



HEMP-DRYING.COM
DRIVEN BY INNOVATION

Drying & Retting Solutions For Industrial Hemp

Control & Consistency
Highest Quality
Efficiency




HEMP-DRYING.COM
DRIVEN BY INNOVATION



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DRIVEN BY INNOVATION

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 Online version
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Translation

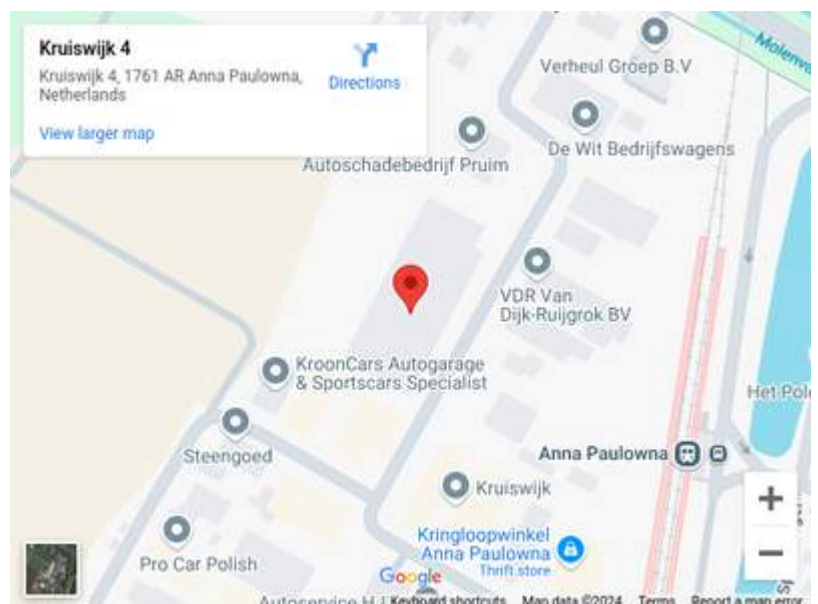


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ABOUT US

In the transition to a circular green economy, industrial hemp will play an important role by providing regenerative source materials for many industries, whilst storing carbon and restoring healthy soil life.



To increase the potential of industrial hemp as a globally used and locally produced industrial source material, we design and supply **reliable, consistent, and efficient drying and retting solutions** that add value to your harvest.

Agratechnik (www.agratechnik.com) has 50 years of experience in drying agricultural produce. With drying driven by innovation, our systems are installed globally. Specializing in drying flower bulbs, seeds, garlic, and onions amongst many other crops.



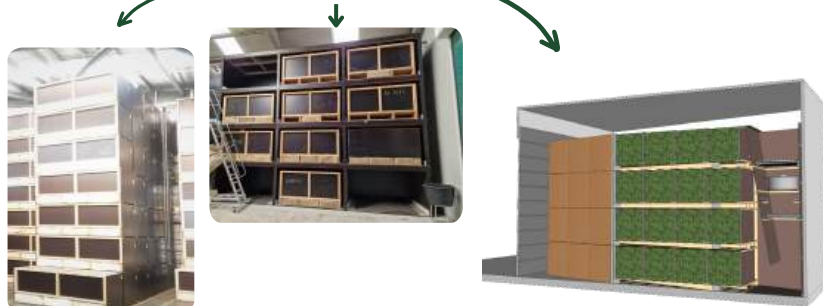
10 years ago Cannabis-drying.com was founded. Taking the innovations by Agratechnik, and elevating it to provide specialized drying equipment for medicinal and recreational cannabis (www.cannabis-drying.com).

Our combined experience enables us to deliver tailored drying & retting solutions for our clients. Hemp-drying.com, offers energy-efficient, precise, and controlled drying and retting solutions. We aim to transform your fresh harvest into premium quality hemp materials demanded by the market.



OUR PRODUCTS

Boxes Installations



Container Installations



ABC-Software

	Stage 1	Stage 2	Stage 3	Stage 4	Stage 5
Active stage	○	○	○	○	○
Stage on/off	✗	✗	✗	✗	✗
Target AH	9.3 gr	9.3 gr	9.3 gr	7.5 gr	7.3 gr
Calc. target RV	61 %	72 %	69 %	69 %	69 %
Delta AV	0.0 gr	0.0 gr	0.0 gr	0.0 gr	0.0 gr
Target T°	19.0 C	19.0 C	17.0 C	16.0 C	16.0 C
Min. airflow	25 %	25 %	25 %	25 %	25 %
Max. airflow	100 %	90 %	90 %	70 %	60 %
Min. period	0.5 day	0.5 day	1.0 day	2.0 day	3.0 day
Max. period	1.0 day	1.0 day	1.5 day	2.5 day	3.5 day
Duration	0.7 day	0.6 day	0.6 day	0.0 day	0.0 day
Total period stage 1-5	614 hrs				



Hemp Stalk



Long Fibers & Clean Shives

CONTROLLED
RETTING AND DRYING
HIGH QUALITY APPLICATIONS



**Controlled
Retting Installation**

For the clean, consistent, and efficient extraction of high-quality fibers, a controlled and precise retting process of the hemp (or flax) stalks is essential.



HEMP-DRYING.COM
DRYING & RETTING INSTALLATIONS

HARVEST

- Harvesting the hemp stalks and placing them parallel on the field.
- Start retting and drying on the field.
- At a stable moisture content the hemp is baled and stored.



CONTROLLED RETTING

- Bales are unrolled parallel into Hemp-drying.com boxes. Or the bale is placed on its side in a special box.
- Boxes are stacked in the controlled retting installation.
- Conditioned air is distributed per layer, tailored to the retting microbes/enzymes.
- Optimal retting conditions are maintained.
- The process stops at the desired retting stage.
- Stalks are dried to the ideal moisture content for scutching.

Controlled Retting Installation

PROCESSING

- Stalks are retted to match scutching line capacity.
- Stalks are dried to ideal moisture for scutching.
- Hemp-drying.com boxes are conveyed to the scutching installation.
- Boxes are emptied to feed parallel hemp stalks for scutching.
- Scutching line is tuned to retting quality and supply.
- Results in precise and effective fiber and hurd separation.



BENEFITS

- Year-round stable storage in bales, curing the stalks
- Year-round stalk retting to match scutching line capacity
- Tailored retting for desired outcomes
- Control over input and output quality
- More efficient scutching for higher value output

CONTROLLED RETTING INSTALLATION



Retting elements

- A.** Heating of airflow
- B.** Ventilator
- C.** Nebulizing moisture
- D.** Moisture adsorption to humidify the air
- E.** Sensor of ingoing air
- F.** Distribution of airflow to the boxes
- G.** Airflow per layer of boxes
- H.** Gap for air outlet for recirculation
- I.** Closed cell

Drying

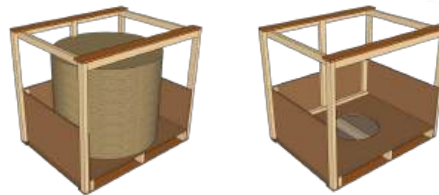
- A.** Heating of airflow
- B.** Ventilation
- F.** Distribution of airflow to boxes

CONTROLLED RETTING INSTALLATION

For ease of use in a traditional scutching line, the stalks can be retted on the bale.

A special box is created in which the bale is placed. At the center of the bale, airflow is forced through the stalks.

The airflow is conditioned to the desired temperature and humidity and drawn through the bale at the desired air speed.



ABC SOFTWARE CONTROL & AUTOMATION

Stage 1: Creating an optimal environment for microbial growth.

Stage 2: Humidifying stalks to optimal moisture and temperature.

Stage 3: Ensuring internal circulation under ideal conditions for microbial activity.

Stage 4: Finalizing retting under optimal conditions.

Stage 5: Completing retting and drying to the desired moisture content for scutching.

Section 1

Section stage setup

13

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Menu = 2

	Stage 1	Stage 2	Stage 3	Stage 4	Stage 5
Active stage	◇	◇	◆	◇	◇
Stage on/off					
Target AH	16.0 gr	19.0 gr	21.0 gr	22.0 gr	25.0 gr
Calc. target RV	80 %	83 %	87 %	86 %	92 %
Delta AV	0.0 gr	0.0 gr	0.0 gr	0.0 gr	0.0 gr
Target T°	25.0 C	27.0 C	28.0 C	29.0 C	30.0 C
Min. airflow	25 %	25 %	25 %	25 %	25 %
Max. airflow	60 %	50 %	40 %	40 %	40 %
Min. period	0.5 day	0.5 day	1.0 day	2.0 day	3.0 day
Max. period	1.0 day	1.0 day	1.5 day	2.5 day	3.5 day
Duration	0.7 day	0.6 day	0.6 day	0.0 day	0.0 day
Total period stage 1.5	514 hrs				

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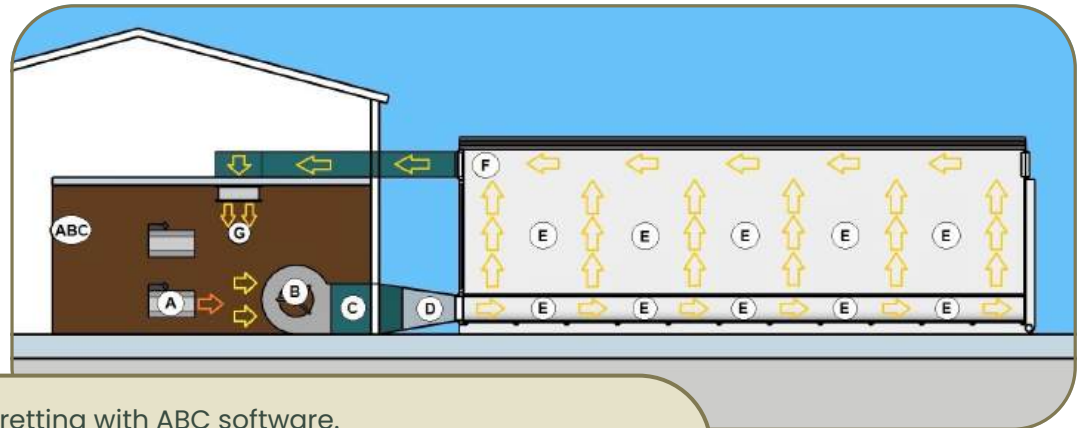
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Our ABC software allows you to control, automate, and analyze the process

Retting & drying in bulk for controlled and consistent outcomes is achieved in the container installation by Hemp-drying.com.

