

Example Standard Operating Procedure (SOP)

SOP Title: Using ZONE Sensors for Hang Drying Cannabis

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1. Purpose

The purpose of this SOP is to standardize the use of ZONE Sensors during a cannabis hang dry, ensuring consistent product quality and compliance with regulatory requirements. It describes how to fragment a large harvest of multiple cannabis strains into different batches for separate monitoring via the ZONE dashboard.

2. Scope

This SOP applies to all personnel involved in cannabis drying operations using the hang dry method with ZONE Sensors to monitor plant moisture and environmental conditions

3. Definitions

- **Hang Dry Method:** A method for drying cannabis in which the harvest plants or branches are hung upside down on a line or hanger.
- **ZONE Sensors:** Growvera wireless sensors used to monitor plant moisture and environmental conditions and during the drying process.
- **ZONE Dashboard:** Online dashboard where all ZONE sensor data is reported and organized on a per-dry basis. May be accessed via app.growvera.com
- **ZONE Space:** Digital representation of a cannabis drying space found on the ZONE dashboard for which acceptable temperature and humidity ranges are set.

- **ZONE Strain:** Digital representation of a cannabis strain found on the ZONE dashboard for which a target moisture content is set.
- **ZONE Dry:** A collection of plant moisture, temperature, and humidity data for a strain and space found on the ZONE dashboard.

4. Responsibilities

- **Operators:** Responsible for following the SOP and correctly using the ZONE Sensors and dashboard.
- **Supervisors:** Ensure compliance with the SOP and review ZONE dry data and quality control checks.
- **Quality Assurance:** Validates the procedure and ensures product quality standards are met.

5. Equipment and Materials

- ZONE Sensor Packs
- ZONE Gateways
- An ethernet cable per ZONE gateway
- A water activity meter or moisture balance for quality control
- Preferred Drying Equipment
- Personal Protective Equipment (PPE)
- A computer or large tablet for using the ZONE dashboard

6. Procedure

Initial Setup

1. **Setup Strains and Spaces on ZONE dashboard**
 - a. Login using your credentials via app.growvera.com
 - b. Navigate to the *Settings* tab.
 - c. Using the *Create Strain* button, set up the strains by specifying
 - i. Name
 - ii. Target moisture content.
 - d. Using the *Create Space* button, set up the drying spaces by specifying
 - i. Name
 - ii. Acceptable temperature range
 - iii. Acceptable humidity range

2. **Set Up Gateways**

For each of the ZONE gateways included in your deployment

- a. Position the gateway either within or close to the drying spaces. Monitoring multiple drying spaces with a single gateway is possible so long as the drying spaces are not too far apart.
- b. Plug in the gateway using the power cable

- c. Connect the gateway to the internet using an ethernet cable
- d. Wait for the gateway to indicate it is connected
 - i. Holding the gateway so that the antenna is facing to the right, the left and center LED indicators should be showing solid green.
- e. Ensure the gateway is connected using the ZONE dashboard.
 - i. Login to the dashboard using your credentials on via app.growvera.com
 - ii. Navigate to the *Settings* tab.
 - iii. Under the gateway section, ensure the gateway is connected

Assess the Harvest

1. **Gather information**
 - a. Number of Strains
 - b. Volume of each particular strain
 - c. Number of drying spaces
2. **Designate Drying Batches**

Create batches of cannabis plants for drying based on.

 - a. Which strain they are
 - b. The volume of the strain
 - c. Which drying space they are to be dried in.

Set Up Drying Batches for ZONE Monitoring

For each of the drying batches to be monitored, repeat the following

1. **Retrieve ZONE Sensor Packs from Storage**
2. **Create a Dry on ZONE Dashboard**
 - a. Login using your credentials via app.growvera.com
 - b. Create the Dry
 - i. Click the *Add New Dry* button under the *Home* tab
 - ii. Give the dry a name
 - iii. Select the strain.
 - iv. Select the space that the cannabis is being dried in.
 - v. Check that the imported moisture, temperature, and humidity configurations are satisfactory before clicking *Create New Dry*.
 - vi. Ensure the dry appears in the *Pending Dries* section under the *Home* tab.
3. **Assign Sensor Packs to Dry**
 - a. Click on a *Pending Dry*
 - b. Assign the sensor packs that you want to use via the drop down menu
 - c. Click *Next* after the packs have been selected
4. **Allocate resources for the Drying Batch**

Organize the assigned sensor packs with the other necessary equipment, such as drying racks.

