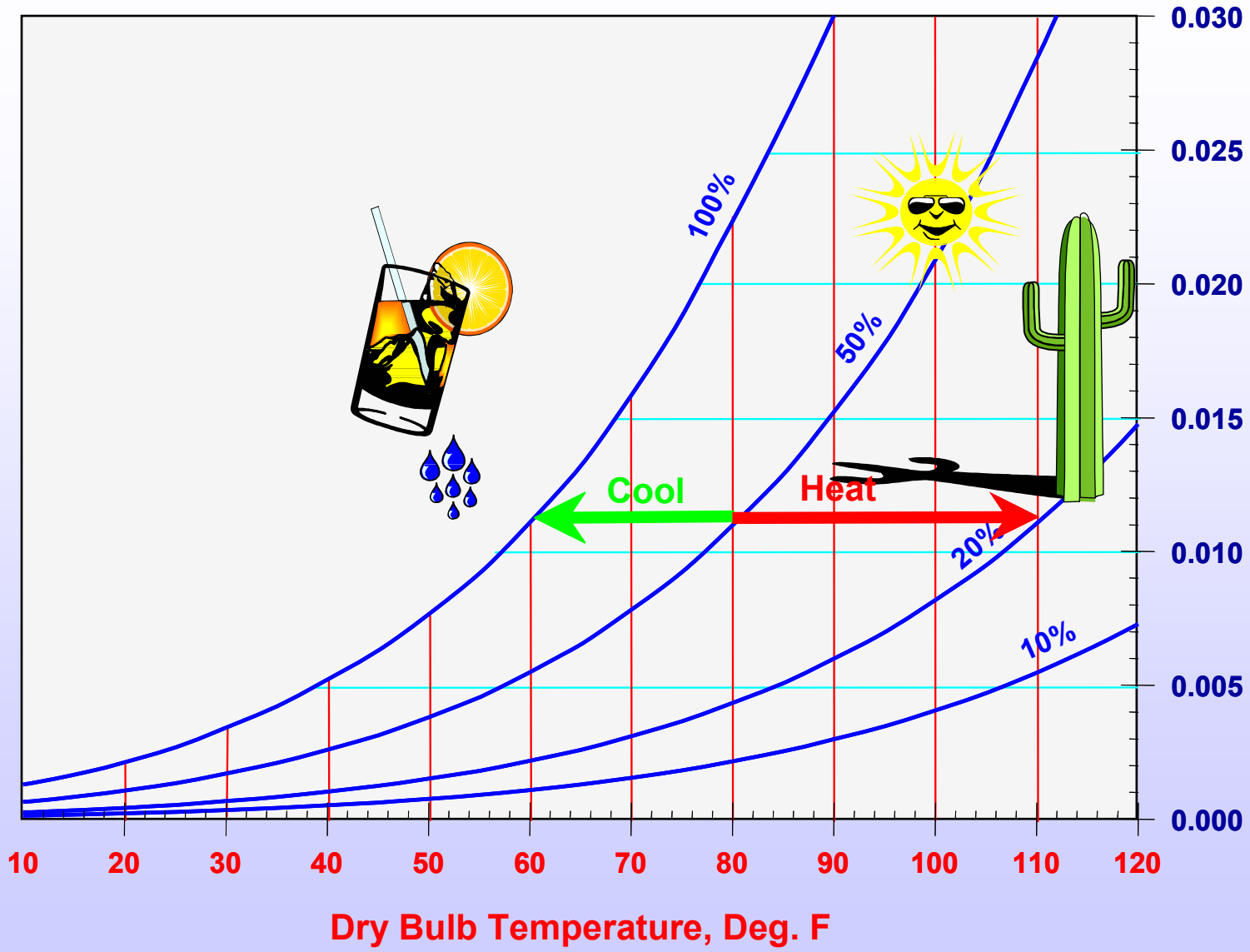
# Psychrometrics







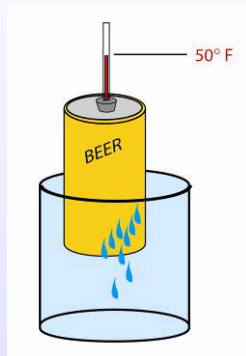


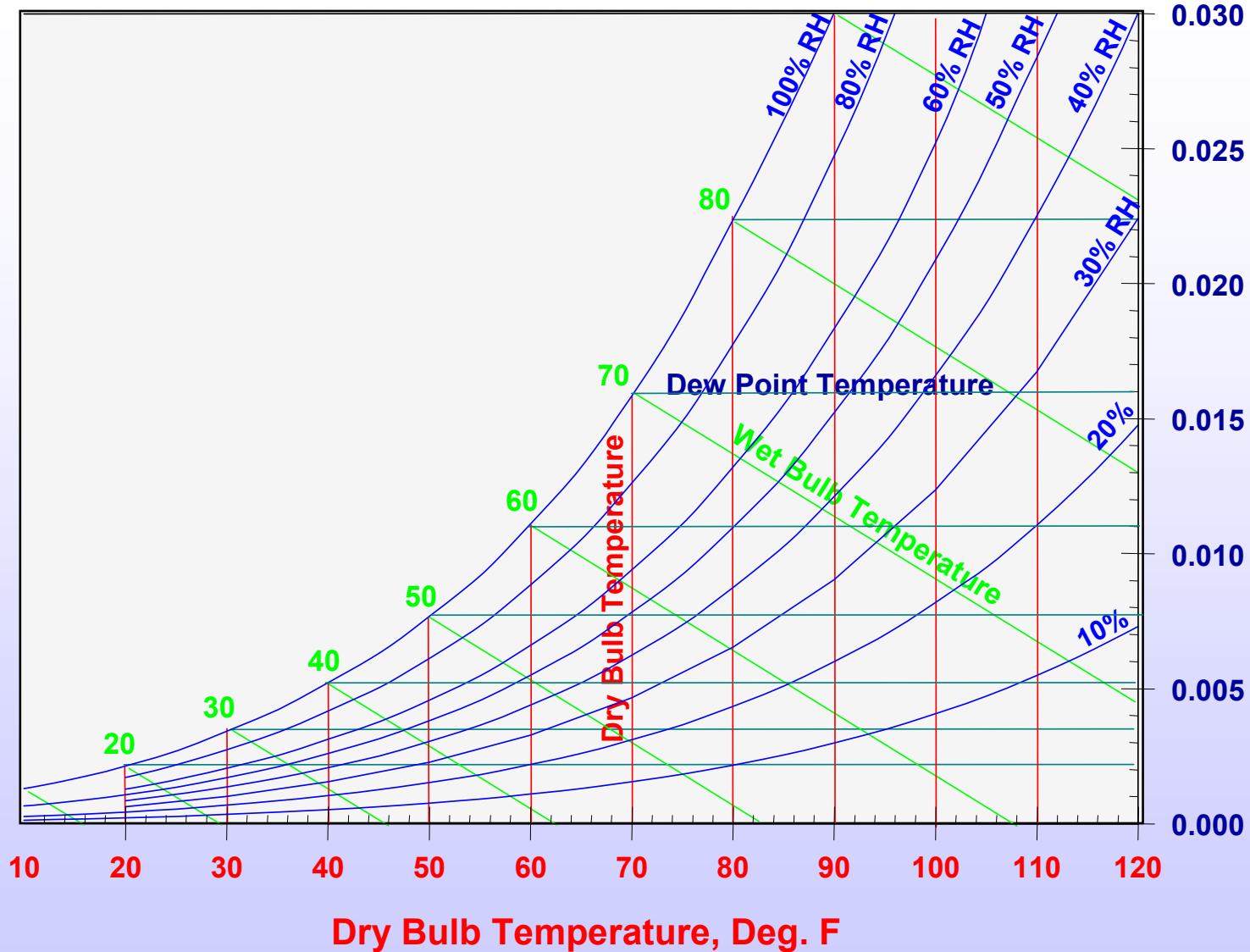


Humidity Ratio, lb Moisture/lb Dry Air

