

Tech Guide #5

Filling a Freezer With a Low Pressure Supply Line

Some Issues and Concerns

June 8, 2009

When filling your CBS Isothermal Freezer it is very important to have the proper supply tank pressure

1. The recommended supply tank pressure is approximately 22 psi (1.5 bar). Tank pressure lower than this may result in extended fill times, excessive liquid nitrogen use and possible liquid nitrogen loss in your freezer which could result in sample damage or loss.
2. Try to maintain a minimal distance between the supply tank and the freezer. CBS recommends 4 feet (1.22 m) to 6 feet (1.83 m).
3. Liquid nitrogen transfer lines longer than 6 feet (182 cm) may evaporate excessive liquid nitrogen during the transfer process. An insulated supply line may reduce evaporation.
4. The supply line should be as straight as possible with minimal bends. A horizontal supply line is most efficient.
5. A good quality pressure gauge (with a range from 0-50 psi, 0-3.44 bar) on the supply tank to measure pressure will assure normal freezer operation.

How do I transfer LN2 from my supply cylinders or bulk storage tank to my CBS freezer?

LN2 can be transferred several ways. You can use a flexible stainless steel transfer hose, foam insulated pipe, flexible vacuum-jacketed hose, rigid vacuum-jacketed pipe, or a combination of these means. Stainless steel flexible transfer hose is usually used in short lengths of less than 10 feet (3 meters).

Rigid vacuum-jacketed pipe and vacuum-jacketed hose are the most efficient means of transferring LN2. Large, permanent installations frequently use vacuum-jacketed pipe for their main LN2 transfer system.

In some applications a foam insulated copper supply line may be adequate depending on the frequency of use and distance.

Vacuum insulated LN2 supply line

➤ Outer Pipe

➤ Vacuum Space

➤ Inner Pipe



Vacuum insulated pipe, also referred to as vacuum jacketed pipe, is constructed of an inner and outer pipe. The inner pipe, which carries the cryogenic liquid, is wrapped with multiple layers of super-insulation consisting of alternating layers of a radiant heat barrier material and a non-conductive spacer material. The air in the space between the two lines is pumped out, creating a static vacuum shield. The vacuum space contains getter materials to collect out-gassed molecules to further improve the vacuum.

The thermal barrier between the inner and outer lines is so effective that even with -196 C liquid nitrogen flowing through the pipe, the outer surface remains safe to touch with bare hands.

Low Pressure Fill

(some issues and concerns)

When the supply tank pressure is too low, below 10 psi (.689 bar) the following may occur.

As the liquid nitrogen flows at a very low pressure and therefore a low speed, the liquid nitrogen could actually evaporate before it reaches the freezer.

As this evaporation occurs it is sending nitrogen gas in to the freezer. As the warmer nitrogen gas enters the freezer and comes in to contact with the existing liquid nitrogen in the freezer this liquid nitrogen also begins to evaporate.

If this evaporation continues unchecked it could eventually lead to the depletion of the liquid nitrogen in your freezer, the supply tank and the possible loss of your inventory (samples).

Low pressure filling will cause ice buildup around the lid and on the outside of the freezer and a large amount of liquid nitrogen will be wasted.

