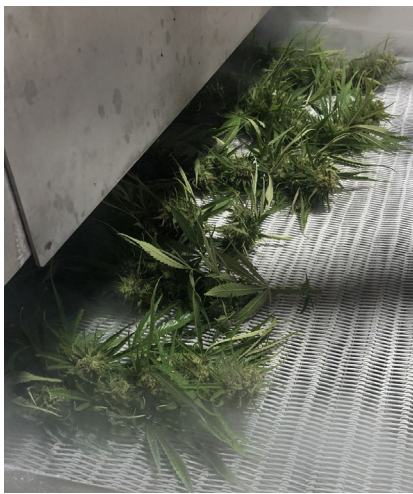


Flash Freezing Industrial Hemp



Prevent biomass degradation or mold while locking in the plant's rich chemical content



Freezing industrial hemp using a cryogenic liquid-nitrogen system can offer a cost-effective, faster alternative to traditional methods of drying and storing. Plus flash freezing retains more of the valuable cannabinoid compounds in the hemp product.

Due to liquid nitrogen's extremely cold temperature, it can cool a process or freeze products like food or hemp within minutes instead of the hours required with more traditional methods like mechanical freezing. The major benefits of cryogenic freezing are speed and controlled cooling. This consistent, repeatable temperature control enables the process standardization needed to help meet compliance requirements for Good Manufacturing Practice guidelines and other required measures.

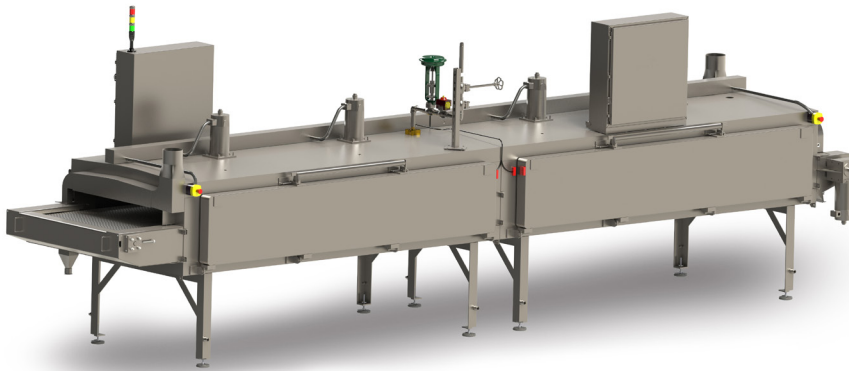
Freezing versus drying hemp before storage

In the harvesting process, it is critical to preserve the plant's sensitive chemical compounds such as CBD and terpenes. Preserving hemp directly after cutting can take days or weeks using conventional drying methods such as air/hang-drying or mechanical drying. Drying also requires large storage space requirements during that lengthy process. Contamination from mold or other material changes resulting from these drying techniques may decrease the value of the crop due to loss of valuable compounds or other issues.

Liquid nitrogen can be used in a cryogenic tunnel freezer to quickly freeze hemp immediately after harvesting. Freezing hemp in minutes can help prevent mold formation and lock in the plant's chemical content. Then the hemp is stored frozen to prevent degradation until it is ready for processing. This results in quality and preservation benefits. In addition, freezing allows further biomass handling without smearing the oil-containing trichomes.

Low temperature freezing also promotes the formation of much smaller ice crystals, which causes less damage to a plant's cellular structure. This benefit has been seen in the food freezing industry, where freezing fragile foods like raspberries or strawberries have benefited from this technique.

Cost-effective hemp freezing technologies



Air Products Freshline® freezing solutions includes equipment and industrial gases designed for a variety of batch or continuous freezing processes. You'll find that their innovative design makes them easy to clean, saving you both downtime and labor costs.

The **Freshline IQ tunnel freezer** is a proven workhorse for the food and pharmaceutical industries. It is finding similar success in hemp processing by providing quick, thorough freezing with a low-initial capital expenditure. Based on ten-foot modular units, it is easily expandable on-site to grow with production needs.

The cryogenic injection system and the specially designed internal fans efficiently disperse the vaporized cryogen throughout the tunnel. This means the shortest possible freezer; thus, no wasted floor space and minimized operating costs. Additionally, it is easy to clean. A belt and table cleaning system is fitted on both ends.

Take the guess work out of your hemp processing.

Our team of experts can review your process and help you identify opportunities where industrial gases, such as CO₂ or liquid nitrogen, can enhance product quality and shelf-life, increase productivity, and improve safety. We have a state-of-the-art applications lab to test your product, or we can visit your site for field testing.

Benefits of freezing hemp with Freshline IQ freezer

- Higher yield of desirable compounds (i.e. CBD oils) than traditional drying
- Better ability to preserve other valuable compounds like terpenes
- Significantly faster than traditional drying
- Allows for long term cold storage to prevent product degradation
- Modular field expandable design
- Easy to clean
- Simple to maintain and operate



Freeze. Liquid Nitrogen can protect your hemp harvest.

Sales will only be made to customers who can show compliance with applicable state and federal laws and regulations.

**Put our experts to the test.
Contact us to discuss your needs.**

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