

## **Desiccant Dehumidifiers Vs. Refrigeration Dehumidifiers**

Dehumidifiers that use desiccant and refrigeration based dehumidifiers can both remove moisture from the air; the question is which one is best suited for the application? There are no simple answers to this question but there are several accepted guidelines most dehumidifier manufacturers follow:

Both desiccant and refrigeration based dehumidifiers work most efficiently together. The advantages of each compensate for the limitations of the other.

Refrigeration based dehumidifiers are more economical than desiccants at high temperatures and high moisture levels. In general mechanical refrigeration systems are seldom used for applications below 45%RH. Example, in order to maintain an outlet condition of 40% RH it would be necessary to bring the coil temperature down to 30F, which results in the formation of ice on the coil and a reduction in moisture removal capacity. Efforts to prevent this (defrost cycles, tandem coils, brine solutions etc) can be very burdensome and expensive.

Desiccant dehumidifiers are more economical than refrigeration based dehumidifiers at lower temperatures and lower moisture levels. Typically, a desiccant system is utilized for applications below 45%RH down to 1%RH. In many applications, a DX or chilled water pre cool coil is mounted directly at the dehumidifier inlet. This allows for removal much of the initial heat and moisture prior to entering the dehumidifier where the moisture is reduced even further.

The difference in cost of the electrical power and thermal energy (natural gas or steam) will determine the ideal mix of desiccant to refrigeration based dehumidifiers in a given application. If thermal energy is cheap and power costs are high, a desiccant system will be most economical to remove the bulk of the moisture from the air. If power is expensive and thermal energy reactivation is costly, a refrigeration system is the most efficient choice.

The most common applications requiring 45%RH level or below are: Pharmaceutical, Food and Candy, Chemical Labs, Automotive, Military, and Marine Storage.

Applications requiring 50%RH or higher are probably not worth expending a whole lot of effort on because the can usually be achieved through refrigeration. Some cases, the use of desiccant system can reduce operating cost of the existing refrigeration system. Example- when treating ventilation air in building HVAC systems, the dehumidification of fresh air with the desiccant system decreases the installed cost of the cooling system, and eliminates deep coils with high air and liquid-side pressure drops. This saves considerable fan and pump energy as well.