CONTAINER INSTALLATION



- ABC:** Initiate and monitor retting with ABC software.
- A:** Ventilator draws in air at preset airflow.
- B:** Circulate slightly heated outside air at the desired temperature.
- C:** Sensor measures incoming air absolute humidity.
- D:** Disperse air at the bottom plenum, rising evenly through biomass.
- E:** Measure outgoing air absolute humidity with sensors.
- F:** Circulate air back to the ventilator.
- G:** Vent equipped with removable filter and humidifier.

Section 1

1.3

Section stage setup

1-01-2009

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Menu

=

2

	Stage 1	Stage 2	Stage 3	Stage 4	Stage 5
Active stage					
Stage on/off					
Target AH	16.0 gr	19.0 gr	21.0 gr	22.0 gr	25.0 gr
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Max. airflow	60 %	50 %	40 %	40 %	40 %
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Max. period	1.0 day	1.0 day	1.5 day	2.5 day	3.5 day
Duration	0.7 day	0.6 day	0.6 day	0.0 day	0.0 day
Total period stage 1.5	514 hrs				

ABC SOFTWARE Control & Automation

- Stage 1:** Creating an optimal environment for microbial growth.
- Stage 2:** Humidifying stalks to optimal moisture and temperature.
- Stage 3:** Ensuring internal circulation under ideal conditions for microbial activity.
- Stage 4:** Finalizing retting under optimal conditions.
- Stage 5:** Completing retting and drying to the desired moisture content for scutching.

BENEFITS OF THE CONTROLLED RETTING INSTALLATION

- Total crop control from seed, to retting, to scutching
- Don't rely on nature, but utilize the strengths of nature with our technology
- Improve long fiber yields and quality
- Consistent product quality through repeatable process
- Controlled retting enables precise fiber and hurd separation
- Customize retting intensity for market demands

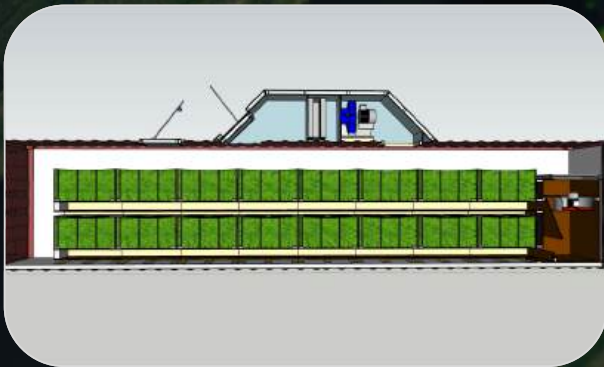


Hemp Flower

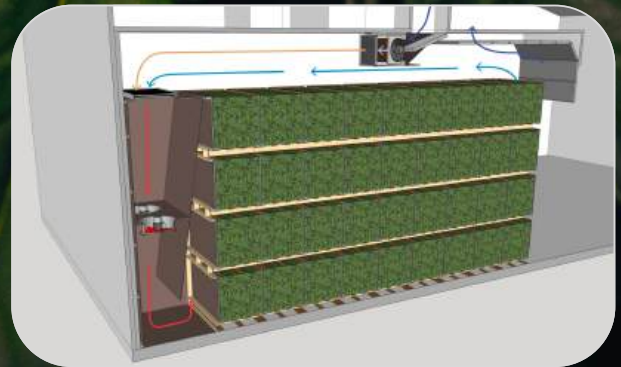


Cannabinoid & Terpene Retention

CONDITIONED DRYING
LOW TEMPERATURES
MAXIMIZE VALUE



CONDITIONED DRYING
CONTAINER



CONDITIONED
DRYING CEL

Retain the maximum amount of cannabinoids and terpenes with a controlled and precise drying process.



Dual Purpose Crop

- Hemp flowers are separated and collected in a trailing container.
- Stalks are cut and left in the field for subsequent harvesting.

HEMP FLOWER



Cannabinoid Purpose Crop

- Grown in greenhouse or outdoors.
- Flowers are bucked or trimmed.
- Placed in our specialized drying boxes.

Conditioned Drying Cell



Conditioned Drying Container

CONDITIONED DRYING PROCESS

- Conditioned with dehumidified air for efficient drying at low temperatures.
- The installation is filled with boxes filled with hemp flowers.
- Hemp flowers are placed in boxes, in trays or bulk.
- Drying occurs in five stages to gradually dry the flowers.
- Air with a low temperature preserves cannabinoids and terpenes.

PROCESSING TO CANNABINOID PRODUCTS

- The carefully dried hemp flowers are sold as a CBD flower product.
- The hemp flowers with well-preserved cannabinoids and terpenes are extracted after drying.
- The contents of the extracted hemp flowers are used in oils, tinctures, foods, cosmetics, sports balms, and vaporizers.

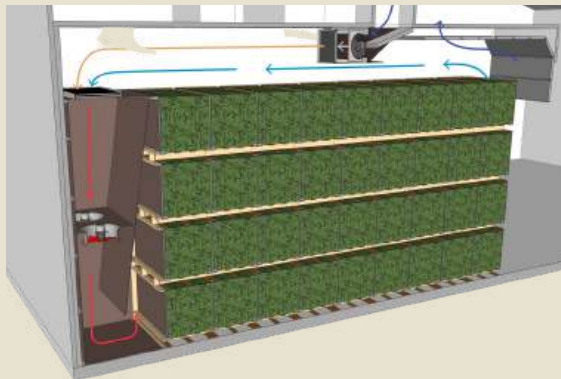


BENEFITS OF THE CONDITIONED DRYING INSTALLATION

- High-quality, low-energy drying with cool, dehumidified air.
- Optimal conservation of active compounds through low-temperature drying.
- Automatic, controlled drying for consistent quality.
- Cost-effective, durable drying with a heat pump system.

Achieve maximum cannabinoid and terpene retention through precise, controlled drying processes. Utilize closed-cell cooling-drying installations (heat pumps) for energy-efficient solutions.

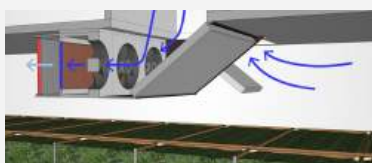
CONDITIONED DRYING INSTALLATION



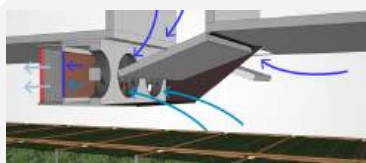
- The drying installation is placed within a closed cell.
- A hybrid heat pump provides dry air at low temperatures.
- Boxes, up to **3.5m³** each, hold hemp flowers.
- Forced airflow dries each box individually.

Sensors monitor drying conditions in the controlled drying cell and guide the process through our ABC software in five automated stages.

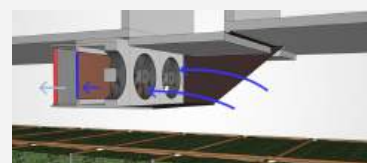
HATCHES FOR REGULATING SUPPLY OF OUTSIDE AND INSIDE AIR TO A COOL-DRY UNIT



When the product is humid and the outside air is dry, outside air is used.

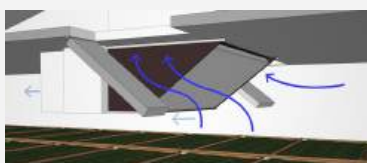


When the air in the cell is drier than outside, inside air is partially used.

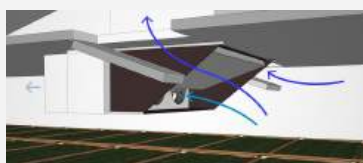


When the outside air is too humid, only inside air is used for drying.

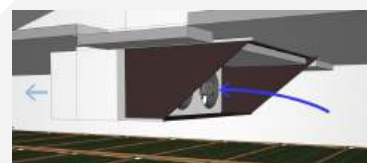
NEXT TO THE COOLING-DRYING UNITS, HATCHES ARE PLACED TO DISCHARGE HUMID AIR



They are connected to suction hatches; 100% outside air means 100% opened position.



When the air in the cell becomes drier than outside, inside air is partially used.



When the air in the cell is drier than outside, inside air is completely used.

- To make use of the dried air optimally, the conditioned drying cells are closed with a rolling shutter.
- The rolling shutter makes for optimal use of space and easy maneuvering and handling of the drying boxes.

BENEFITS OF THE CONDITIONED DRYING INSTALLATION

- Well suited for small and large-scale hemp flower producers
- Optimum control of conditions within the drying cell
- Special boxes for drying hemp flowers outfitted with or without trays
- Efficient use of outside and inside air for high-quality and low-cost drying

Retain the maximum amount of cannabinoids and terpenes with a controlled and precise drying process. Individual boxes with a heat pump provide a flexible, high-quality solution while saving energy.

