

CONSTANT CONDITIONS VITAL FOR WORKING WITH LITHIUM-ION BATTERIES

COTES DEHUMIDIFYING SOLUTIONS

PROCESSING
13,000
CUBIC METRES
OF AIR PER
HOUR

REDUCES
THE DEW
POINT TO
-60°C
OR LOWER

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Humidity management is a prerequisite for peak performance in lithium-ion battery development

NEXT-GENERATION LITHIUM-ION BATTERIES

In the United Kingdom, Nexeon Ltd. is working to bring ground-breaking silicon anodes to market for the next generation of lithium-ion batteries. Nexeon® has patented a new way of structuring and etching silicon for use in such anodes, resulting in extended cycle life and a significant increase in battery capacity.

In addition to boosting capacity, Nexeon technology reduces the amount of material used in lithium-ion batteries, providing the required performance at lower cost than graphite. This breakthrough has substantial commercial potential, with the added advantage of not requiring big changes to existing manufacturing processes.

MOISTURE CONTROL IS VITAL

The Nexeon pilot plant is configured to represent a commercial-scale manufacturing facility. An advanced-technology dry room is crucial for this capability, because moisture greatly reduces the performance of the electrolyte. It is therefore absolutely essential that the levels of moisture in the air are kept as low as possible.

According to Nexeon, one of the biggest practical challenges lies in the moisture introduced by the unusually many visitors to this new set-up. Moisture from their bodies has a relatively big effect on the very low humidity levels in the facility.

PROCESSING EXCEPTIONAL VOLUMES OF AIR

In 2010, Nexeon opened a fully automated pilot plant for silicon anode production, based around a manufacturing dry room delivered by Scientific Climate Systems Ltd.

This is equipped with a Cotes CRP40000 adsorption dehumidification system, configured to remove undesirable moisture from 13,000 cubic metres of air per hour.

A CHALLENGING START

The dry room and the CRP40000 dehumidifier (installed outdoors in a corrosion-resistant AISI 304 stainless steel cabinet) were commissioned during torrential downpours in summer 2010.

Nevertheless, the new installation met or exceeded all the required specifications, and achieved an exceptionally low -74.5°C dew point.

PLEASED WITH THE PERFORMANCE

According to Nexeon's Engineering and Operations Director Ian McDonald, the company is very pleased with how the Cotes CRP40000 adsorption dehumidifier makes it possible to maintain the required dew point, and to quickly return humidity to the desired -60°C level, minimising fluctuations after visitors have exited.

ENERGY EFFICIENCY AND FLEXIBILITY

This large-capacity dehumidifier unit was specially configured to comply with Nexeon requirements, with a big focus on minimising energy consumption.

The CRP40000 dehumidifier is therefore fitted with an indirect gas-fired regeneration heater to dry the air, and an unusually large proportion of the dried air is recycled.

In addition, a pre-cooling system is fitted to help avoid any extra energy consumption caused by temperature fluctuations and other variations in operating conditions.

Special control systems also give Nexeon considerable operating flexibility, either manually or automatically. This includes reducing the dew point from the design figure of -60°C to -30°C (or higher) to meet different requirements, and reducing both dehumidification effects and energy consumption at times with less activity or lower manning levels, such as nights and weekends.

RELIABILITY ESSENTIAL

It is also important that Nexeon is able to rely on the Cotes dehumidification system – completely. "It would be catastrophic for us if it were out of operation for any prolonged period. We simply wouldn't be able to make any cells at all," notes Ian McDonald.



Installing the Cotes dehumidification system at the Nexeon facility.

"Nexeon is pleased with the ability of the Cotes CRP40000 adsorption dehumidifier to maintain the required operating point, and to quickly return humidity levels to the desired -60°C operating point."

IAN MCDONALD
NEXEON ENGINEERING AND OPERATIONS DIRECTOR

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