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Tissue Bank Freeze Drying, What's the difference?

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Millrock Technology provides turnkey lyophilization systems to meet a wide range of Tissue Banking applications. We hope that you find this brief overview of Tissue-Bank-Freeze-Drying helpful as a starting point to discuss your needs with us.

Choosing the right freeze dryer for tissue freeze drying can seem daunting without proper consultative guidance. **Fig 1**. shows a very wide variety of Millrock Technologies lyophilization systems used for tissue and collagen freeze drying applications. With the right consultative approach from Millrock Technology, we will turn a seemingly complex choice into a straightforward logical decision.

Fig 1.

Lyophilization systems have a range of configurations for different materials; programmability, shelf configuration, operational parameters and size. Choosing the right instrument for specific collagen or Tissue Banking applications is part of the needs assessment and service we provide to our customers.

Three basic challenges in choosing the right freeze dryer for Collagen or Tissue-Bank-Freeze-Drying are 1) the container or "Tissue Carrier" used to hold the material during lyophilization, 2) The surface area vs. water / solvent content and, 3) The handling of biological material.

The Tissue Container

Freeze Dryers used for pharmaceutical applications are usually not designed for Tissue-Bank-Freeze-Drying as these systems are often built to accommodate glass vials. Tissue Banking regularly uses either plastic or steel containers, presenting challenges to the process of freeze drying that are best addressed in the overall design of the lyophilizer.

If possible, the Tissue Carrier should be of stainless-steel construction, made to allow for direct and uniform contact with the lyophilizer shelf. Plastic trays are usable but can make heat transfer from the

lyophilizer shelf more difficult, resulting in more complex considerations for optimal freezing and sublimation.

Surface Area vs. Water / Solvent Content

Freeze-drying methods for collagen and tissue vary by application resulting in numerous freeze-drying equipment considerations. Collagen, with its high-water content involve considerations regarding condensing rate whereas tissue freeze-drying typically involve shelf surface area considerations.

Shelf Size and Spacing for the Tissue Carrier?

- Applications, where materials are very thin may work best in a chamber with close shelves [Fig. 3]
- Applications for large containers or thicker material require wider shelf space distances [Fig. 4]

Millrock Technology designs and manufactures Freeze Dryers to meet almost any chamber / shelf configuration need.

Fig. 3 Example
15 closely spaced shelves
for thin material

Fig. 4 Example
4 shelves with 6” spacing
for large containers or thick material

Condenser Temperature -53C or -85C?

While a condenser temperature of -53C will work when only H2O is being removed, most of our tissue applications are best processed using -85C condenser temperature as solvents used have trouble freezing at -50C.

Instrumentation: Vacuum Sensing, Pirani or Capacitance Manometer?

The short answer regarding the type of instrumentation to use is to include the same vacuum sensor in production as was used in protocol development. Typically, in pharmaceutical applications, a Capacitance Manometer is required as it gives the absolute vacuum reading in contrast to Pirani, which is affected by moisture content and changes during the process.

This is not to say that the Capacitance Manometer is necessary for Collagen or Tissue Banking applications. A Capacitance Manometer is not required for many tissue applications and a discussion about your unique application will dictate its requirement.

Castor Mounted or Wall Mounted?

Depending on your need, Millrock Technology manufactures both free-standing castor mounted freeze dryers [fig. 4] and wall mounted for clean rooms [fig. 5]. (Other custom mounting options are also available.)

Fig. 4
Millrock Technology
castor mounted

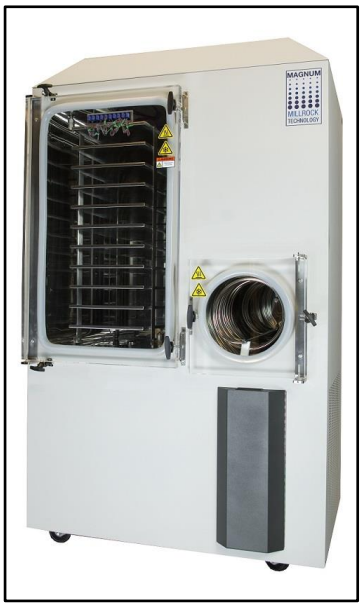

Fig. 5
Millrock Technology
wall mounted for clean room

Sterilization Options?

Tissue Banking often uses a post-process method for sterilization, such as gamma radiation, thereby eliminating the need to sterilize the freeze-dyer prior to each run. If your product requires the lyophilizer to be sterilized before process, the equipment can be designed to accept a vaporized hydrogen peroxide generator. When hydrogen peroxide is used, the chamber must have a stainless-steel door. SIP (Steam In Place) systems are also available from Millrock Technology. SIP can add greatly to the overall cost of the system.

Please give us a phone call and discuss your unique needs with us. You can rely on us to have the experience to specify and propose the perfect Tissue Bank Freeze Dryer.

“Trust the Rock”

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