You’ve all heard this rule of thumb: “For every $\Delta T$ of 10 °F, 1% of the recirculation rate must be evaporated to achieve this cooling.” Where does this rule of thumb come from? It starts with one definition and one fact:

- A British Thermal Unit (BTU) is defined as the amount of energy it takes to raise 1 pound of water 1 °F.
- Approximately 1,000 BTU of heat is lost from water for every pound of water evaporated.

Since we are dealing with percentages and to make things simple, let’s suppose that we are dealing with 100 pounds of water. If we wanted to cool 100 pounds of water by 1 °F, that would mean that we would have to remove 1 BTU of energy from each pound or water.

The rule of thumb deals with a 10 °F temperature change. To cool 100 pounds of water by 10 °F, we would have to remove 10 BTU of energy from each pound of water.

$$10 \text{ BTU} \times 100 \text{ pounds} = 1,000 \text{ BTU removed total.}$$

The above equation shows that to cool 100 pounds of water by 10 °F, we have to remove 1,000 BTU. From the second bulleted item above, we know we can do this by evaporating 1 pound of water.

$$1 \text{ pound evaporated} / 100 \text{ pounds total} = 0.01 \text{ or } 1\%$$

Therefore, to cool water by 10 °F, you must evaporate 1% of the water. When dealing with a cooling tower, to cool the incoming water being sprayed over the tower by 10 °F, then 1% of the flowrate over the tower must be evaporated. This is where the rule of thumb “For every $\Delta T$ of 10 °F, 1% of the recirculation rate must be evaporated to achieve this cooling” comes from.

All of this is assuming 100% of the cooling is due to evaporation of course. In reality, the seasonal average in your area may be 75% evaporative cooling. This means that for every $\Delta T$ of 10 °F, 0.75% of the recirculation rate must be evaporated with the rest of the cooling being from sensible cooling.
summer, the percent evaporative cooling may be near 100%, and in the wintertime it may be nearer to 0%.