# Dew Point Temperature (DP, °F)

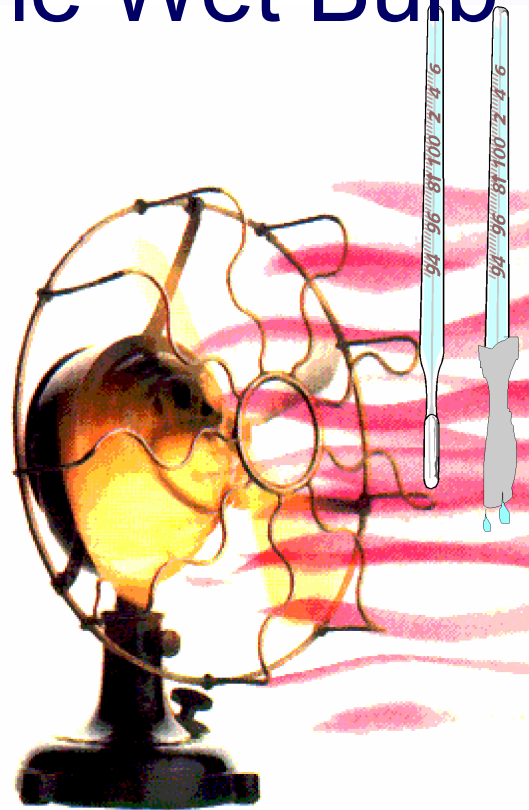
The temperature at which existing moisture will condense from the air (forming dew)