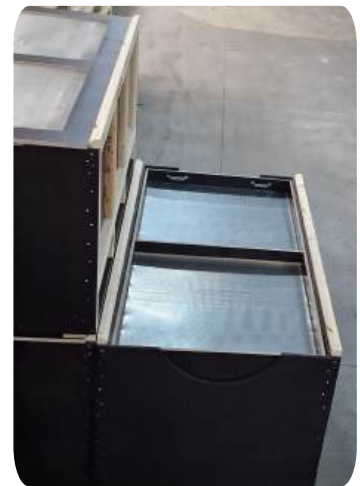


INDIVIDUAL BOX DRYER

- Optimal airflow
- High-pressure fans per box
- Dehumidified air per section or per individual box
- Highly precise drying
- Place the box once filled
- The drying program starts automatically

BOXES WITH TRAYS

- Trays of water-resistant plywood and stainless steel
- Easy to fill and handle
- Dividing the flower for optimal airflow and quality
- 6 trays per box
- Perfect for bucked or trimmed flower



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14.3 C	<input type="checkbox"/>	13.8 C	<input type="checkbox"/>
5.7 gr	<input type="checkbox"/>	5.7 gr	<input type="checkbox"/>
7.4		8.4	
13.3 C	<input type="checkbox"/>	12.8 C	<input type="checkbox"/>
5.7 gr	<input type="checkbox"/>	5.7 gr	<input type="checkbox"/>
7.3		8.3	
12.6 C	<input type="checkbox"/>	12.5 C	<input type="checkbox"/>
5.7 gr	<input type="checkbox"/>	5.7 gr	<input type="checkbox"/>
7.2		8.2	
12.0 C	<input type="checkbox"/>	11.7 C	<input type="checkbox"/>
5.6 gr	<input type="checkbox"/>	5.7 gr	<input type="checkbox"/>
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ABC-SOFTWARE

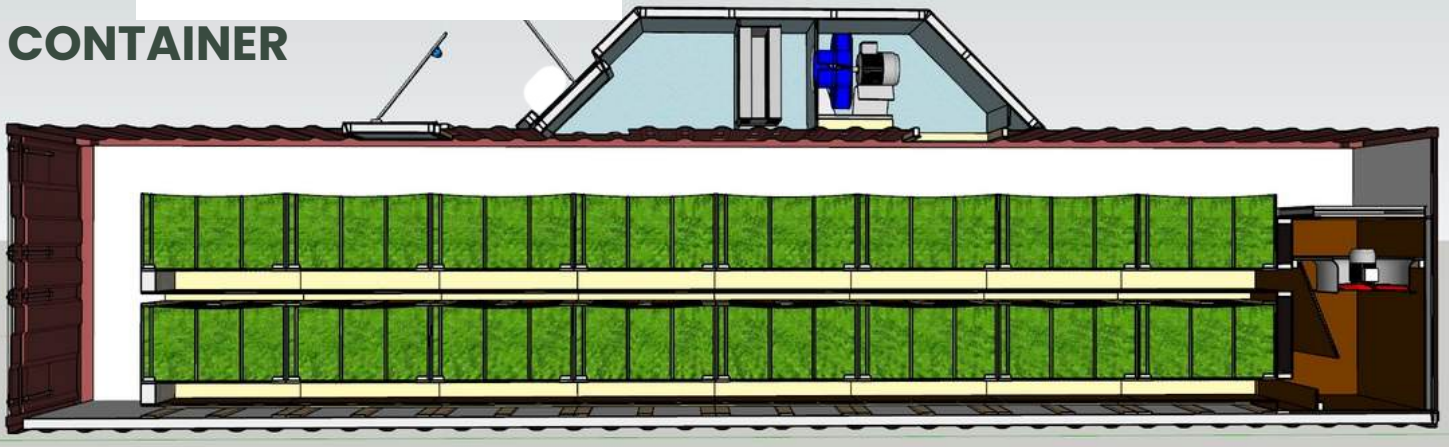
- Clear overview of all box places
- Per box place, the drying progress is stated
- Automatic drying process with the ABC Pre-sets
- Excess energy is automatically conserved or reused
- Easy to use
- Insight into all the variables
- Logfiles for registration and analysis of the drying process

BENEFITS OF INDIVIDUAL BOX DRYING

- Modular installation, making continuous batch drying possible
- Each box, or batch can run it's own drying pre-set
- Optimal conditioned airflow to each individual box
- Automation and energy efficiency through the ABC-software

Retain the maximum amount of cannabinoids and terpenes with a controlled and precise drying process. A container installation that is conditioned using a heat pump and a heat and cooling block, can create a large drying capacity at low temperatures ($\approx 20^{\circ}\text{C}$).

CONDITIONED DRYING CONTAINER



- A 40 feet container provides a large drying capacity within an enclosed environment.
- The container can be placed at a location at your convenience.
- The boxes made from water-resistant plywood can be open for bulk drying or divided with drawers.
- Bucked or trimmed flowers are placed in the boxes and into the installation.

CONDITIONING UNIT WITH VENTILATOR, COOLING UNIT & AIRFLOW HATCHES



When the product is moist and/or the outside air is dry, outside air is aspirated.



When the air in the cell becomes drier than outside, inside air is partially used.



When the outside air is too moist or the air from the product is dry, only inside air is used for the drying process.

Ventilation is provided immediately to start carrying off the first moisture. Once the container is full, the drying regimen is started with the ABC-software.

The drying container is fully conditioned to remove moisture from the hemp flowers continuously through five stages.

Each stage is automatically guided by the preset drying schedule, gradually and consistently dehumidifying the product until the desired moisture content is reached.

BENEFITS OF THE CONDITIONED DRYING INSTALLATION

- Stand-alone installation for high-quality drying at low temperatures
- Placed at your convenience, portable with adaptations
- Long-term economic savings and better quality due to hybrid heat pump
- Automatic control and guidance by the ABC-software



Hemp Seed



Gentle & Efficient

EASY
QUICK
EFFECTIVE
EXPERIENCED



CONTAINER DRYING
INSTALLATION



BOX DRYING
INSTALLATION

Prevent spoilage and oxidization of your fragile hemp seeds. Through a controlled and precise drying process by the tried and tested seed drying installations of Hemp-drying.com.



HEMP-DRYING.COM
DRYING & RETTING INSTALLATIONS

HARVEST

The hemp seeds are separated from the flower during harvest. These seeds are deposited in the bunker of the harvester or a container:

Option 1

Quickly after (or during) harvest the seeds are deposited in the seed-drying boxes.

Option 2

During or quickly after harvest the seeds are deposited in the drying container.



BOX DRYING INSTALLATION



CONTROLLED DRYING

- The standard for drying seeds.
- Temperatures up to 40°C to prevent oxidation.
- Strong airflow prevents spoilage or scalding.
- Fully automated with ABC software.



CONTAINER DRYING INSTALLATION

- Modular boxes for small or large-scale drying to desired moisture content.
- Containers for efficient bulk drying and harvesting to desired moisture content.

PROCESSING

- Properly dried seeds can be stored at a stable moisture level until processing.
- Installations are easily emptied for seed processing or packaging.
- Controlled drying process preserves seed quality.
- Ensures seeds reach desired moisture content for storage, dehulling, or pressing.

BENEFITS OF THE DRYING INSTALLATIONS

- Efficient and quick harvesting into our installations for drying
- Controlled temperature and airflow for the optimal drying process
- Tried and tested drying techniques for seeds
- Maximize efficiency and minimize losses

BOX SEED-BED

Boxes for drying seeds are fitted with a special fine screen to prevent seeds from getting lost.

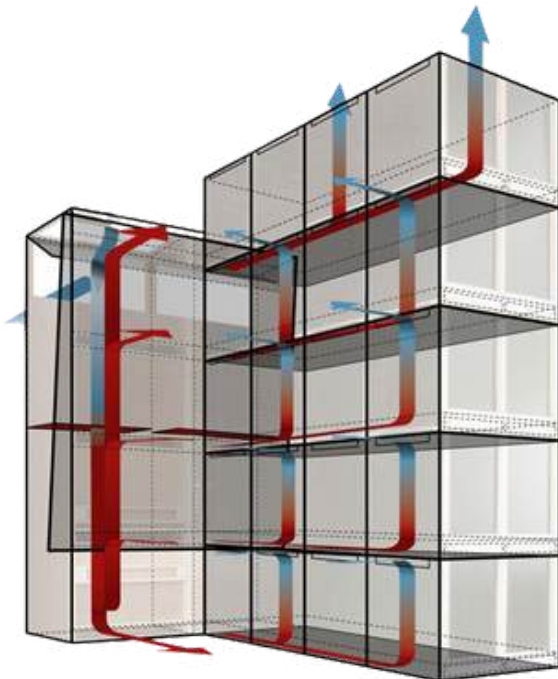
- Special fine screens in seed-drying boxes prevent seed loss.
- Corner posts on the outside of the boxes prevent seeds from getting stuck.
- Each box has up to 3.5m³ capacity.
- High-quality materials ensure box durability.
- Optional fine screen lids prevent contamination or animal interference.

DRYING AIRFLOW

A drying installation is designed for and placed at a location at your convenience.

An air distribution unit is composed of:

- Air ducts for outside air
- A heating source (biogas, radiator, heat pump)
- A ventilator provides airflow
- Temperature and relative humidity to control and guide the drying process



BOX DRYING INSTALLATION



Boxes are placed in front of and on top of each other against the air outlet gaps.

- Each box receives conditioned airflow.
- Airflow passes through the seeds, extracting moisture.
- Moist air exits the boxes.
- Continuously controlled airflow maintains desired conditions.

Automatically controlled drying through our ABC-software, for the best and most consistent quality.

BENEFITS OF THE BOX DRYING INSTALLATION

- Easy to fill, transport, handle, and empty boxes
- Quickly start drying after harvest to prevent spoilage
- Automated drying ensures top quality with minimal spoilage and energy use.
- Specialized drying boxes for delicate hemp parts.
- Optimal floor space utilization.