Liquid Level Filling Set Points

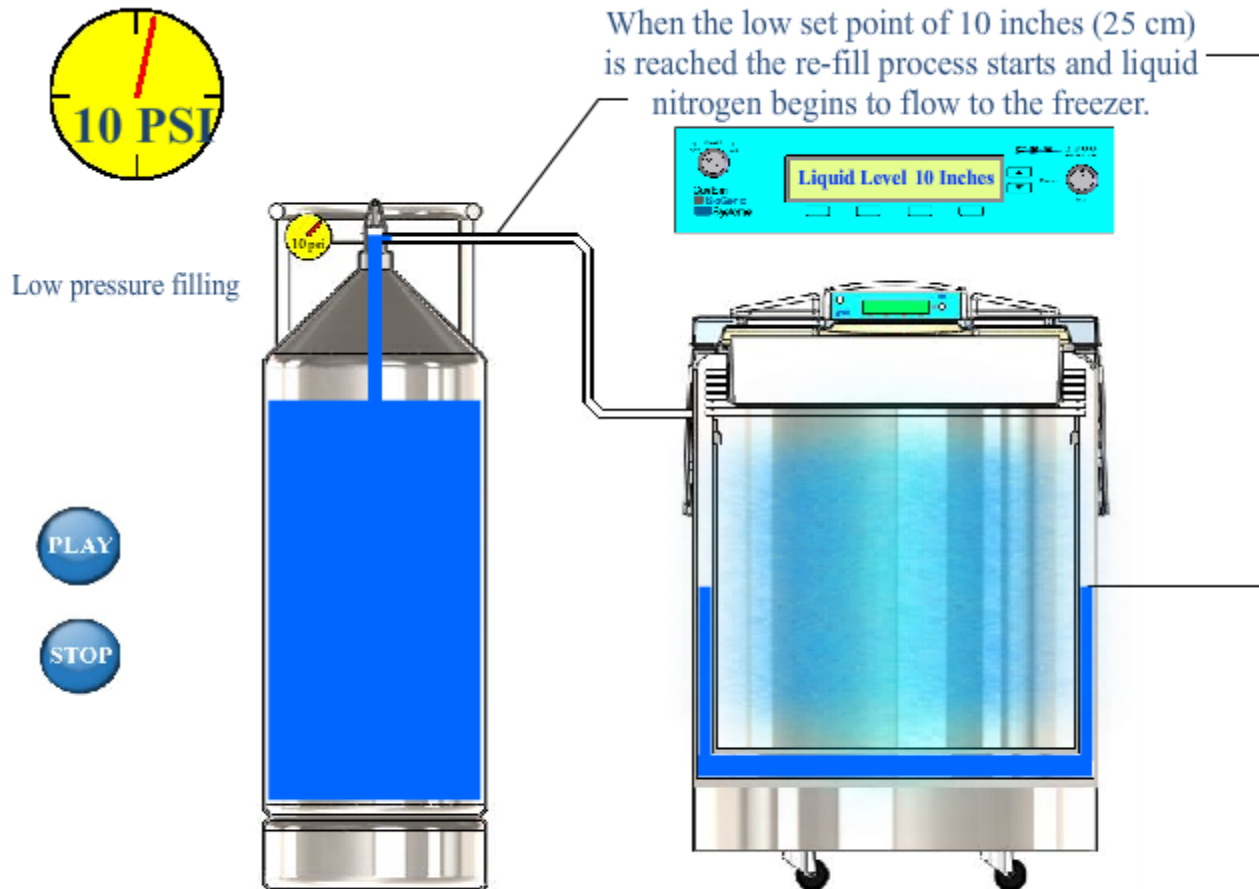
Your CBS Isothermal Freezer is delivered with factory pre-set liquid level filling set points.



- The low set point (start fill) should be set at 10 inches (25 cm).
- The high set point (stop fill) should be set at 17 inches (43 cm).

These filling set points will provide excellent operating parameters. However, they can be changed to suit your specific requirements.

Click the [play](#) button below to view a low pressure re-fill animation.



Filling Details

The amount of time required to re-fill a freezer with liquid nitrogen will vary with model. Listed below are the estimated fill times for each CBS Isothermal Freezer.

- V1500 – approximately 10 minutes
- V3000 – approximately 15 minutes
- V5000 – approximately 15 minutes
- V5000 EH – approximately 15 minutes

When re-filling your freezer the proper supply tank pressure should be 22 psi (1.5 bar) approximate. If the supply tank pressure is lower than the recommended 22 psi (1.5 bar) you may experience extended fill times, excessive liquid nitrogen usage, ice buildup on the outside of the freezer and possible liquid loss. Liquid loss may result in sample damage or loss.

Thank you for choosing Custom BioGenic Systems

For more information please visit www.custombiogenics.com

or contact us at

Custom BioGenic Systems

150 Shafer Drive

Romeo, Michigan 48065

Tel: 1-800-523-0072 (US Only)

Tel: 1-586-331-2600

Fax 1-586-331-2588