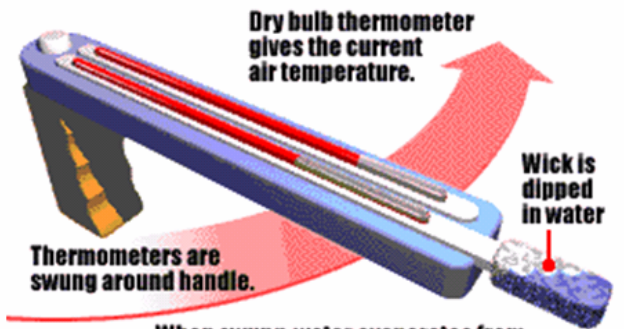


Humidity Ratio, lb Moisture/lb Dry Air

# Measuring the Wet Bulb Temperature



## How a sling psychrometer works

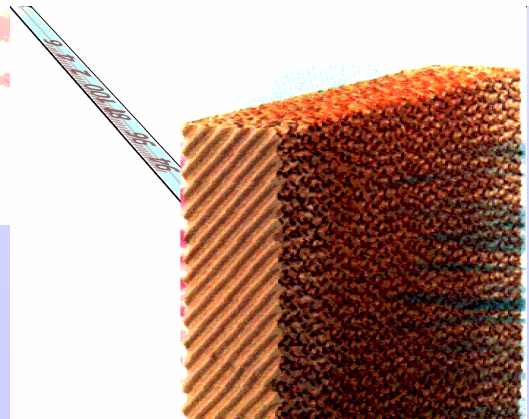


Dry bulb thermometer gives the current air temperature.

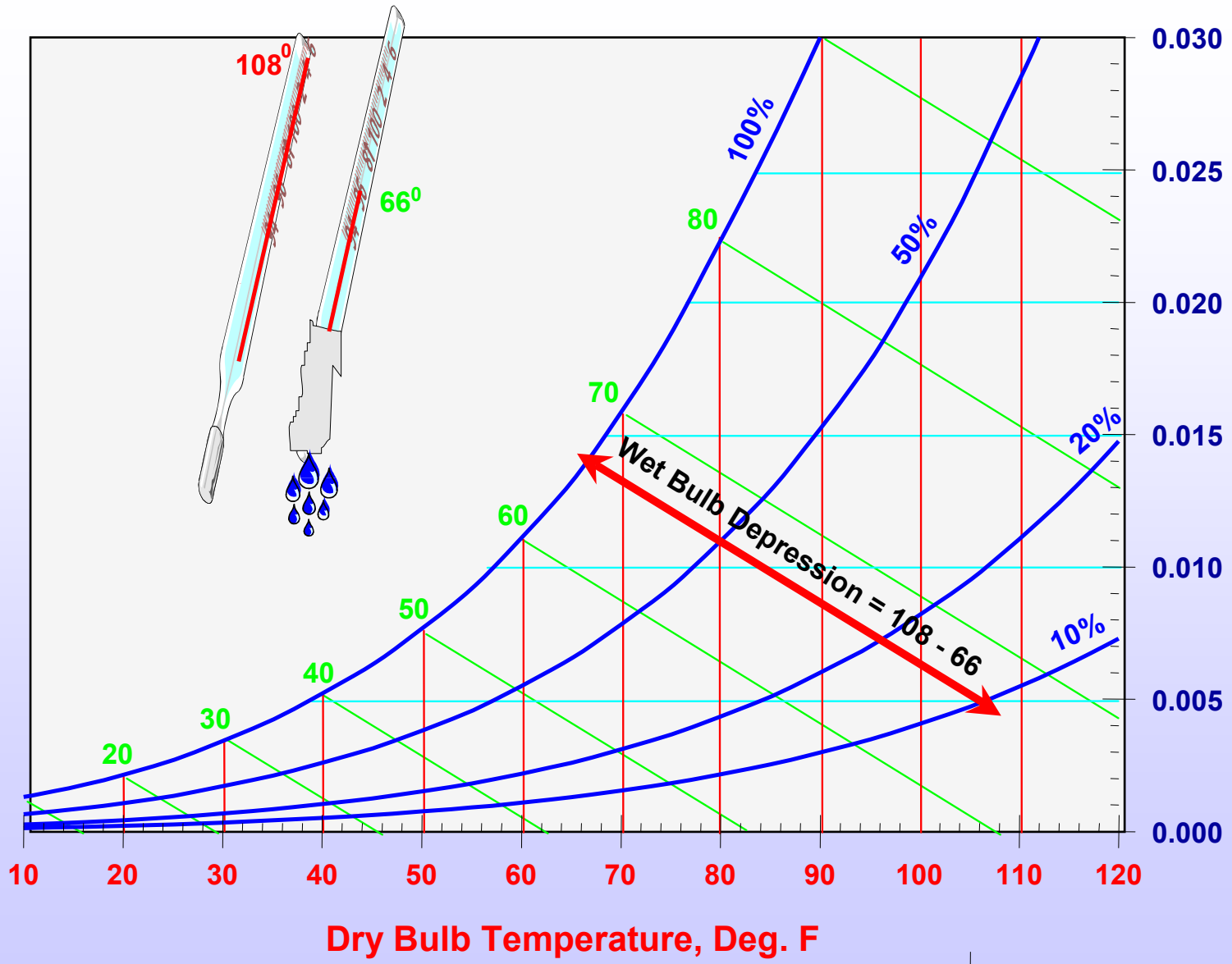
Wick is dipped in water

Thermometers are swung around handle.