INDIVIDUAL BOX DRYER

- Optimal airflow
- High-pressure fans per box
- Heating per section or per box
- Highly precise drying
- Place the box once filled
- The drying program starts automatically

ABC SOFTWARE

- Clear overview of all box places
- Per box place, the drying progress is stated
- Automatic drying process with the ABC Pre-sets
- Excess energy is automatically conserved or reused
- Easy to use
- Insight into all the variables
- Logfiles for analysis of the drying process



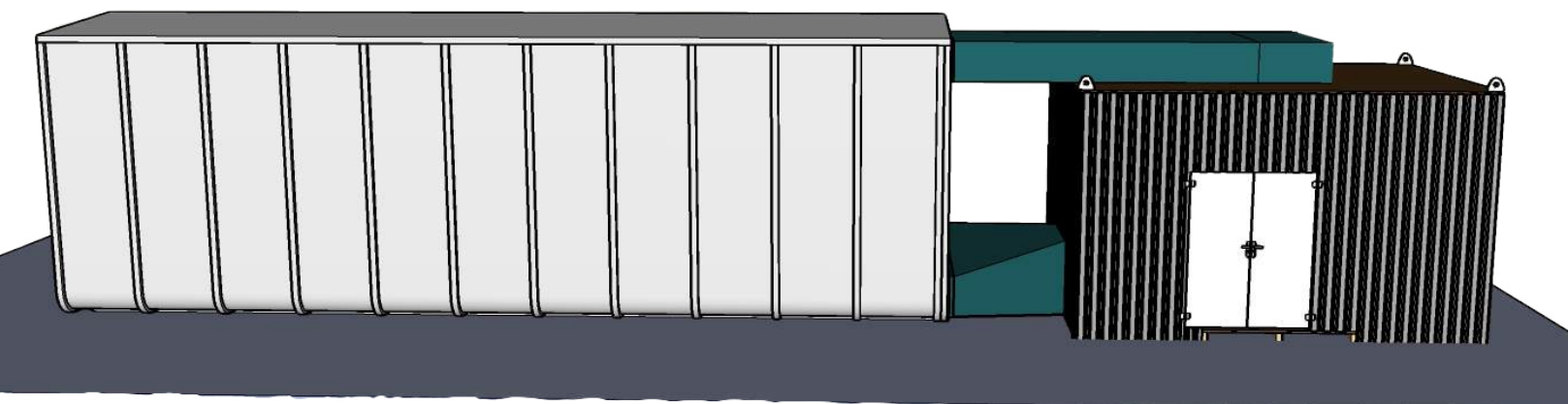
DRAWER DRYER

Dryer for small batches of seeds

- Precision drying of small amounts of seeds
- Easy and straightforward in use
- Trays with special mesh for seeds
- Air inlet guidance per drawer
- Air in and outlet per individual drawer
- Manual control, or automatic control by the ABC-software

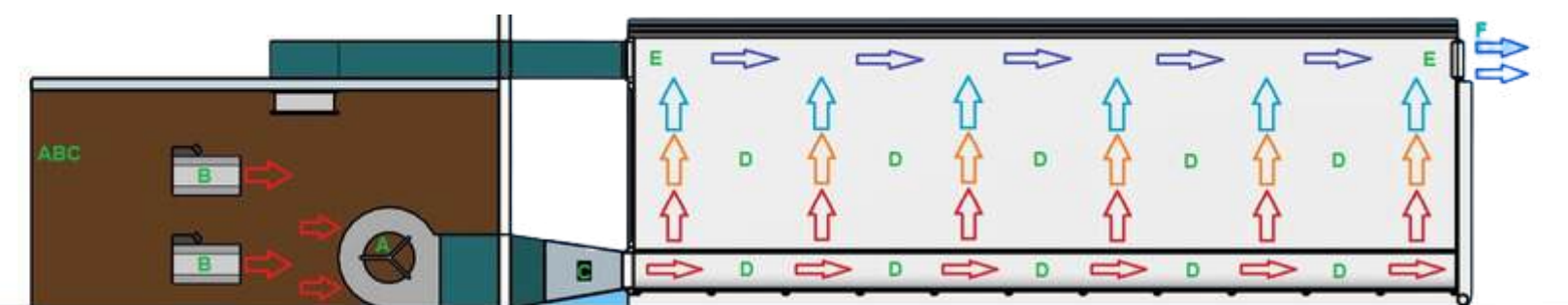
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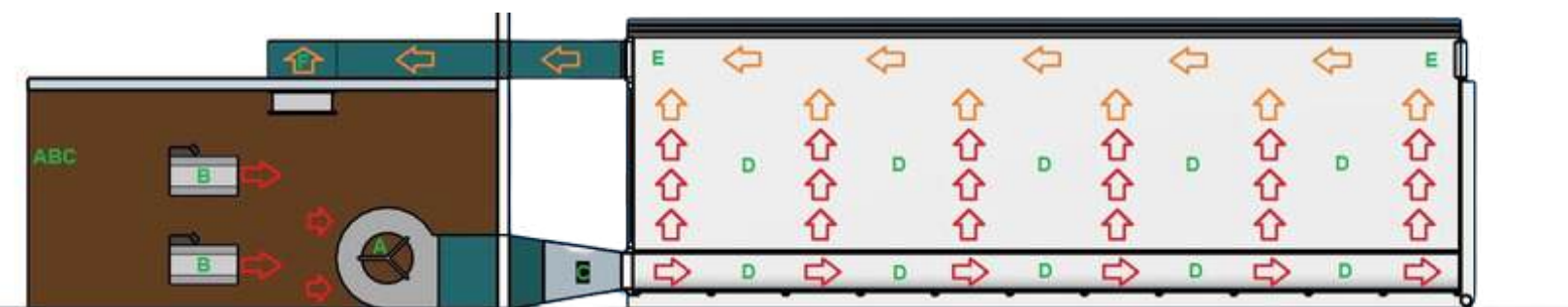
CONTAINER DRYING INSTALLATION

- 35m³ drying capacity
- Container for drying seeds with conditioned air
- Opening roof lids for easy filling and unloading
- Container is transportable, thus can be used for harvesting
- Different heating sources applicable: (bio)gas burners, heat pump system
- High quality components for high quality drying outcomes



REMOVING HUMID AIR

- Incoming and outgoing temperature and moisture are measured by sensors
- In the beginning stages of drying a lot of moisture is dried from the product
- This moisture is removed from the container
- Gradually the hemp seeds become dryer



RECYCLING DRY AIR

- In the later stages of drying less moisture is extracted from the seeds
- Once the sensors measure the air is relatively dry after passing the product the air is not removed but recirculated
- This relatively hot and dry air is dried again to save energy

BENEFITS OF THE CONTAINER DRYING INSTALLATION

- You can harvest directly into the container
- Complete control over the environment with open or closed air circulation
- Controlled drying with efficient use of energy
- Optimal drying process for hemp seeds

DRYING THEORY

HOW TO DRY EFFICIENTLY?

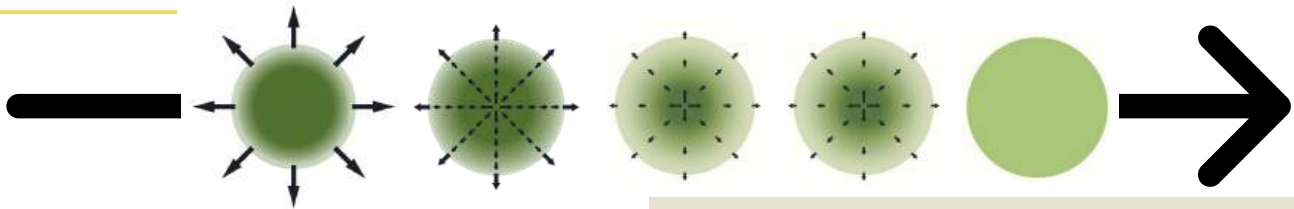
For air to hold water, the water molecules need to move, which requires energy. This energy comes from the air's temperature. So, warmer air can hold more moisture because it has more energy.

Absolute Humidity (AH) is the amount of water, in grams, in one kilogram of air. Relative Humidity (RH) is the percentage of how much water the air currently holds compared to the maximum it can hold.

The table shows that at 2 degrees Celsius, 4.36 grams of water per kilogram of air means the air is completely saturated with moisture (100% Relative Humidity). But at 12 degrees Celsius, the same amount of water only saturates the air halfway (50% Relative Humidity).

Relative Humidity % (RH)	100%	T° C/F
Absolute Humidity g water / kg air (AH)	4.36	2° 35.6°
	4.36	12° 53.6°
Relative Humidity % (RH)	50%	T° C/F

Subtraction of Moisture



When the absolute humidity in the air that gets blown through your product is lower than the absolute humidity in the product, this air will adsorb moisture and dry until the surrounding air and the air in the product are in balance.

We use this principle by measuring the incoming and outgoing absolute humidity, allowing us to control the drying of your product to the desired moisture content. The difference between the outgoing and incoming absolute humidity is known as the 'delta absolute humidity'.

Automatic control of the process

Active stage	Stage 1	Stage 2	Stage 3	Stage 4	Stage 5
Stage on/off	✗	✗	✗	✗	✗
Target AH	8.3 gr	9.3 gr	8.3 gr	7.6 gr	7.3 gr
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Max. period	1.0 day	1.0 day	1.5 day	2.5 day	3.5 day
Duration	0.7 day	0.6 day	0.6 day	0.0 day	0.0 day
Total period stage 1.5		51.4 hrs			

Our ABC-Software optimizes the drying process to **maximize output while minimizing energy input**.

Airflow and temperature are automatically guided at each stage of drying.

The ABC-software provides **real-time insights into key variables**, measured by sensors, allowing you to monitor the progress of your product's drying or retting process at every step.

Section 1 Drying Product T° 16.2 C RH 91 % Duct T° 20.3 C RH 54 %	Section 2 Drying Product T° 19.2 C RH 76 % Duct T° 23.5 C RH 44 %	Section 3 Post-drying Product T° 32.2 C RH 32 % Duct T° 35.1 C RH 23 %	Section 4 Post-drying Product T° 28.9 C RH 34 % Duct T° 30.1 C RH 29 %	Section 5 Post-drying Product T° 26.3 C RH 36 % Duct T° 26.9 C RH 32 %	Section 6 Off Product T° 20.2 C RH 61 % Duct T° 20.3 C RH 58 %
Section 7 Drying Product T° 24.6 C RH 81 % Duct T° 28.9 C RH 32 %	Section 8 Drying Product T° 27.2 C RH 61 % Duct T° 31.6 C RH 27 %	Section 9 Off Product T° 20.4 C RH 59 % Duct T° 20.3 C RH 58 %	Section 10 Off Product T° 20.2 C RH 60 % Duct T° 20.3 C RH 58 %	Section 11 Drying Product T° 33.2 C RH 28 % Duct T° 34.9 C RH 24 %	HEATING UNIT Cu 85.2 C Outside T° 21.3 C RH 57 % AH 8.1 gr

ABC-SOFTWARE PROPERTIES

- Sensors monitor air conditions.
- ABC software optimizes conditions for drying or retting.
- Drying progresses through gradual, efficient stages.
- ABC software maximizes efficiency and quality with minimal energy use.
- Each section of the installation can operate independently.