Load Cannabis Batches and Begin Data Collection

For each of the drying batches to be monitored, repeat the following

1. **Attach Assigned Sensors to the Cannabis**

For all sensors in the assigned sensor packs, repeat the following

- a. Select a plant
 - b. Attach a single ZONE sensor to the plant and ensure proper connection
 - i. Remove an individual ZONE sensor from the sensor pack
 - ii. Press the button on the front of the sensor, the sensor will begin to blink its LED indicator red.
 - iii. **Attach the sensor on the main stem of the cannabis as close to the head cola as possible.** Do this by ensuring the sharp electrodes puncture the stem.
 - iv. Ensure the sensor LED indicator is blinking green. This indicates that proper connection to the plant has been established.
 - v. If the indicator ceases to blink, push the button to restart the indicator.
2. **Load the Batch and Distribute Sensors Throughout Space**
As you load the batch of cannabis into the drying space, distribute the plants with the sensors attached throughout the space. Aim for an even distribution in height and spacing.
3. **Start the Dry Data Collection on the ZONE Dashboard**
- a. Login to the dashboard using your credentials via app.growvera.com
 - b. Select the *Pending Dry* you would like to start.
 - c. Click the *Next Button*.
 - d. Take a moment to ensure that the sensor packs assigned to the dry are correct.
 - e. Click the *Start Dry* button on the bottom of the dry page.

Drying Process

1. **Monitoring**

At least once a day, check the ongoing dry data to ensure that the trends are what you expect.

2. **Responding to Alerts**

During the drying process, if ZONE sends you an alert, respond in the following ways

- a. **Temperature/Humidity Alert:** Adjust the drying environment as needed to maintain optimal conditions or update the acceptable temperature and humidity ranges.
- b. **Gateway Offline Alerts:** Ensure the gateway is powered and is connected to the internet so that sensor data can be captured. Failure to do so will result in no sensor data being captured. Contact Growvera Support if the problem persists.
- c. **Sensor Offline Alerts:** If the majority of the sensors in an assigned sensor pack are offline, ensure that the gateway is properly connected and nearby the drying room. Sensors will re-establish connection. Contact Growvera Support if the problem persists.
- d. **Moisture Alert:** The moisture target you set has been reached. Do a quality check to ensure the plant material is to your liking. If the plant material is still too

moist for your liking, edit the target moisture content via the pencil icon to target a new percentage instead.

3. **Final Quality Check**

Once the cannabis is dried to your liking, perform a final quality check using a different instrument for water activity or moisture.

Use the results as a benchmark for the next time a dry cycle with this strain is performed.

4. **Stop the Dry Data Collection**

- a. Login to the dashboard using your credentials via app.growvera.com
- b. Select the dry that is to be stopped in the *Ongoing Dries* section.
- c. Click the *Stop Dry* button at the bottom of the dry page and click *Yes* when prompted that you would like to end the dry.
- d. Ensure that the stopped dry appears in the *Completed Dries* section after a few seconds.

Post-Drying

1. **Unloading and Removing Sensors**

Once the drying cycle is complete, unload the cannabis. As you unload the cannabis, remove the sensors attached to the stems and place them back into their sensor packs. The 5 digit number printed on the sensor corresponds to the pack number.

2. **Clean the Sensors and the Drying Space**

- a. Using an alcohol wipe or an alcohol spray bottle and a rag, spray and wipe the electrodes and the plastic surrounding the electrodes on the sensors.
- b. **Do not soak the sensors or wash them.**
- c. Clean any equipment used during the drying process.
- d. Sanitize the room prior to next use.

8. Documentation

All past dry data is stored under the *Completed* tab on the ZONE dashboard.

Maintain records of:

- Final product quality assessments
- Adjustments made during the drying process

Report any of the following to the Growvera Support Team:

- Misbehaving or permanently offline sensors
- Gateways with unstable connection.
- Erratic dry data or unclear results