When swung, water evaporates from the wick, cooling the wet-bulb thermometer. Drier air results in lower temperature.

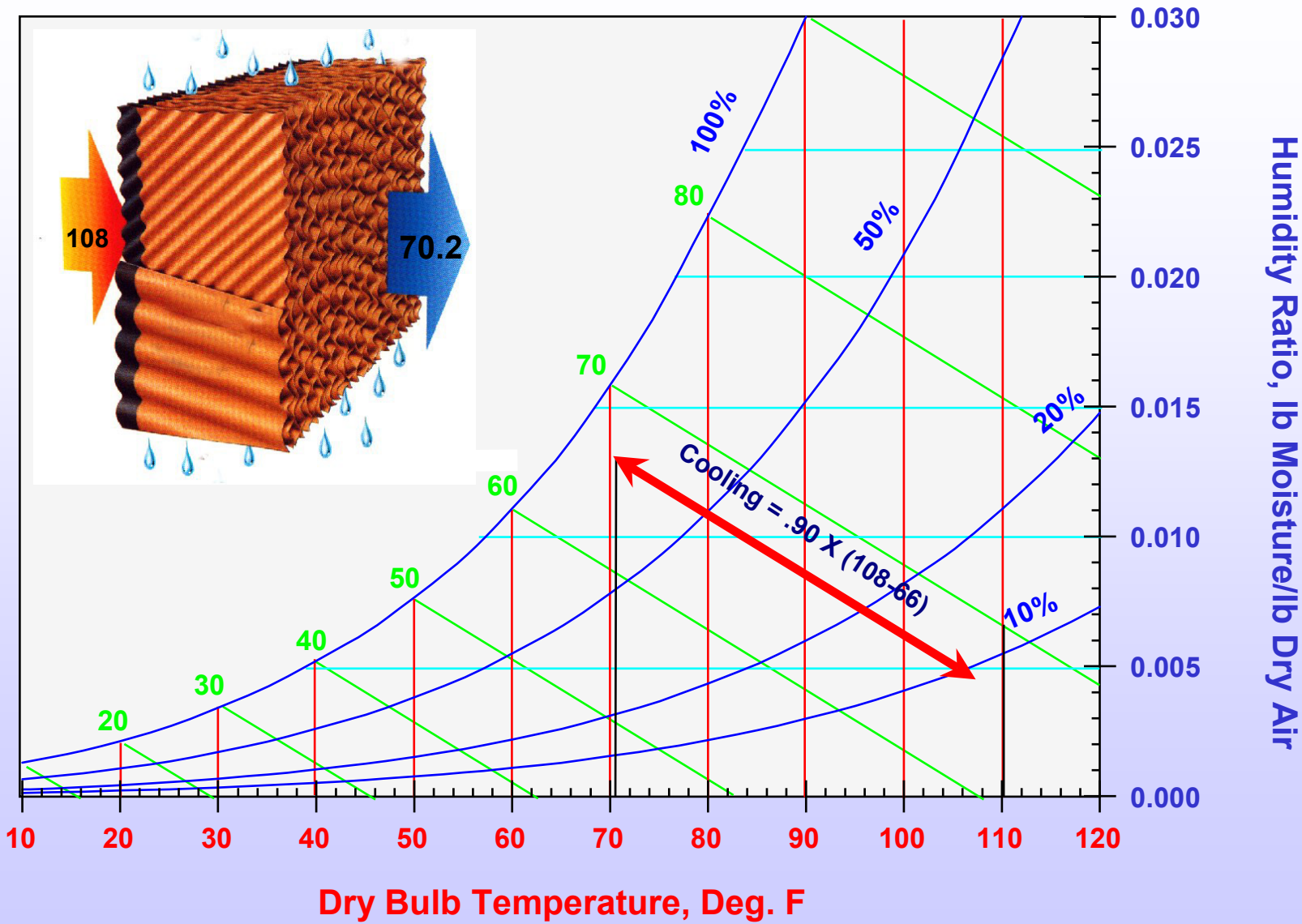


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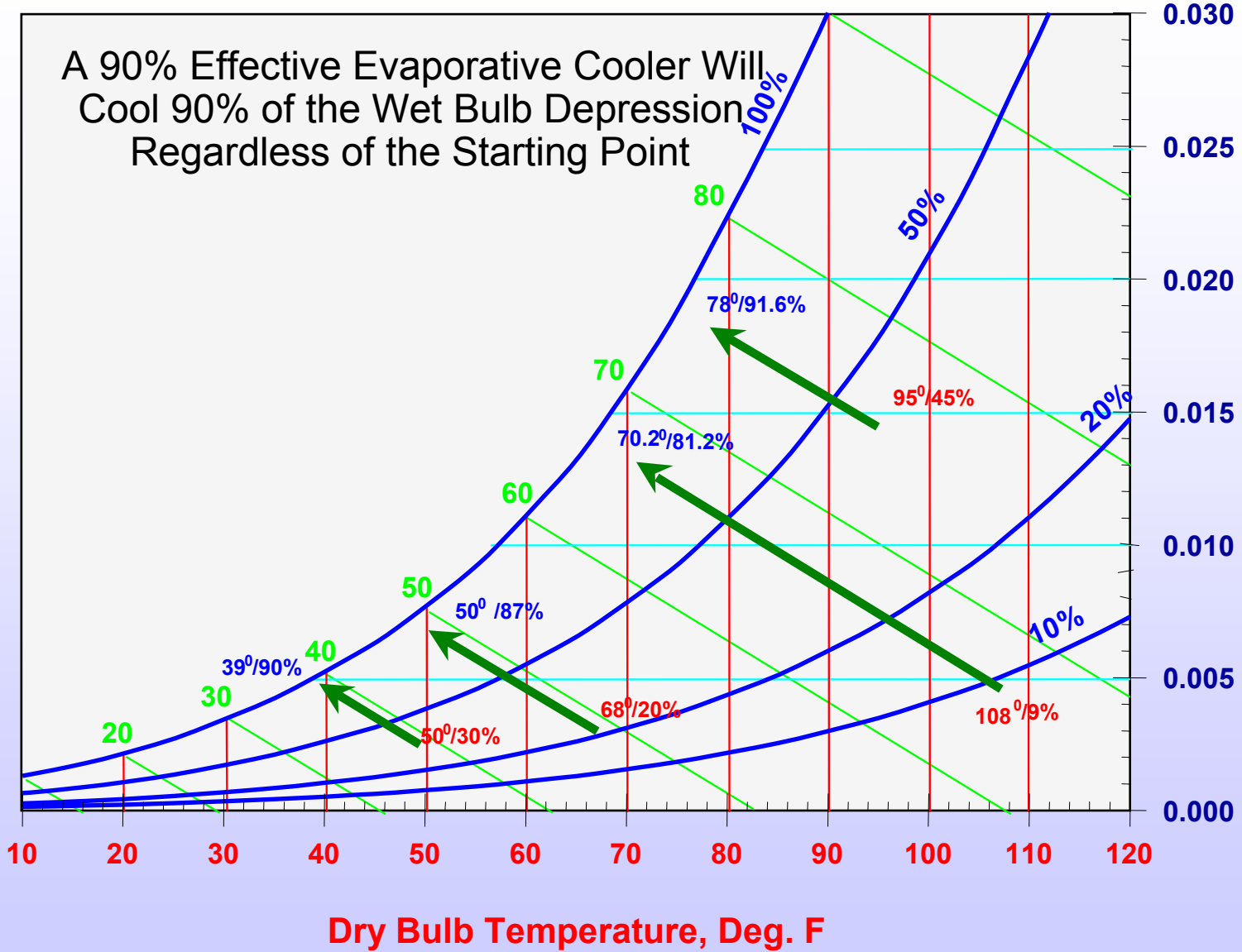