THE ABC-SOFTWARE

To start, control and monitor the drying process, we have developed our ABC-software. This has already been applied to a wide variety of agricultural drying solutions, with modular processes to be flexible to your needs.

- ABC-software offers insight into all variables via sensors.
- Monitors drying progress continuously.
- Automatically executes preset drying (or retting) program in stages.
- Example on the right: 5-stage program for conditioned hemp flower drying.

	Section 1 Section stage setup					1-01-2009 0:00
	Menu = 12					
Active stage	Stage 1	Stage 2	Stage 3	Stage 4	Stage 5	
Stage on/off	X	X	X	X	X	
Target AH	8.3 gr	9.3 gr	8.3 gr	7.6 gr	7.3 gr	
Calc. target RV	61 %	72 %	69 %	68 %	68 %	
Delta AV	0.0 gr	0.0 gr	0.0 gr	0.0 gr	0.0 gr	
Target T°	19.0 C	18.0 C	17.0 C	16.0 C	15.0 C	
Min. airflow	25 %	25 %	25 %	25 %	25 %	
Max. airflow	100 %	90 %	80 %	70 %	60 %	
Min. period	0.5 day	0.5 day	1.0 day	2.0 day	3.0 day	
Max. period	1.0 day	1.0 day	1.5 day	2.5 day	3.5 day	
Duration	0.7 day	0.6 day	0.6 day	0.0 day	0.0 day	
Total period stage 1.5	51.4 hrs					

	Section 1 Temp / RH settings.						14-09-2014 13:19
Choice: drying / post-drying / off	Drying						
Load preser nr.	1						
Settings same as preset	Save as preset nr. 0						
	Drying			Post-drying			Measurem
	Min.	Max.	Desired	Min.	Max.	Desired	
Product T°		32.0 C		32.0 C	25.0 C		16.0 C
Room T° 2	15.0 C	33.0 C	21.0 C	15.0 C	33.0 C	25.0 C	20.0 C
Product RH					35 %		90 %
Delta T°			5.0 C				4.0 C
Delta AV			3.0 gr		10 gr		14 gr
Duct AH	2.0 gr			2.0 gr			8.7 gr
Hatch position	0 %	100 %		0 %	100 %		100 %
Flow per box			1000 M3		500 M3		17540 M³
Maximum time post-drying	150 Min.			Remaining			0 Min.
Waiting time restart post-drying	3:00			Runtime restart post-drying			0:05

- Or these can be 2-stage drying for hemp seeds, like the example on the left.
- Custom processing regimens can be saved in ABC-software.
- Ensures consistent outcomes.
- ABC-software saves energy and time in your drying process.

- Easy-to-use ABC-software with clear navigation.
- Each section operates independently on custom schedules.
- Modular process ensures economical processing with top quality.
- Adjustable drying or retting variables tailored to your product needs.

	SMS English 4-06-2012 14:12										
Section 1	Section 2	Section 3	Section 4	Section 5	Section 6	Section 7	Section 8	Section 9	Section 10	Section 11	HEATING UNIT
Drying	Drying	Post-drying	Post-drying	Post-drying	Off	Drying	Drying	Off	Off	Drying	
Product	Product	Product	Product	Product	Product	Product	Product	Product	Product	Product	
T° 16.2 C	T° 19.2 C	T° 32.2 C	T° 28.9 C	T° 26.3 C	T° 20.2 C	T° 24.6 C	T° 27.2 C	T° 20.4 C	T° 20.2 C	T° 33.2 C	Cv 85.2 C
RH 91 %	RH 76 %	RH 32 %	RH 34 %	RH 36 %	RH 61 %	RH 81 %	RH 61 %	RH 59 %	RH 68 %	RH 28 %	
Duct	Duct	Duct	Duct	Duct	Duct	Duct	Duct	Duct	Duct	Duct	Outside
T° 20.3 C	T° 23.5 C	T° 35.1 C	T° 30.1 C	T° 26.9 C	T° 20.3 C	T° 28.9 C	T° 31.6 C	T° 20.3 C	T° 20.3 C	T° 34.9 C	T° 21.3 C
RH 64 %	RH 44 %	RH 23 %	RH 29 %	RH 32 %	RH 58 %	RH 32 %	RH 27 %	RH 58 %	RH 58 %	RH 24 %	RH 57 %
											AH 8.1 gr
Preset overview											

KEY POINTS

- Automatic and controlled drying or retting process
- Predetermined execution for high-quality end product
- Real-time insight into progress and variables
- Separate schedules for different drying sections
- Process data available for post-analysis

HEATING/CONDITIONING SOURCES

There are multiple effective ways to create drying capacity in the air. Following, are a couple of examples Hemp-drying.com can offer or is compatible with.



(BIO-) GAS BURNER

- A (bio-) gas burner is a trusted source for drying capacity.
- Heating the air increases its ability to absorb moisture from the product.
- Ideal for drying hemp seeds and stalks due to the relatively high temperature (35°C).

HEAT EXCHANGE UNIT

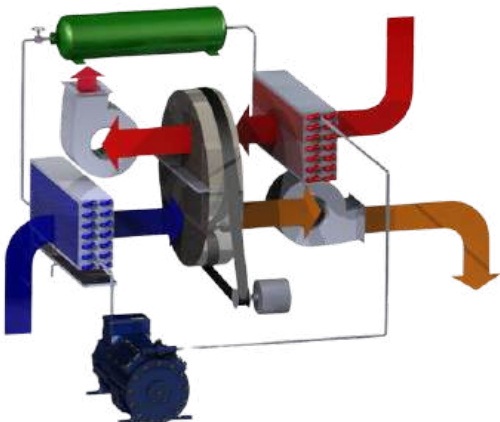
- Hot gas from the condensator gives energy to the warm water circuit through the heat exchange unit.
- Cooled-off gas is compressed within the compressor and returned to the condensator.
- The warm water is collected in a buffer tank.
- From the buffer tank, the warm water goes to the radiators above the ventilators.
- At the condensator, the air is dried through condensation by cooling the air.
- At the air distribution unit, the air is warmed with the same energy to absorb moisture from the hemp harvest.



HYBRID AIR-DRYER



WORKING PRINCIPLE



- The process air is pre-dried by first intensely cooling the air.
 - Because of the resulting condensation the air will become dryer.
- This cool air with a high relative humidity passes through the adsorption rotor.
 - Here extra moisture is subtracted, such that the air becomes very dry at a relatively low temperature.
- The energy applied for cooling, will be used for heating the air for regeneration.
 - The spinning adsorption rotor is dried again using hot air.
 - The regeneration air emerges warm and moist out of the adsorption rotor.
- An option is to cool down this regeneration air with a lot of energy again.
 - The released energy can subsequently be used again to heat process air.
 - In this way no extra gas is needed.

By making use of the hybrid heat pump a significant amount of heat energy will be saved.

WAGRATECH AIR-DRYER

The WAgrotech Air-Dryer is the first hybrid heat pump specifically designed to meet the requirements of the seed industry.

Both the WAgrotech Hybrid Air-Dryer and the entire drying process are controlled by our own ABC processor.



- Maximum use of the energy offered
- Variable capacity according to drying demand
- There are several standard options;
 - Additional cooling is possible at high ambient temperatures
 - Hot water is created
 - Process air can be cooled to very low temperatures
- Optimal use of the energy offered in the WAgrotech Air-dryer

Increasingly higher demands are being placed on seed quality. In addition to a lower moisture content, a low process air temperature is also desired as the outside temperature increases. In addition, there is often a desire to create hot water to heat the air in the drying installation.

A standard hybrid air dryer is not suitable to meet these requirements. That is why Agratechniek B.V. developed the WAgrotech Hybrid Air Dryer; the first hybrid heat pump specifically designed for the seed market.

Capacities (At 20°C & 60% RH)

TYPE 1		TYPE 2/3	
3500 M3 ~ 22 L/HR	4500 M3 ~ 33 L/HR	3500 M3 ~ 30 L/HR	4500 M3 ~ 45 L/HR
6000 M3 ~ 43 L/HR	9000 M3 ~ 65 L/HR	6000 M3 ~ 60 L/HR	9000 M3 ~ 90 L/HR

WAGRATECH AIR-DRYER

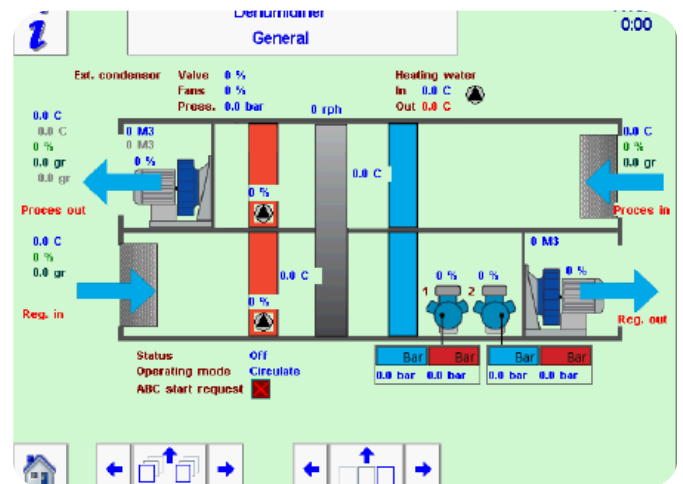
To be able to handle the different conditions that need to be created for high-quality seed to be dried, and the various environments where drying takes place, 4 configurations of the WAgrotech Hybrid Air-Dryer have been developed:

Standard Drying

The basic configuration is suitable for air drying under average conditions. Incoming air at 30°C is dried and cooled to a temperature of 25°C with an absolute moisture content of <3 grams/kilogram of air.

Cooled Drying

For more extreme conditions there is an option to remove extra heat energy. This configuration is capable of drying the process air to a moisture content of <2 grams/kilogram AH at ambient temperatures of 40°C to a temperature of 20°C.



Creating hot water

Warm water is often used as a medium to heat the air in a seed-drying installation. The WAgrotech air dryer can also process this.

