Products & Solutions

for seed centres

CABINET DRYER DL600 and DL1200 Series

BCC

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For easier seed extraction, cones or capsules are dried before extracting the seed. This is done through a controlled dehumidification drying process which opens the cones and exposes the seed for easy extraction.

For medium and long term storage of seed, the moisture content of the seed needs to be reduced to below 10% (species-dependant). Both seed of conifer and hardwood species are dried by way of a controlled dehumidification drying procedure, rather than heating.

BCC manufactures two ranges of Cabinet Dryers:

1. the smaller DL600 Mini series and
2. larger DL1200 series (two- and four-door model available), that are suitable for drying of cones, fruits, berries, seeds and pollen etc.. Even though the DL600 is referred to as the Mini series, this is a full-scale production dryer with the capacity to dry small cone batches as well as seed.

THE PROCESS

Drying of cones:

- The Drying Boxes are filled with unopened cones in a layer of up to approximately 100mm thick. Cones increase in volume during the drying process (batch and species dependent).
- A Cone Dosing device can be used to transfer cones from the Cone Storage Boxes into the Drying Boxes.
- The Drying Boxes are placed into the Dryer shelves either by hand or when the boxes are heavy, by Lifting Cart (in the case of the DL1200 series drying boxes).
- Depending on the species, cones are dried for a period between 8 and 24 hours at temperatures of 40-60°C.
- Temperature and relative humidity (RH) are programmed according to the specie requirements after which drying process is started.
- The air is circulated continuously, dehumidified and temperature automatically adjusted before entering the drying chamber again, thus avoiding temperature fluctuations.
- Note that the drying capacity will depend on the set process temperature and minimum RH.
- For temperatures below 20°C the process will be longer, also due to reduction of the dehumidification capacity.
- After drying is complete, the drying boxes are removed from the dryer by hand or by lifting cart (DL1200).
- Optional: the drying boxes could be placed into a carrier that holds up to 5 boxes (DL1200).
- The cones are transferred to the Seed Extractor for further processing.

Drying of seed, nuts and berries:

- After processing, seed is dried to ensure successful medium and long term cold storage to avoid loss of viability of the seedlot.
- Seed that has undergone a wet processing activity e.g. PREVAC or Liquid Separation, needs to be surface dried before further processing.
- In many cases the seed is dried to storage moisture content, which reduces the drying time at a later stage. This can also be done in the BCC Dryers.
- For drying of large seedlots, seed is place in an even layer in the Drying Boxes.
- To dry small lots of seeds a number of Insert Boxes are recommended. These are placed in the ordinary Drying Boxes and are used to keep the different seed lots separated.
- For the DL600 Mini series, the Insert Boxes come in two sizes:
  4 inserts of 50 % of the size of a Drying Box (large) and
  8 inserts of 25 % of the size of a Drying Box (small).
  This is enough to fill up all four Drying Boxes.
- For the DL1200 series, the Insert Boxes come in two sizes:
  1/8 of the size of a Drying Box (small) and
  1/4 of the size of a Drying Box (large).
  Insert Boxes of different sizes can be combined to fill up one or several Drying Boxes.
- The Drying Boxes are placed into the Dryer shelves either by hand or when the boxes are heavy, by Lifting Cart (in the case of the DL1200 series drying boxes).

- Depending on the species and the moisture content of the seed, seed is dried for different periods and temperatures.
- Examples of different seed is shown below (for DL1200):

  A seed lot of Norway spruce or Scots pine with a moisture content of 25-30% will normally be dried down to 5-7% in 6-10 hours, with a batch size 160-170 kg or 280 litres.

  The drying capacity for beech nuts is 250 -400 kg per batch, when drying seeds from 30-34% down to 10%. The required drying time is approximately 20-30 hours, depending on the set temperature and minimum RH.
- Temperature and relative humidity (RH) are programmed according to the species requirements after which the drying process is started.
- The air is circulated continuously, dehumidified and temperature automatically adjusted before entering the drying chamber again, thus avoiding temperature fluctuations.
- Note that the drying capacity will depend on the process temperature and minimum RH.
- For temperatures below 20°C the process will be longer, also due to reduction of the dehumidified capacity.
- After drying is complete, the drying boxes are removed from the dryer by hand or by lifting cart.
- The drying boxes could be placed into a carrier that holds up to 5 boxes.
- The seed is transferred to the seed processing room for further processing (in the case if surface drying) or to the packing room for packing.

