Humidity Control for Consistent Nutraceutical Manufacturing

Desiccant dehumidification provides humidity control allowing consistent production in all nutraceutical applications.

FDA guidelines for nutraceutical manufacturing call for complete product consistency and the highest quality. At the same time, the demands of the marketplace require efficient, low cost production.
The keys to meeting both requirements are predictability and stability of the process variables. Of all the important process parameters, environmental humidity can vary the most.

Many vitamin processes such as tableting, hard capsules and softgels require low humidity. Certain herbal extracts and powders are extremely hygroscopic resulting in the need for low humidity. These processes can be overwhelmed by even normal (50%) humidity, yielding inconsistent product and erratic production rates. Munters offers a dependable, cost-effective solution to control humidity.

Desiccant humidity control technology provides consistent moisture removal capacity, even at low humidity control levels. The nutraceutical process benefits in important ways.

Benefits of dehumidification

- **Tableting & hard capsules - smooth powder flow and improved tablet and two piece capsule quality**
  Many nutraceutical powders (herbal extracts, effervescents and proteins) are extremely hygroscopic. This leads to the agglomeration and clogging of the powder feed to the tableting press and to high speed two piece capsule filling machines. Dehumidification allows smooth powder flow even during periods of high humidity.
- **Softgel manufacturing quality**
  Softgel manufacturing requires low humidity. Encapsulation areas are usually kept between 30% and 35% Relative Humidity (RH). Drying rooms and tunnels are kept between 15% and 25% RH. The higher the humidity, the longer the drying time. Higher humidity also increases the risk of flat spots and leaks.
- **Batch-to-batch consistency**
  With reliable humidity control, your tableting operation will be fast, consistent and most important of all, predictable. Munters desiccant dehumidification equipment will eliminate low summer production rates or variations in GMP compliance.
- **Tablet coating**
  Variations in drying air humidity cause difficult adjustments in bed temperature and spraying rates. Munters humidity control allows fast evaporation of even aqueous coatings at low temperatures. Heat damage can be eliminated and your products protected from moisture intrusion by rapid, predictable coating evaporation.
- **Improved HVAC sanitation**
  Munters desiccant humidity control precludes the growth of bacteria and mold in ductwork by eliminating moist, warm places for colonies to grow.

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Why conventional systems fail

Commercial-grade, non-desiccant, HVAC systems rely on refrigeration technology to control both temperature and humidity. Such designs are chosen to reduce initial equipment expenditures and operating costs. Unfortunately, while vapor compression refrigeration is effective at controlling high temperatures and high humidities, these systems can be severely limited at lower humidity levels.

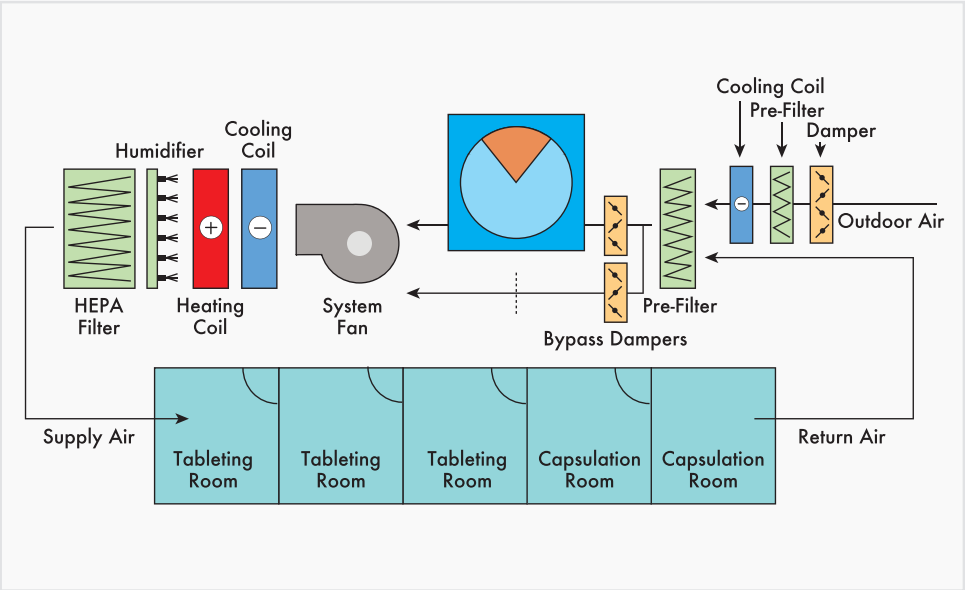
Maintaining room conditions at 68°F and 50% RH or lower requires the air handling system to deliver air dry enough to absorb the internal moisture load generated by workers, door activity, products, manufacturing processes and other sources. This means that a refrigeration system must over cool the air to condense moisture, and then reheat it to maintain a set Relative Humidity level. However, reheating is costly, and the system must be carefully controlled to avoid chilling the room and its occupants.

In many cases, the required Relative Humidity is lower than 50%. At that point, refrigeration technology becomes very erratic because condensed moisture freezes, blocking the cooling coil and starving the system of dry air altogether. This erratic behavior occurs often in the summertime, when high temperature and high moisture loads occur simultaneously for extended periods. Then the refrigeration system struggles to overcome both loads.

To reliably achieve and maintain the consistent low humidity level required in an industrial process, a different solution is necessary, one which is not limited by the freezing condensate in a refrigeration system.

The use of a desiccant in combination with a cooling system allows for independent control of both temperature and humidity.

Munters Desiccant Dehumidification System



The Munters HoneyCombe® desiccant dehumidifier is placed upstream of the final temperature conditioning coils to remove moisture before it can condense on cold surfaces, keeping ductwork dry and less prone to bacterial and fungal growth. The capacity of the dehumidifier is controlled by face-and-bypass dampers, which meter more air through the HoneyCombe® rotor as the requirement for dry air increases in the space. When the room control condition is satisfied, more air is bypassed around the desiccant. This capacity control design can achieve a control stability in the space of ±2% RH.

The solution: desiccant dehumidification

With Munters equipment, the moisture in the air is removed by using a desiccant. The absorption process is not limited by the freezing point of water because moisture is removed as a vapor.

As a result, the Munters system can remove as much moisture as necessary to maintain the low moisture levels that make your operations fast, consistent, and productive. For example, Munters systems create and maintain levels at 15% RH for effervescent tableting rooms or 50% RH for products that require consistent control at higher humidities.

Munters equipment offers flexibility. We can provide a stand-alone dehumidifier to supplement an existing air conditioning system or we can provide a totally integrated and self-contained system, allowing your process to be operated with complete independence from central building heating and cooling systems. Munters can even supply rental solutions for temporary installations, minimizing your capital equipment budgets, or even as a "try-before-you-buy" trial.

Each nutraceutical manufacturing operation and location has its own unique characteristics. At your request, we will survey your facility and provide an equipment recommendation to meet the special needs of your process. We will be pleased to help you solve any humidity control problem.

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