



Dehumidification Application

The choice for
desiccant dehumidification®
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MOISTURE CONTROL IN LITHIUM BATTERY ROOMS

Bry-Air environmental control systems allow for consistent control to efficiently prevent the effects of humidity on products.



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Over the years, the manufacturing of lithium batteries has gone from relatively small sample batches to large, mass production operations. These high energy batteries are used in a wide range of applications. The most important single factor governing the manufacture of lithium batteries is the fact that they must be produced in a very low humidity environment. In the early years, moisture free (inert gas) glove boxes were used to produce the batteries in small quantities.

However, as the demand for batteries grew, so did the demand for larger capacity production. At the same time there were significant developments in the production of low humidity dehumidification equipment. This equipment allowed for up scaling of the production process and substantially increased the production of lithium batteries.

The reason that it is essential to maintain a low humidity environment in the production of lithium batteries is because lithium reacts with water

(vapor) to form lithium hydroxide, hydrogen and heat. Water vapor acts as a catalyst, thus the rate at which these reactions occur depends upon both the moisture level in the atmosphere and the time that the lithium metal is exposed to that moisture. The more exposure, the poorer the quality, performance, and shelf life of the batteries.

A Bry-Air desiccant dehumidifier is the most efficient and economical means of providing the very dry air required for lithium battery production. The system is specially designed to control moisture levels in lithium processing areas at -20° to -40° F dew point. This condition represents a moisture content of less than two grains of water vapor per pound of dry air.

In designing the system, there are two key variables which must be established. The first of these is the moisture load in the space. This load is generally made up of the following:

- A. Moisture ingress due to



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permeation i.e. the vapor pressure differential between ambient (surrounding) and the space to be conditioned.

B. A major contribution to moisture load is the workers in the room. Typically an average person will release 1,500 to 2,000 grains per hour into the conditioned space through breathing and perspiration.

The second critical variable to be defined is the control of the moisture level in the space. The sizing of the equipment and thus, the cost, not only depends on the amount of moisture to be removed, but also on how dry the air is to begin with. The larger the latent load inside the space, the more CFM it will require to reach the desired conditions. It has been clearly established that the drier the air the better the product quality. Generally the desired moisture level varies from -40°F to -15°F .

Apart from designing an energy efficient and reliable moisture control system, great care must be taken when considering the construction of the room. The single most important characteristic of the construction is that it must be vapor tight and access must be controlled through an air lock vestibule.

While control of moisture levels below -20°F dewpoint is not an altogether simple problem, it is certainly well within the range of existing technology. The low level moisture control system has become an essential production tool for other electro-chemical technologies, as well as lithium battery systems.

Sodium based batteries and sealed lead acid batteries can also benefit from very dry atmospheres during the production process. In addition, some types of fuel cells benefit when moisture is absent during the assembly operations.

Bry-Air dehumidifiers are working in many lithium production facilities around the world, resulting in millions of dollars saved for our customers.

For more information on Bry-Air's products and services please visit www.bry-air.com

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