

Bry-Air®

DRY ROOMS

Incorporating Patented

Green DryPurge® (GDP) Technology
for low dew point dehumidifier requirements



Critical for Lithium
Battery Manufacturing
from the Leaders in Dehumidification... Worldwide

www.bryair.com

Total Solution Provider for

Dry Rooms with Environment Control Equipment

incorporating Patented Green DryPurge® (GDP) Technology*

Critical for Lithium Battery Manufacturing

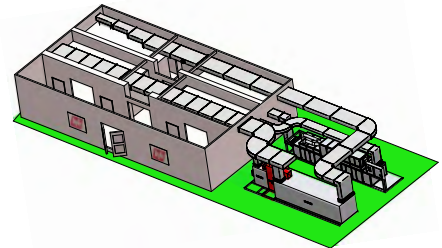
There are four critical legs on which the lithium battery production space stands on:

1. Technology
2. Raw Material
3. Machinery
4. **Dry Rooms**

Bry-Air has the product and global standard technology for dry rooms.

The Green DryPurge® (GDP) dehumidifier technology which is the most energy efficient dehumidifier for <1% RH dry rooms is patent of Bry-Air (Asia).

Bry-Air has the capability to build state-of-the-art Dry Rooms, and provide complete solution for achieving low dewpoint control for your hygroscopic and moisture sensitive material processing.



Bry-Air has proven success in meeting the stringent requirement of dew point lower than (-) 75 °C with a single rotor

*Tailored exclusively for Li-ion Battery manufacturing

embedded with Patented Green DryPurge® (GDP) Technology

Some interesting References of Bry-Air Green DryPurge® (GDP) Technology Dehumidifier



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स/ No.NSTL/B&E/DRY ROOM/2018
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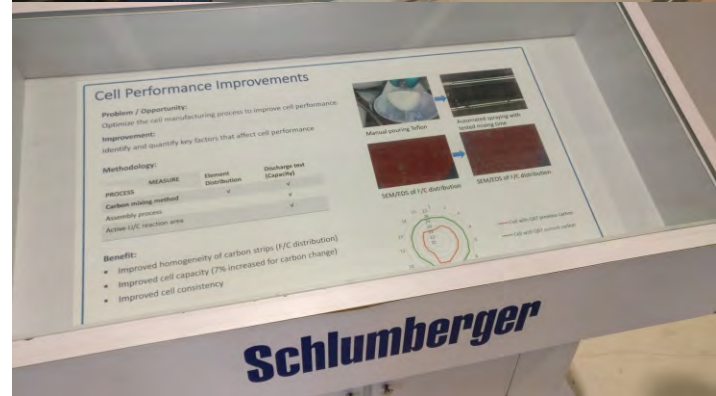
दिनांक / Date: 05 APRIL 2018

TO WHOM SO EVER IT MAY CONCERN

M/s. Bry Air (Asia) Pvt Ltd, India has executed "Supply, erection and commissioning of the 1% & 10% RH Dry rooms for lithium ion battery manufacturing facility" (i.e Dehumidifier, Dry room with complete Air ventilation system) satisfactorily.

The performance of the dehumidifiers for the project are satisfactory, as we are achieving in the Dry Room 1: Less than 1% RH and in Dry room 2: 10% RH. The above quality standards have met our requirements for dry rooms.

(DR. A. SRINIVAS KUMAR)
SCIENTIST-G,
TECHNOLOGY DIRECTOR



Environment Control – Very Critical for Li-ion Battery Production

- Li-ion battery production is undertaken in very critical and controlled (dry room) environment conditions
- Non maintenance of the desire RH during Li-ion cell manufacturing (< 1%) and battery assembling (< 10%) may lead to consequences such as:
 - Degradation in power storage characteristics of lithium
 - Reduced performance and battery life
 - Explosion in batteries in extreme cases

Areas of Critical Moisture Control in Battery Production Facilities

- Battery Assembly Area
- Cover Attachment to Power Collector
- Glass to Metal Sealing
- Electrolyte filling in Cell
- Cathode Production
- Testing
- Electrodes Insertion
- R&D, etc.

Ideal Dry Room Conditions for Li-ion Battery Manufacturing

- Moisture level in Lithium-ion battery processing areas should have less than (-) 35 °C dew-point and/or moisture content of 0.14 grams per kg of dry air
- Room temperature should be maintained at recommended levels, around 25 °C, with tolerance of +/- 2 °C along with dew points in the range of (-) 35 °C (0.14 g/kg)
- The air change rate in the production room should be 20 to 50 air changes per hour with maintenance of minimum fresh air introduction for positive room pressure and ventilation for workers

Dry Room design is a complex process.

Handling needs special knowledge of heat load and moisture load calculation.

Bry-Air has the capability and experience to control the critical parameters of heat load and moisture load and deliver a successful dry room.

Dry Rooms are also being used by pharmaceutical companies, automotives, special (safety) glass manufacturers, semiconductors, energy storage and selective other industries which have very low dew point requirements for their hygroscopic material processing and storage.