Humidity Ratio, lb Moisture/lb Dry Air

# DIRECT EVAPORATIVE COOLING



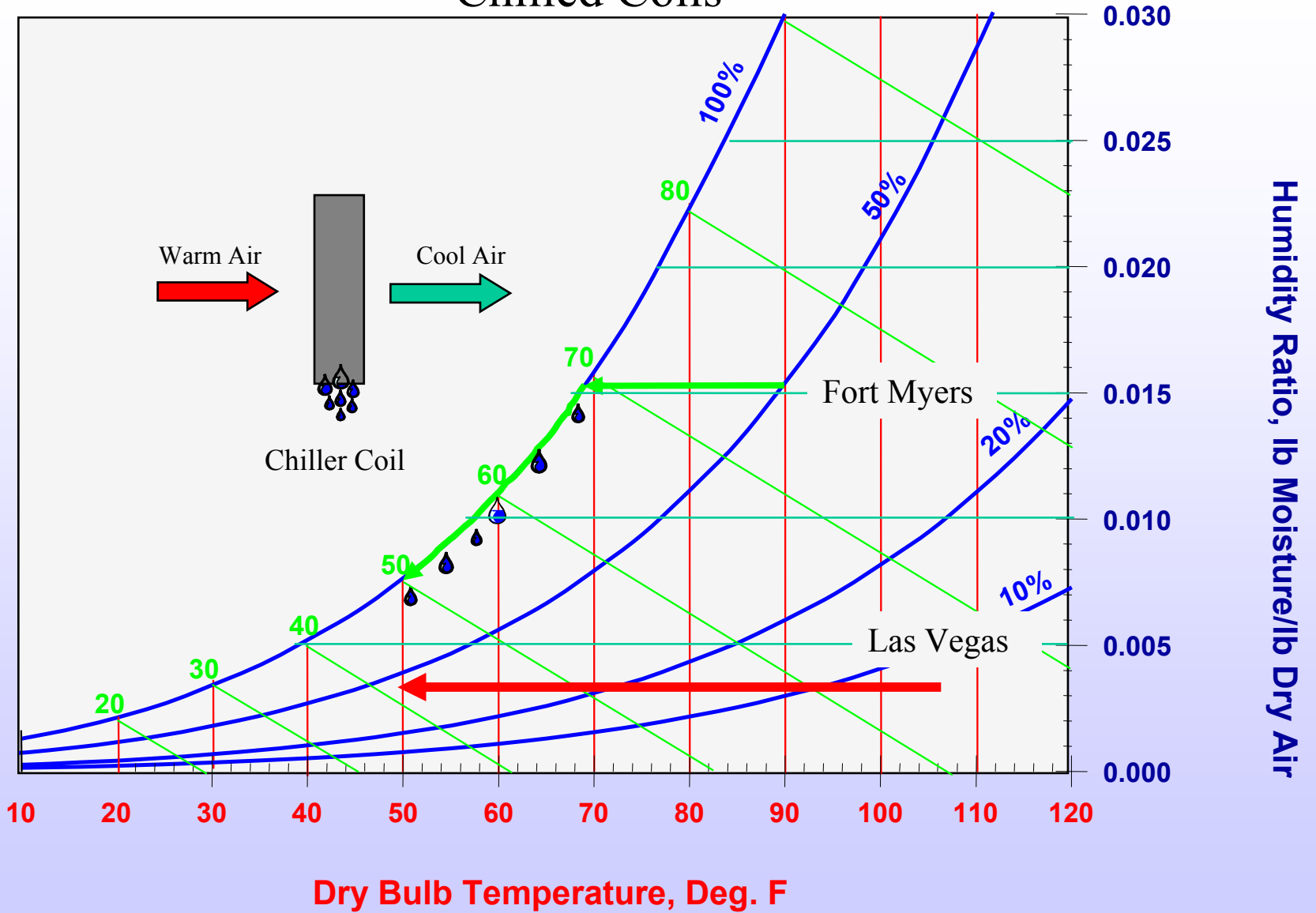
A 90% Effective Evaporative Cooler Will Cool 90% of the Wet Bulb Depression Regardless of the Starting Point



