Ventilation Systems

Humidity in ventilation systems

Ventilating is the process of changing or replacing air in any space to provide high indoor air quality. In order to maintain an office building within the comfort zone, or to maintain any application specific climate conditions, humidity plays a key role.

Various equipment can be added into air handling units to either remove or add moisture.

The most common way to dehumidify air in an air handling unit is to regulate the cooling coil below the dew point and remove humidity by condensation. In most cases it is necessary to reheat the air afterwards via a heating coil.

To increase humidity, a contact humidifier can be used where the air passes through or over a wet surface where it picks up additional water vapor to be introduced to the environment. A similar process is used with an air washer unit where water nozzles spray water aerosol into the air stream. Water can also be added by an ultrasonic humidifier where a piezo-electric transducer creates a high frequency mechanical oscillation in a body of water. An extremely fine mist is emitted which is quickly absorbed into the air flow.

Each of these methods require frequent cleaning. Also, the passing air not only absorbs humidity but also loses some heat energy (adiabatic cooling). Therefore, an additional heating coil after the humidifier is usually required.

Direct steam injection is the most common form of humidification. These types of devices require very little maintenance because the steam supply acts as a cleaning agent. However, the steam production and distribution is expensive and is only cost effective for larger buildings.

For accurate control of humidity, the distance between the humidifier and the measurement probe must be long enough to ensure full mixing of the air and water vapor.

continued

Clockwise from above: Classroom without air conditioning . . . Large air handling unit . . . evaporative cooler.

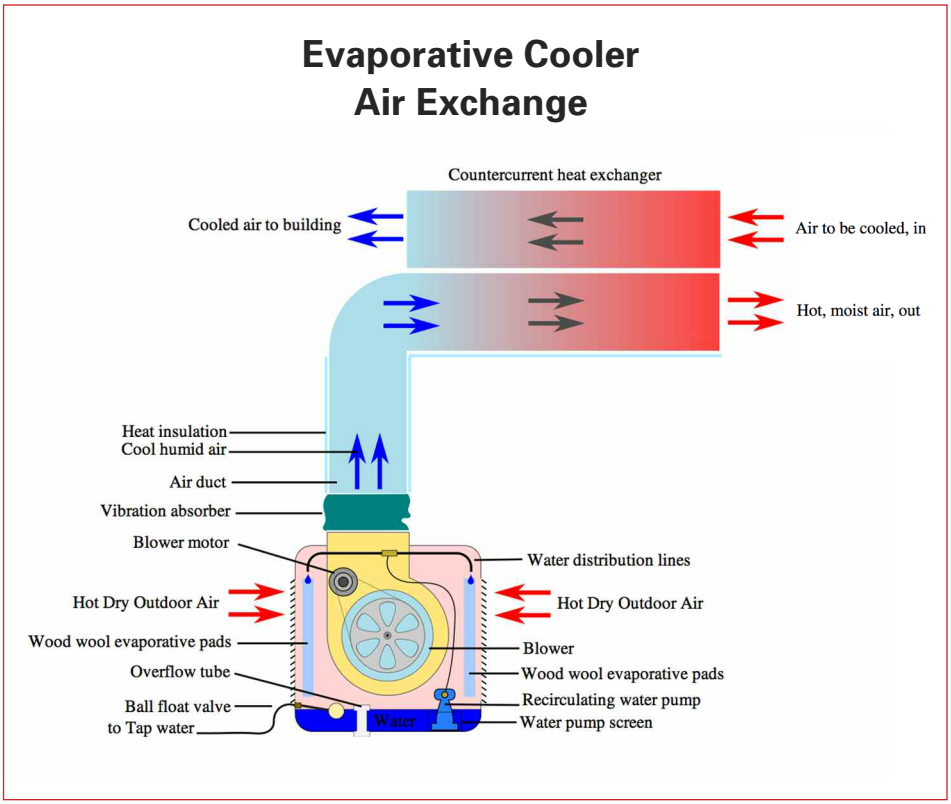
Facts & Figures

- The Beverly Briley building in Nashville, Tennessee currently has the largest installed air handling unit in the world. It is capable of delivering 9,970 cubic metres per minute.
- The first air conditioner was invented by Willis Carrier in 1902. He worked at a publishing company and needed a way to keep his paper from expanding and ink from running.
- The revered summer break from school was a necessity before the invention of air conditioning. The schedule persists today even with the availability of modern air handling units.

Why the need to measure humidity?

Controlling the temperature and the humidity levels in a building using an air handling unit will have an impact on the following:

- The humidity level plays an important role in the "felt temperature" also known as "heat index". Generally, the temperature feels colder when the humidity level is lower and vice versa.
- Humidity level below 30%rh, that are particularly common during the heating period, promote itchy and cracked skin, irritated eyes and chapped lips. Dry air also dries the shield of mucus in airways that protects against bacteria, viruses and airborne pollutants increasing the risk of infections.
- On the contrary, high humidity levels directly affect the amount of allergens in the indoor environment. In particular, high humidity causes both dust mite populations and mold colonies to grow.



- An ideal humidity level for places where people live and work is between 45 and 50% RH.
- Dry air can cause wooden furniture to crack and paper to stick in printers.
- Moist air can cause mildew on surfaces and, with time and extreme levels, even concrete will start to dissolve.

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