Bry-Air Airgineers™ are well trained and equipped to deliver any size of Dry Rooms, be it for use in research laboratories (Compact Dry Rooms) or large scale production areas.

Key Constituents and Requirements for Dry Room built:

Constituents:

Panels & Room

- Insulated modular prefab panels
- Fire retardant modular panels
- Air tight room
- Baked white galvanized metal, PPGI, stainless steel interior & exterior sheet work over PUF panel
- Self supporting room
- HEPA filters inside the room

Floor

- Anti static floor

Door

- Entrance door with air lock
- Emergency door

Controls

- PLC based Control, dew point sensor

Requirements:

- Vapor tight and constructed for Zero Leak
- Double skin modular panel construction (PUF) with vapour tight construction have also gained acceptance with advance of new manufacturing processes.
- Inner/outer skin generally to be PPGI/SS/Powder coated constructed
- Proper lighting arrangement
- Power points to be provided at various places as required.
- Air shower provided to limit dust ingress
- Ante room to be provided to reduce moisture load due to door opening.
- Proper insulation of the duct work
- Special entry doors for the main entrance, for the ante/airlock room, Air shower room emergency door
- Anti-static flooring

Bry-Air Advantage

- Proven success in meeting the stringent requirement of dew point lower than (-) 75 °C, required by the most updated and largest lithium battery plant
- Highest dry process airflow in CMH/kW
- More than 100 units installed and commissioned across the world



Sturdy equipment with no standby



Extremely low dew point
[up to (-) 90 °C]



Low operating cost



Capability and reliability



Service backup 24X7



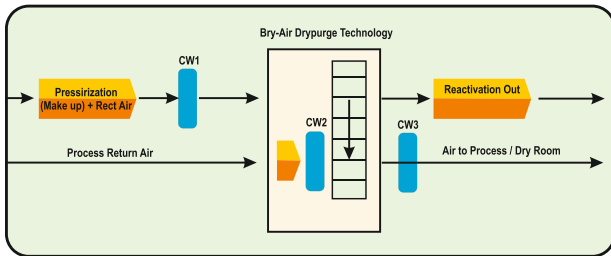
55 years experience in
environment control solutions

Bry-Air Patented Green DryPurge® (GDP) Technology

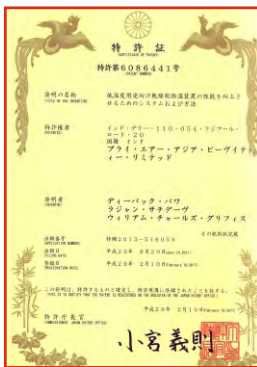
The **Green DryPurge®** Advantage... the Cutting Edge Technology

EcoDry™ Lab for Desiccant Rotors

Bry-Air's Green DryPurge® (GDP) patented technology for dehumidifiers ensures optimum performance of dehumidifiers, even at the ultra low dew point, up to (-) 90 °C.



Test Lab for Active and Passive Desiccant Wheels



11 patent(s) applications filed globally and 8 granted/allowed already including USA, China, Mexico, Japan, South Africa, South Korea, Canada, Europe

DryPurge® is proprietary technology of Bry-Air and is patent protected in several jurisdictions. Details are available at www.pahwa.com



Some outstanding Features and Advantages resulting from Bry-Air GDP Technology

- Highest low dew point supply air CMH/kW of regeneration: High Performance Efficiency/Energy Efficient
- Single Rotor Machine: for as low as (-) 90 °C
- High Performance Rotor: pH neutral, water washable
- Own Rotor Manufacturing
- Performance Demonstration (Type Test): each design can be pre validated in our dynamic test lab
- Manufacturing Capability and Quality Certifications
- Unit Construction: robust, durable, > 20 years life
- Adjustability of Fresh Air Fraction
- No Post Cooling Coil Required: feature of patented technology
- Patented **Green Drypurge®** (GDP) Technology



Rotor made up of pH neutral and chemical resistant material. Inertness to gases such as Hydrogen Flouride (HF) generated during the production of Lithium-ion batteries

Some of our Esteemed Customers:

- Schlumberger
 - Weisstechnik (through them, to two largest European Automotive companies)
 - BHEL (Bharat Heavy Electricals Limited)
 - BYD
 - Wuhan Design Institute
 - Beijing University
 - Meiling Battery
 - Bamo Battery
 - Pulead Technology Industry Company Ltd.
 - Indian Institute of Technology (IIT), Kharagpur
 - Defence Research & Development Organisation (DRDO)
 - Naval Science and Technological Laboratory (NSTL)
- ... and many more

If you are considering setting up a Dry Room, Bry-Air may help you get started. Please get across to us at bryairmarketing@pahwa.com and we will be happy to help you get to the driest room on earth.

Need Dry Rooms?

Get across to the **most trusted and reliable** Moisture Removal Partner