OPERATIONAL BENEFITS & KEY FEATURES

- Compact design – all parts are integrated into one unit.
- The cabinet has between one and four drying sections, each section fitted with 4-5 dryer boxes (refer to Technical Data for details). This makes it flexible and provides for maximum volume efficiency.
- The dryer system – consists of a dehumidifier, air heater, air cooler with fans (only DL1200), filters and ducts. Each section is fitted with a circular fan, forcing air through the dryer boxes (one fan per dryer box in DL600). The dryers are fitted with:
  - an active cooling battery (evaporator) for dehumidification and reduction of process temperature and
  - a heating battery (condensator) to regain temperature if required.
- The control system – includes regulators for temperature and relative humidity, sensors and other electrical components. The heat regain is controlled by the "low alarm" on the temperature regulator.
- The drying procedure is based on dehumidification rather than heating, which ensures a lenient drying of cones and seeds resulting in energy saving.
- Operates over a wide temperature range for drying of both cones and seed of various species that require different drying conditions. For example:
  - Drying of cones at 40-60°C.
  - Drying of conifer seed at approximately 30°C.
  - Drying of hardwood seeds such as beech nuts that require low drying temperatures of 20-24°C (in some cases less than 20°C is required).
- Precise temperature control – the drying air temperature can be set between 18-60°C. The air is circulated continuously, dehumidified and temperature adjusted before entering the drying chamber again, thus avoiding temperature fluctuations in the drying chamber.
- Homogenous drying – the high air velocity through the drying boxes results in similar drying conditions in the upper and lower boxes (DL1200 only).
- Dryer boxes are made from stainless steel and have perforated bottoms for effective airflow.
- A lifting cart can be used to avoid manual lifting and handling. The device is used for both horizontal lifting and rotating of the boxes. This function is available on the DL1200 but can be adapted for use on the DL600.
- Where boxes are handled manually, a carrier holding 5 boxes is available for easier handling (DL1200).
- The dryer can also be supplemented with a device connected to a PC for recording and logging temperatures throughout the process.
- To dry small lots of seeds, Insert Boxes are recommended. These are placed in the ordinary dryer boxes and are used to keep the different seed lots separated.
  - For DL1200 series the Insert Boxes come in two sizes: 12.5% of the size of a dryer box (small) and 25% of the size of a dryer box (large). Insert Boxes of different sizes are combined to fill up one or several dryer boxes.
  - For DL600 series the Insert Boxes come in two sizes: 25% of the size of a dryer box (small) and 50% of the size of a dryer box (large). One set consists of 4 inserts of 50% and 8 inserts of 25%.

ACCESSORIES AND EXTRA FEATURES

A water heated heat exchanger can be used as an alternative to the electrical heater by connecting it to the existing heating plant in the building.

A set of ducts and a fan to extract excessive heat from the seed processing room to the outside or into another part of the building (regaining energy).

Lift cart channels on DL600 drying boxes.

TECHNICAL DATA

Model	**DL600Mini**	**1200/19hl**	**1200/38hl**
Dimensions (mm)	2200 x 1250 x 2200	2700 x 1650 x 2350	4200 x 1650 x 2350
Weight (kg)	650	1100	1750
Power supply	3 x 400V, 20Amp, 50Hz	3 x 400V, 35Amp, 50Hz	3 x 400V, 45Amp, 50Hz
Power requirement (kW)	12	20	27
Max heating capacity (kW)	5	12	16
Minimum temperature	11°C	11°C	11°C
Maximum temperature	50°C	60°C	60°C
Max ambient temperature	40°C	40°C	40°C
Number of sections/doors	1	2	4
Number of drying boxes	4	10	20
Drying box dimensions (mm)	580 x 580 x 225	1200 x 575 x 280	1200 x 575 x 280
Box volume (liters)	75	191	191
Total box volume (liters)	300	1900	3800
Total box surface (m2)	1,35	6,90	13,80
Drying capacities (note: cones increase in volume as they open. Therefore unopened cone volume is smaller than the total box volume)			
Unopened cone volume (liters)	100-120	750	1500
Cone drying time (hours)	8-24	8-24	8-24
Seed volume (kg/liters)			
Scots pine/Norway spruce (thickness 50mm)	28/64 (2 boxes)	30/70 (4 boxes)	60/140
Beech nuts	75-125/140-250	125-200/250-400	250-400/500-800
Seed drying time (hours)			
Scots pine/Norway spruce (25% to 7%)	4-10hrs	6-10hrs	6-10hrs
Beech nuts (34% to 10%)	20-30hrs	20-30hrs	20-30hrs

Note:

- Average power consumption over the complete drying period is approximately 50-80% of the maximum power require ment.
- The air velocity through the Drying Boxes is high, which gives similar drying of the top and bottom boxes over a period of time.
- Drying temperatures of 18-55°C can be maintained. High ambient temperatures reduce the dehumidifier capacity and possible low temperature (18°C is possible at a maximum ambient temperature of 25°C).
- The dryers produce excessive heat in the processing room (especially when drying at low temperatures), which sometimes is unwanted. This would require ventilation of the dryer room.
- alternative power supply available on request

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