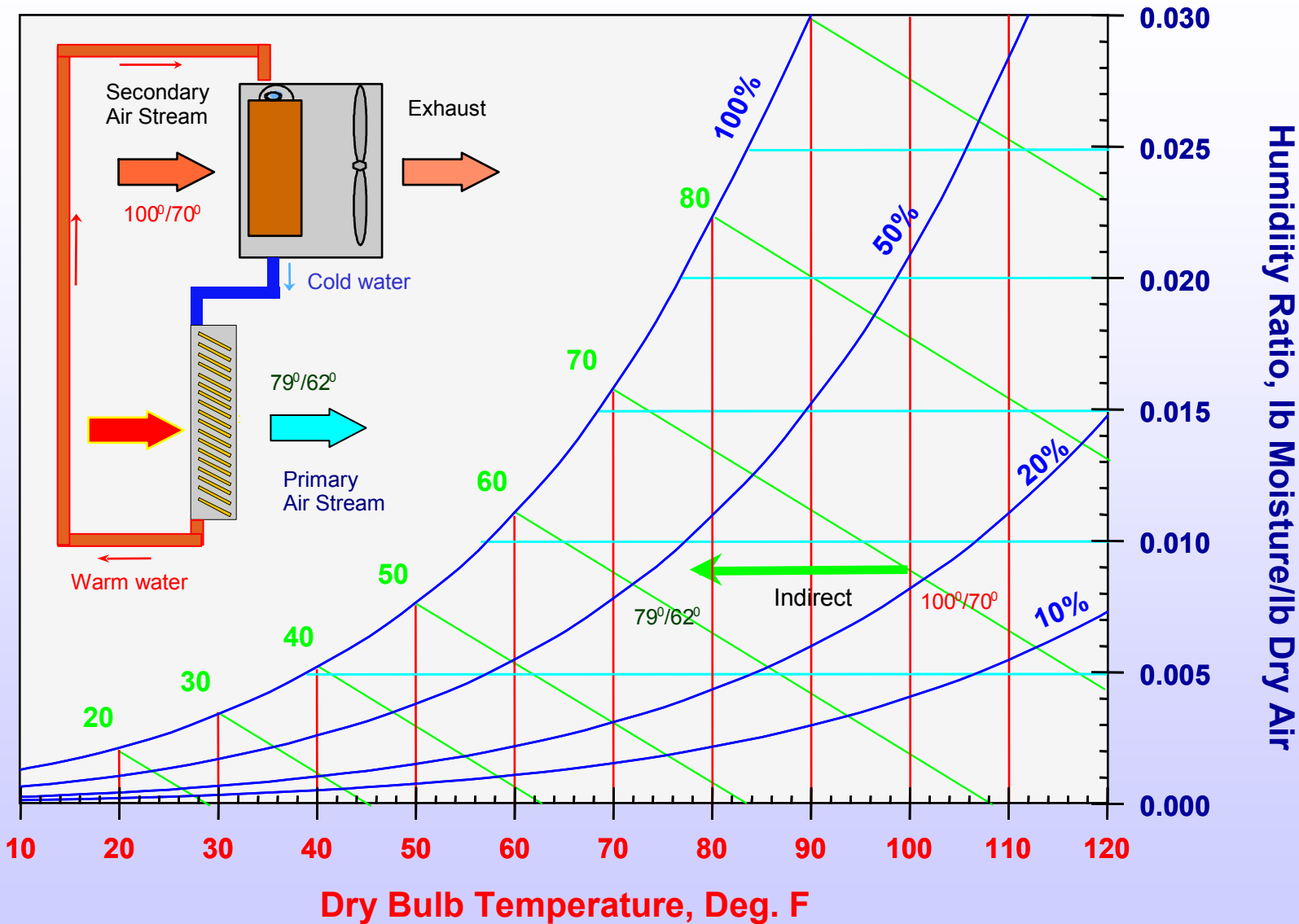
Humidity Ratio, lb Moisture/lb Dry Air

Dry Bulb Temperature, Deg. F

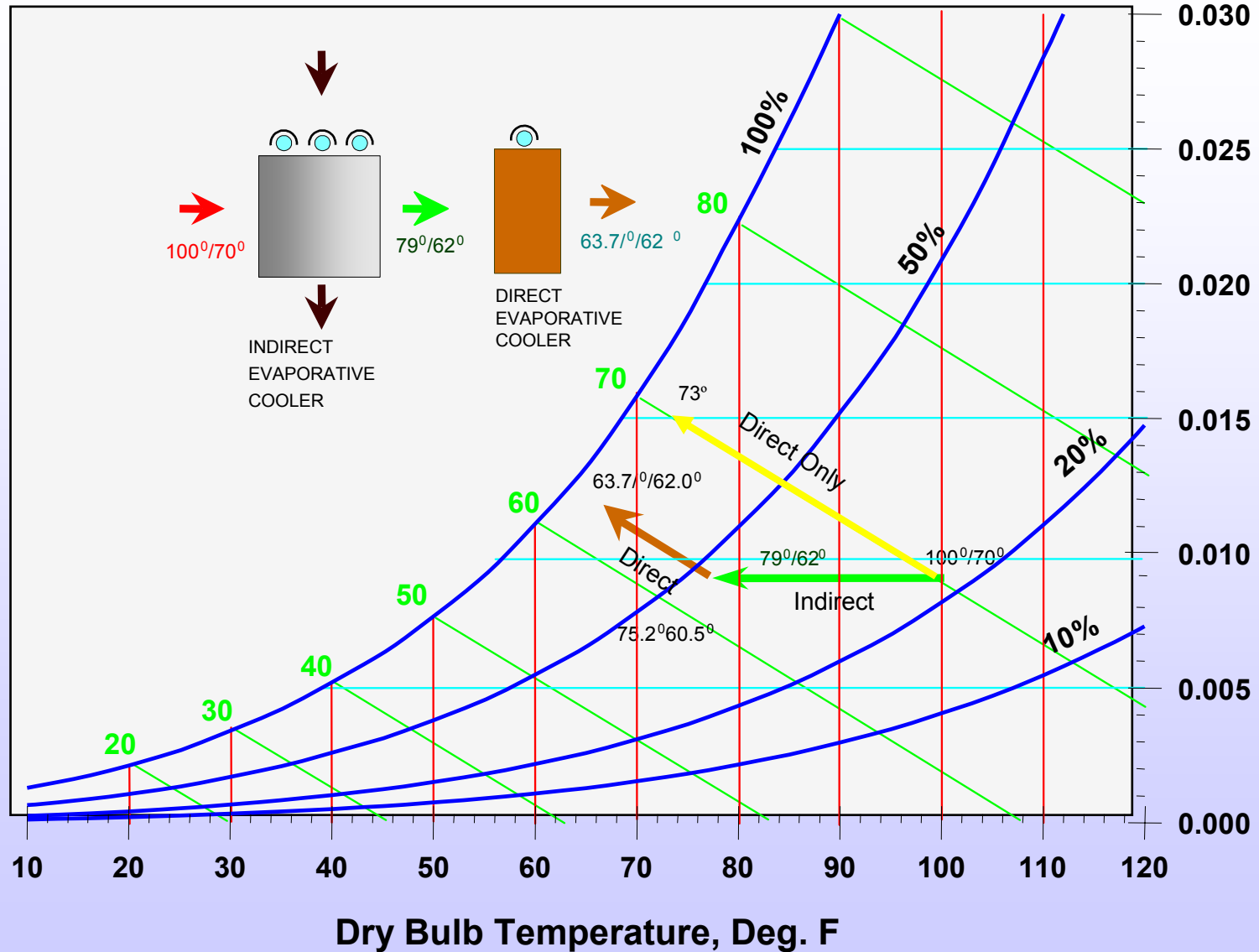
# Chilled Coils



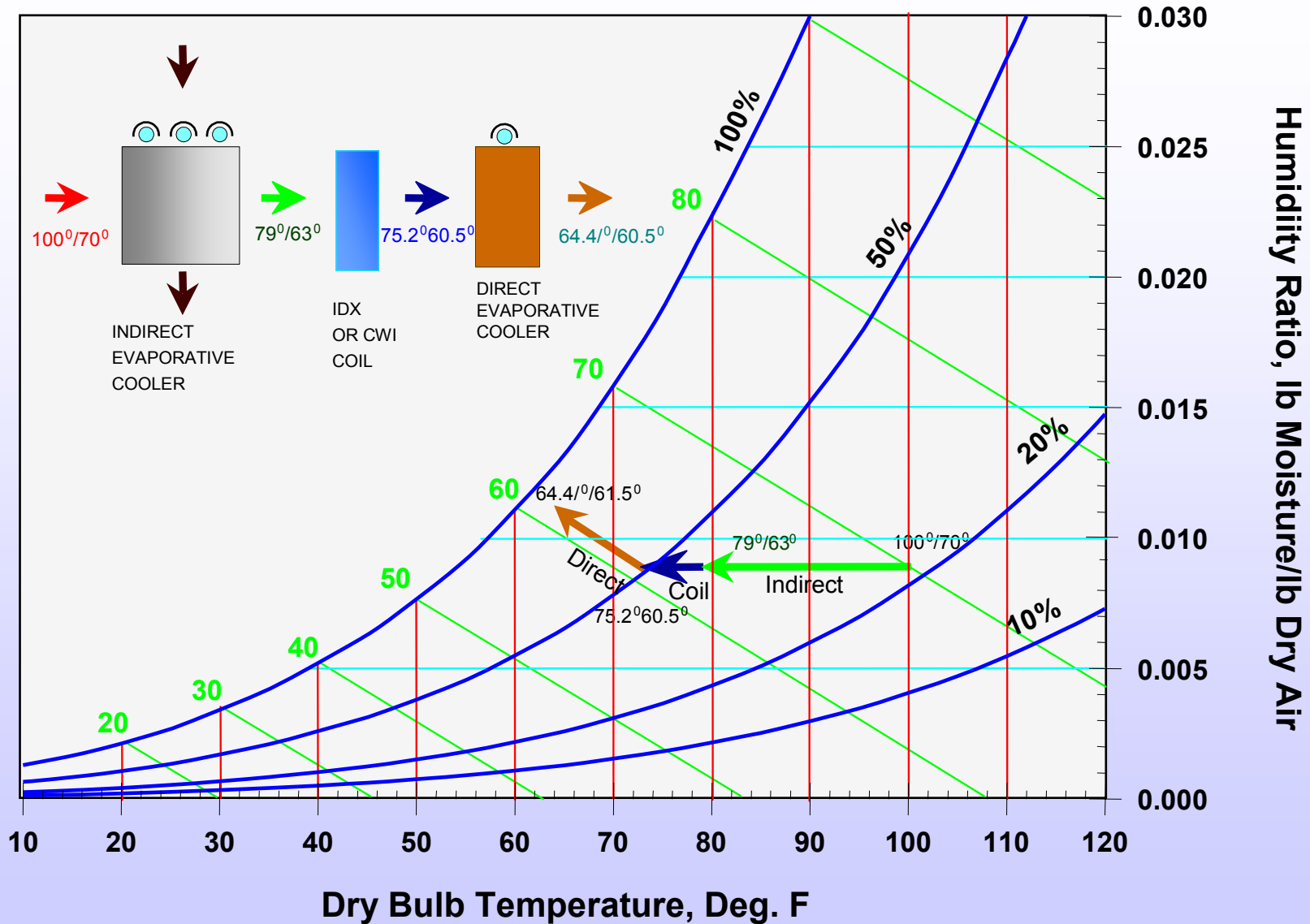
# Indirect Evaporative Cooling



# INDIRECT - DIRECT EVAPORATIVE COOLING



# INDIRECT - DIRECT EVAPORATIVE COOLING WITH CHILLED WATER ASSIST



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