The residual heat released when drying the air is used. In addition, use is made of the energy released when the regeneration air is significantly cooled, and energy is extracted from the outside air. This means that all energy is used maximally during the drying process.

Maximum Cooling

For situations where, for example, a seed vault is used, air of a very low temperature and low moisture content is required.

For these cases, we offer a special option that can meet this requirement.

KEY POINTS

- Energy efficient
- Quality preservation
- Low moisture content
- Optimal use energy input
- Capable of cooled storage
- Capable of working as a central heating for your building

THE BOXES

Boxes crafted from special water-resistant plywood maximize drying volume while minimizing floor space. Equipped with various heating options, this highly efficient method precisely, automatically, and economically dries your hemp products.

Each box is designed to receive optimal airflow, so the product inside is dried or retted optimally. The size of a single box ranges from **1m³ to 3.5m³**.

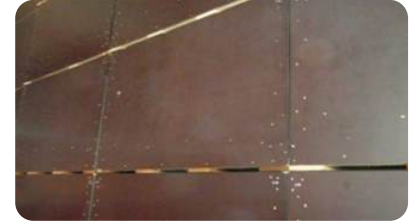
How do the boxes work together ?



Pallet bottom closed by 9mm plywood.



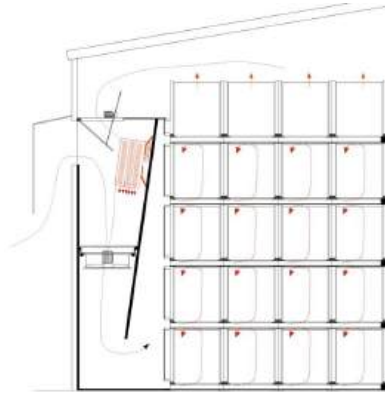
Difference in thickness between plywood and hardwood board.



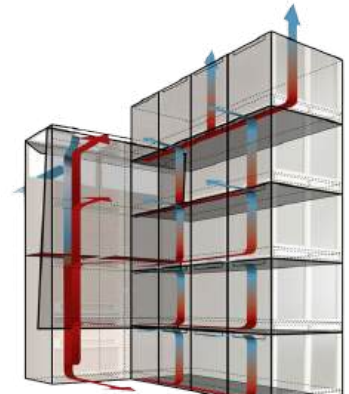
This difference creates openings between box layers for removing moist air per box layer.



Boxes are stacked in front of and on top of each other, positioned before an air distribution unit that includes a conditioning element and a ventilator.



A fan extracts outdoor or indoor air. Air will be conditioned, dried and distributed over the box levels.



Dry and warm air adsorbs moisture from the product and moist air escapes per layer out of the product.



With extra provision, the pallet can be turned over easily by a forklift.



Box cannot move between the pile. The pallet cannot be damaged. This enables a smooth dosing of the product.



KEY POINTS

- Box capacities range from 1m³ to 3.5m³
- Modular, scalable system tailored to drying needs
- Highly mobile for easy transport
- Multi-use for harvesting, drying/retting, and storage
- Suitable for drying hemp seed, flower, and stalks
- Effective retting solution for hemp stalks

DRYING INSTALLATION WITH STACKED BOXES

- Complete drying solution for optimal quality retention
- Controlled drying of the complete harvest
- Efficient use of heating and ventilation for minimal energy consumption
- Variable heating or conditioning
- 1 variable high-pressure fan per section, automatically controlled
- ABC-Software system for automatic, optimal and economical drying



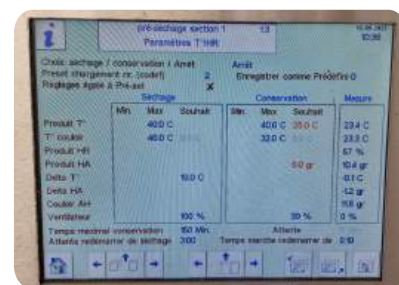
Conditioned airflow per layer of boxes



Boxes stacked 5 high and 8 in front of each other



Easy to fill, transport, stack, and empty with grab or forklift



Automatic drying programs for convenience and consistent drying results

KEY POINTS

- Large drying capacity in a minimal space
- Customizable capacity per box and overall installation
- Modular configuration for tailored setup
- Controlled airflow and heating ensure optimal drying
- Energy-efficient design for cost-effective operation
- User-friendly for ease of use

DRYING INSTALLATION WITH INDIVIDUAL BOXES

- Comprehensive drying solution for preserving optimal quality
- Precise control of drying process for each box
- Minimal energy consumption through efficient heating and ventilation usage
- Variable heating based on radiators with buffer tanks, option for dehumidified air
- Variable high-pressure fans, controllable per box
- Software system for automatic, optimal and economical drying



The amount of box places is based on your drying needs. Along with the box size.



Precise ventilation and heating per box



Humidity & Temperature measurement per box place



ABC software. Automatically controlled per box based on sensors

KEY POINTS

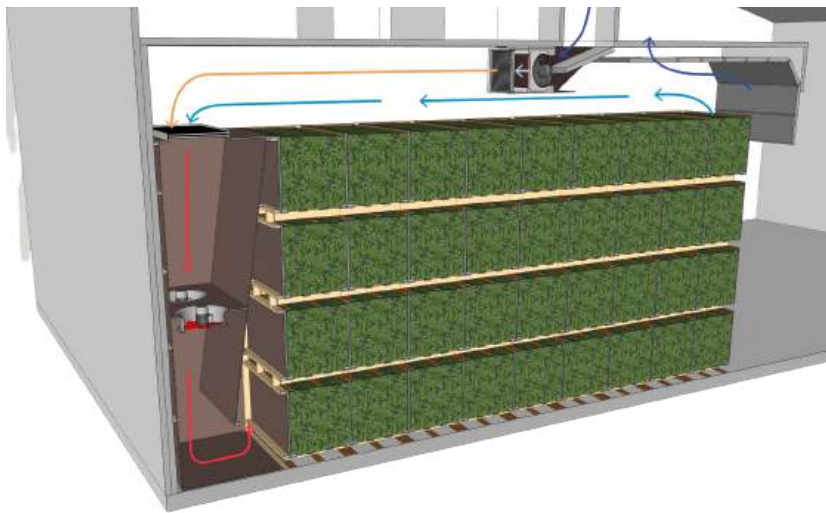
- Quickly start drying after harvest
- Optimal air flow and heating for perfect drying
- High drying capacity at low temperatures with addition of dried air
- Efficient use of energy for energy-efficient drying
- Ease of use

THE DRYING & RETTING CELL

In regions with high humidity levels or for products requiring low-temperature drying or retting, the box installation is placed within a specialized cell structure. This cell can be conditioned to the specific environment needed for processing each hemp component.

Conditioned cells

- Overhead doors facilitate optimal use of cell capacity. The layout and design of the cells with boxes are client-specific. We will advise you.
- Depending on the harvest schedule, the layout and measurements of the cells are determined.

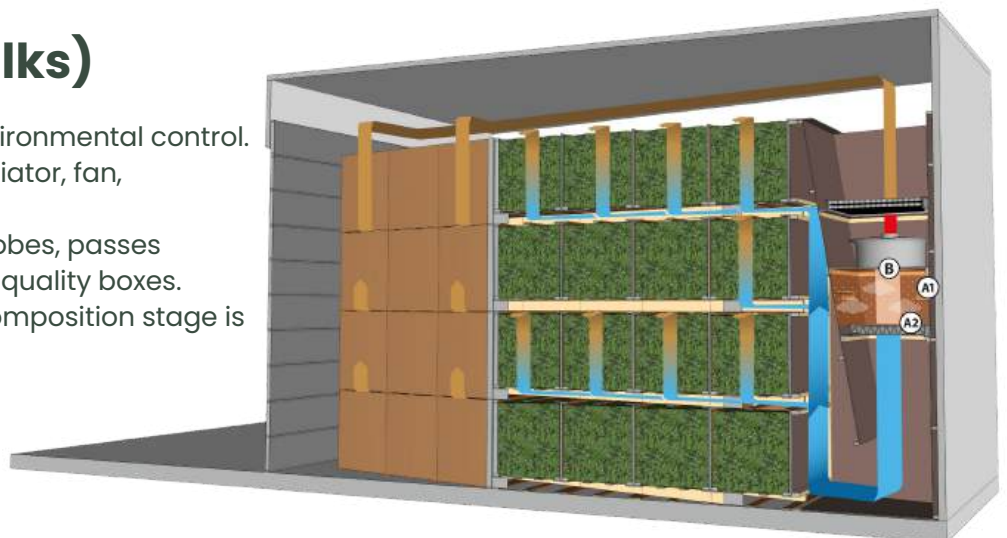


Drying cell (for flowers)

- A cooling block within the cell draws outside air inside.
- The air is cooled to reach the desired moisture content.
- Heating batteries above the fan raise the air temperature per row.
- This process lowers the air's relative humidity to absorb moisture from the product.

Retting cell (for stalks)

- Closed cell ensures precise environmental control.
- Retting installation includes radiator, fan, moisturizing nozzles, and filter.
- Airflow, optimal for retting microbes, passes through parallel hemp stalks in quality boxes.
- Retting halts once desired decomposition stage is reached, followed by drying.



