

Wind observation and measurement: Wind vane & Cup anemometer

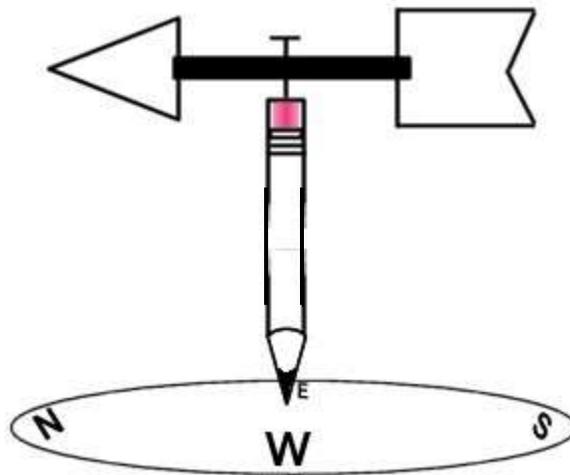
Meteorological requirements

Wind observations or measurements are required for weather monitoring and forecasting, for wind-load climatology, for probability of wind damage and estimation of wind energy, and as part of the estimation of surface fluxes, for example, evaporation for air pollution dispersion and agricultural applications.

WIND INSTRUMENTS

Wind Vane:

A very old, yet reliable, weather instrument for determining wind direction is the **wind vane**. Most wind vanes consist of a long arrow with a tail, which is allowed to move freely about a vertical post. The arrow always points into the wind and, hence, always gives the wind direction. Wind vanes can be made of almost any material. At airports, a cone-shaped bag opened at both ends so that it extends horizontally as the wind blows through it sits near the runway. This form of wind vane, called a *wind sock*, enables pilots to tell the surface wind direction when landing.



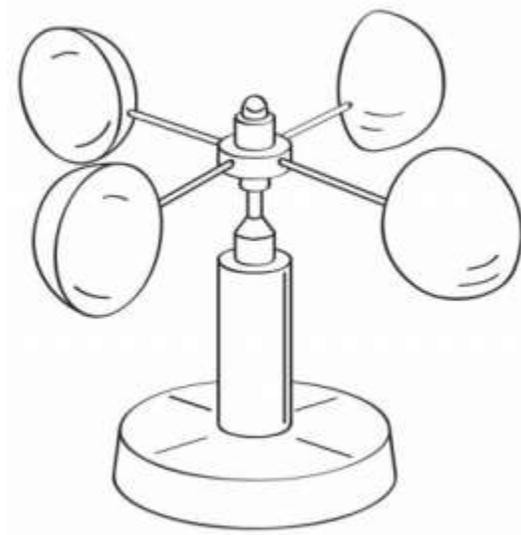
WIND VANE

Anemometer:

The instrument that measures wind speed is the **anemometer**. Most anemometers consist of three (or more) hemispherical cups (*cup anemometer*) mounted on a vertical shaft. The

difference in wind pressure from one side of a cup to the other causes the cups to spin about the shaft. The rate at which they rotate is directly proportional to the speed of the wind. The spinning of the cups is usually translated into wind speed through a system of gears, and may be read from a dial or transmitted to a recorder.

Anemometer



The wind-measuring instruments described thus far are “ground-based” and only give wind speed or direction at a particular fixed location. But the wind is influenced by local conditions, such as buildings, trees, and so on. Also, wind speed normally increases rapidly with height above the ground. Thus, wind instruments should be exposed to freely flowing air well above the roofs of buildings. In practice, unfortunately, anemometers are placed at various levels; the result, then, is often erratic wind observations.