

## Determining Relative Humidity and Dew Point Temperature based on the Sling Psychrometer

The sling psychrometer is an easy and accurate instrument for making observations of relative humidity and dew point temperature. The instrument is made up of two thermometers. One of the thermometers has a wet cloth, or “sock,” over it and is known as the **wet bulb**, while the other has nothing on it and is known as the **dry bulb**. The dry bulb and the wet bulb are swung together in the air and the dry bulb records the air temperature while the resulting evaporation of water from the “sock” reduces the temperature of the wet bulb.

The temperature of the wet bulb is either the same as or less than the dry bulb. When water is evaporated from the sock, the cooling effect of evaporation reduces the temperature of the wet bulb. The greater the difference between the wet bulb and the dry bulb, the drier the air is because more water is able to evaporate and thus there is more of a cooling effect on the wet bulb. When the air is near saturation, that is, has a high relative humidity, very little water will evaporate from the wet bulb and thus the temperature of the two thermometers will be close to each other. The difference in temperature between the two bulbs equals the **wet bulb depression (WBD)**. The wet bulb depression and the air temperature (dry bulb reading) are used with specific tables to find either the dew point temperature or the relative humidity, or both. Table 5.2 (Relative Humidity Table) and Table 5.3 (Dew Point Table) will be used in the following exercise.

$$\text{Dry Bulb Temperature} = \text{Air Temperature}$$

$$\text{Dry Bulb Temperature} - \text{Wet Bulb Temperature} = \text{Wet Bulb Depression}$$

**Example:** finding Relative Humidity and Dew Point Temperature using the Sling Psychrometer:

If the dry bulb temperature reading is 70° F and the wet bulb reading is 60° F, then the wet bulb depression is found as follows: 70° F - 60° F = 10° F. Now go to table 5.2 (Relative Humidity Table) and read **down** the left hand column (air temperature, which is dry bulb temperature) to 70° F and then read **across** the top of the table (wet bulb depression) to a value of 10°. You get your answer by tracing the column down from 10° (wet bulb depression) to where it meets the row from 70° F air temperature. The reading will be **55% Relative Humidity**.

Doing the same with the Dew Point Table (Table 5.3) you should get the answer **53° F** for the dew point temperature.