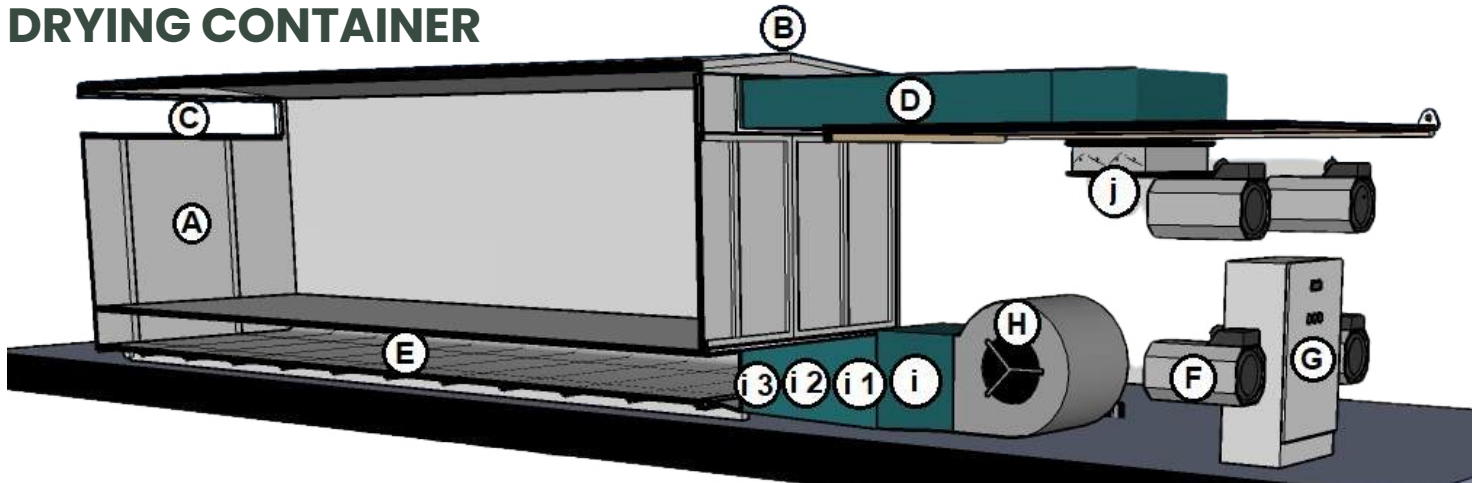
KEY POINTS

- Optimally designed for your space and production capacity.
- Closed environment within the cell.
- High-quality components for superior end products.
- Efficient energy use and retention within the cell.
- Conditions tailored to the product's needs.
- Dry, cool air for drying hemp flowers; humid, warm air for retting hemp stalks.

THE DRYING & RETTING CONTAINER

As a stand-alone unit or connected with other containers the Hemp-drying.com bulk container provides an energy-efficient and practical solution for drying hemp products and retting the hemp stalk in bulk. Each container has a capacity of **35m³** of bulk material.

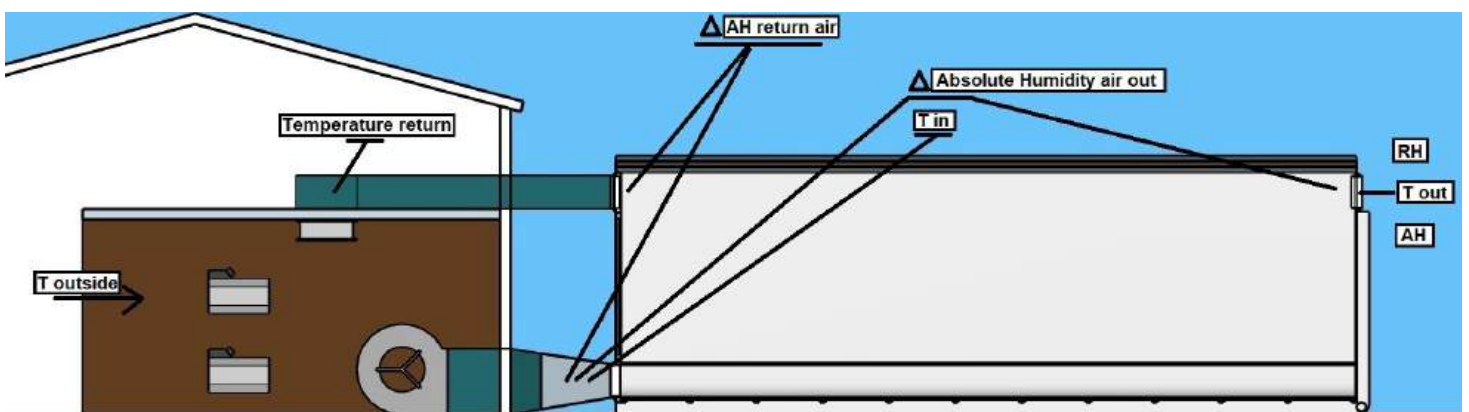
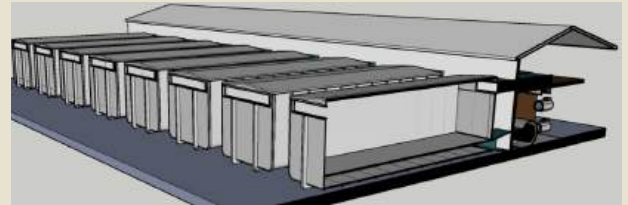
DRYING CONTAINER



- A:** Drying container
- B:** Opening roof lids for filling and unloading
- C:** Outlet moist air with control valve
- D:** Returning air for stabilizing drying or damp air for retting
- E:** Double bottom for dispersion air
- F:** (Bio)Gas heater/burner, radiator, or heat pump system

- G:** Control box
- H:** Ventilator
- i:** Inlet air to container
 - **i1:** Humidifying unit
 - **i2:** Filter
 - **i3:** Inlet retting microbes
- J:** Return channel for air

An installation can be just one container, but can also be composed of multiple connected containers.



To regulate the process with our ABC-software, sensors measure the incoming outside air, ingoing air, outgoing air and returning air. Three sensors measure humidity to determine the absolute humidity (AH) and relative humidity (RH). Using these values, the ABC-software regulates automatically whether air is removed, or air is returned for energy savings.

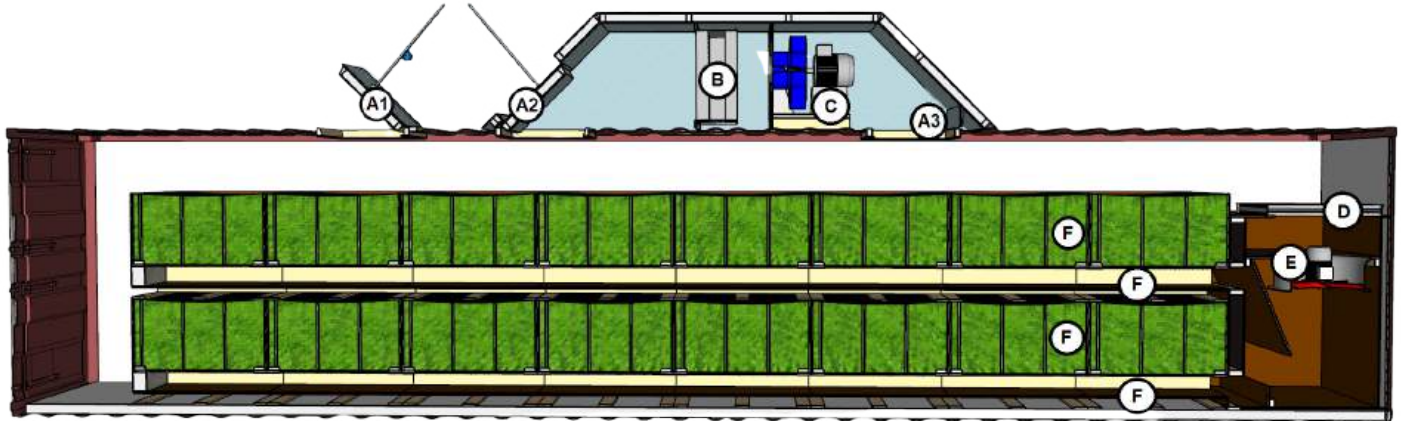
KEY POINTS

- Capacity up to 35m³ of bulk material
- Easy harvesting directly into the container
- Full environmental control with open or closed air circulation
- Controlled, automatic drying (or retting) with efficient energy use

THE CONDITIONED CONTAINER

A 40 feet container provides a large drying capacity within an enclosed environment which can be placed at a location at your convenience. The boxes are made from water-resistant plywood and can be open for bulk drying or divided with drawers. This provides up to **24m³** drying capacity.

CONDITIONED DRYING CONTAINER



A: Valves for regulation of airflow

A1: Valve for discharging saturated humid air

A2: Valve for recirculation of inside air; or when (partially) closed for introduction of outside air

A3: Valve for inlet conditioned air

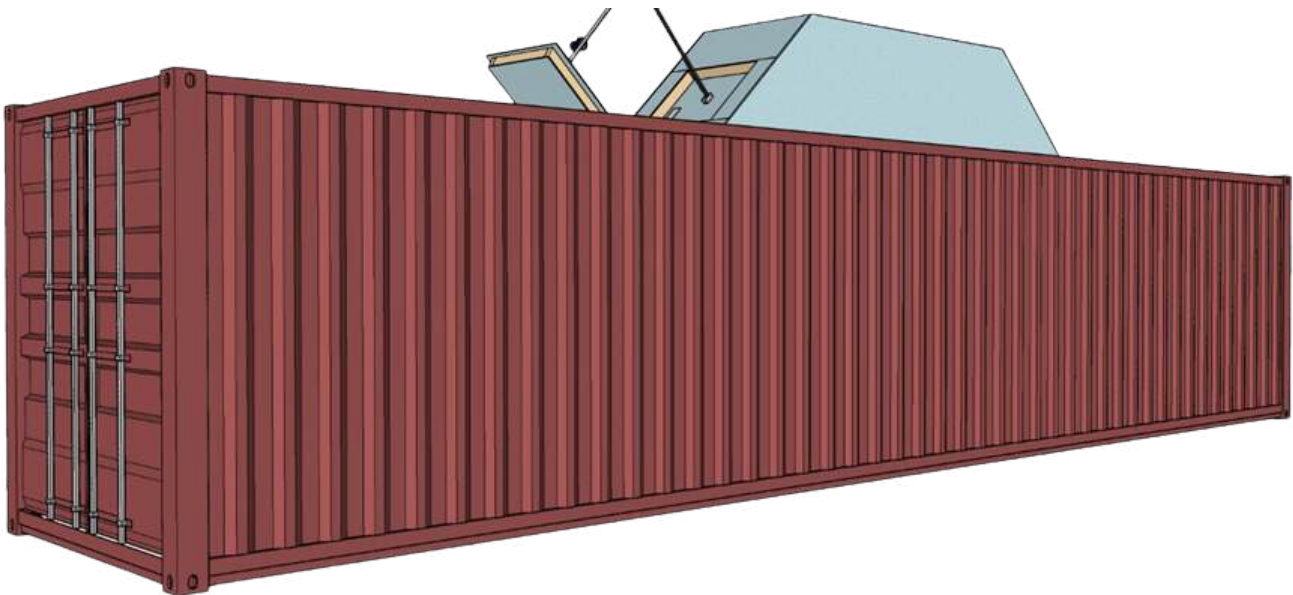
B: Cooling block for conditioning air to remove moisture by condensation

C: Ventilator sucking airflow through the cooling block

D: Heating block for conditioning air to increase drying capacity by heating air (maximum 20°C)

E: Ventilator for creation of airflow through the heating block and to the box pallets

F: Plenum for airflow to the boxes, upwards and through the product



When industrial hemp requires a more gentle, yet effective drying process, drying with dehumidified air is a perfect solution.

For example, to retain the cannabinoids and terpenes in the hemp flowers, or to dry hemp seeds for optimum quality.

A container installation conditioned using a heat pump and a heat and cooling block can create a large drying capacity at low temperatures ($\approx 20^\circ\text{C}$).

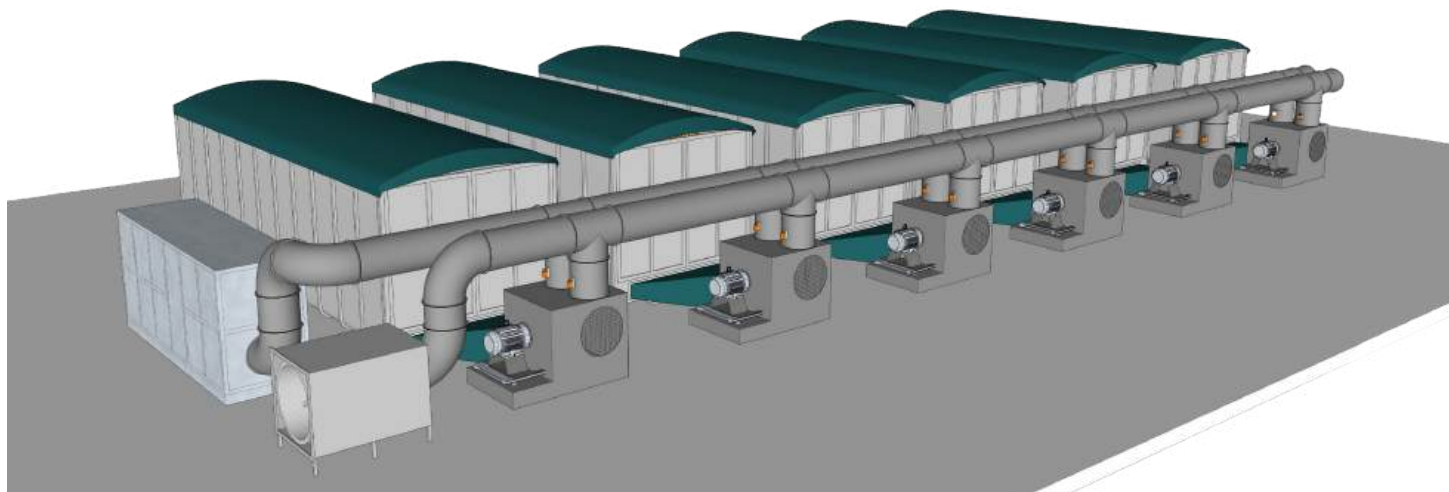
KEY POINTS

- Stand-alone installation for high-quality, low-temperature drying
- 24m³ drying capacity with 16 boxes
- Convenient placement, portable with adaptations
- Long-term savings and improved quality via hybrid heat pump
- Automatic control by ABC software

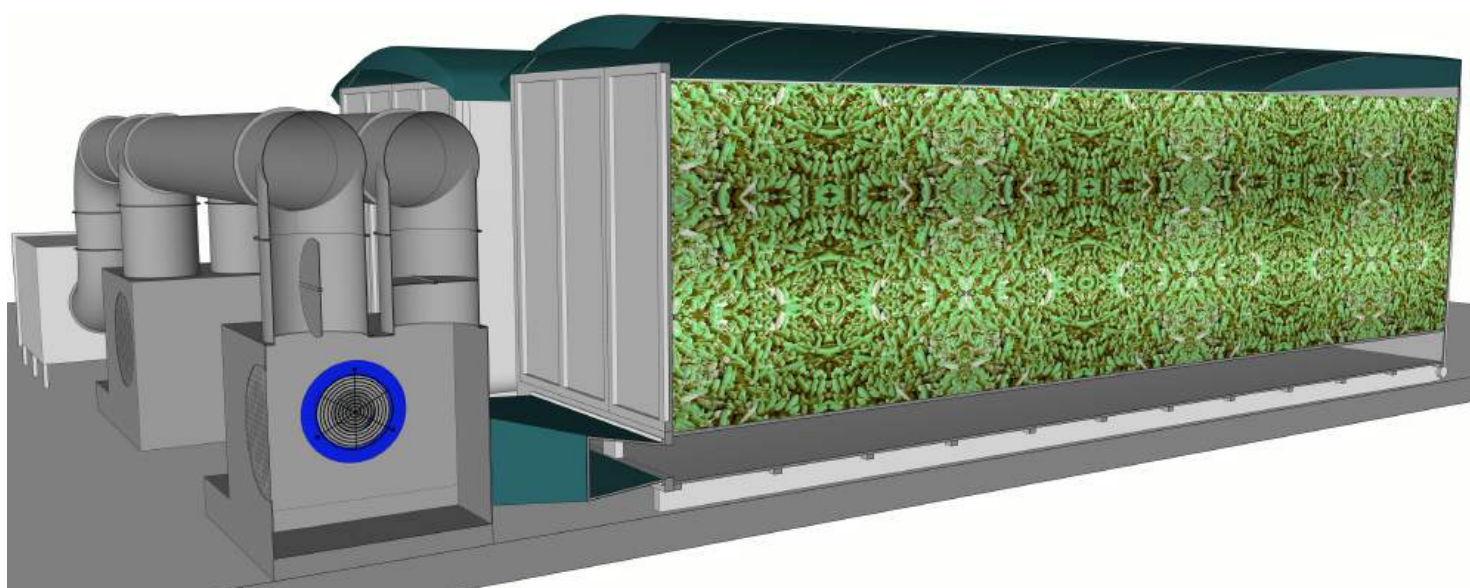
BULK CONTAINER DRYING

- A 40 feet container provides a large drying capacity within an enclosed environment.
- Fixed air distribution facility
- Containers are portable and can be used for harvesting
- Biomass can be deposited in the container at harvest and transported to the air distribution facility

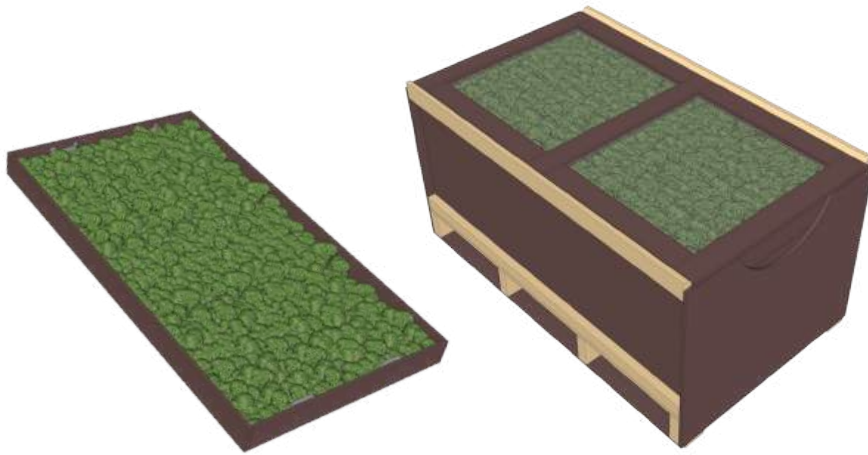
Bulk Drying Containers



When drying in bulk is required at a large scale we can offer our cascading bulk container drying setup. The biomass is deposited into the container. A double bottom ensures bottom up airflow through the product. Different heating sources are applicable depending on the clients demands.



Single Drying Box



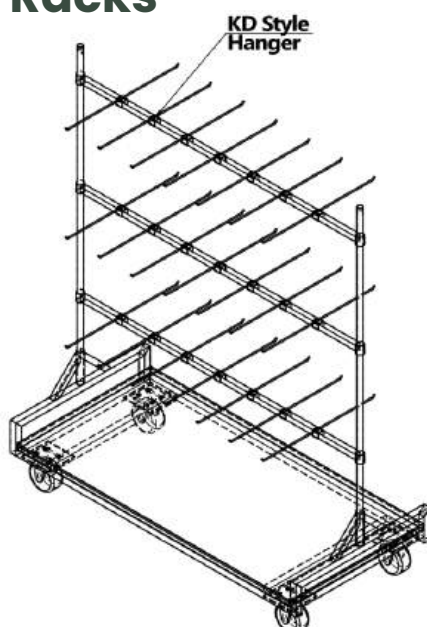
- Drying capacity of approximately 150kg wet flowers within a plug and play box.
- Including high-pressure ventilator and electrical heater
- Portable and easy to use
- Trays dividing the flowers and homogeneous drying results
- Size: 2 meter wide, 1.19 meter deep, and 1 meter high

Drying Table

- Drying capacity of approximately 45kg wet flowers within a filtered environment.
- Including a high-pressure ventilator
- Flowers placed in food-safe plastic trays
- Drying table with 2 HEPA filters ensuring drying without the risk of contaminants
- Possible with electrical heater
- Ideal for placing in the 'hang drying' container
- Size: 0.81 meter wide, 0.61 meter deep x 1.65 meter high



Drying Racks



- Drying capacity of approximately 22kg wet flowers on a drying rack.
- For use in the hang drying container
- Portable and easy to use
- Bottom-up airflow equally distributed amongst the plants
- Size: 1.51 meter wide, 0.71 meter deep, and 1.85 meter high
- Space for 21 to 23 drying racks, equalling 462kg to 506kg of wet flowers


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