

TECHNICAL NOTE



SPI Supplies
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SPI Supplies Liquid Nitrogen Dewars

Introduction

These dewars are designed for storing and dispensing small quantities of liquid nitrogen. Easy to operate, the snap on cap and necktube core assure positive closure and easy access without unnecessary exposures to the cryogen. Constructed from materials of the highest performance and quality including an aluminum exterior, these containers are not only rugged, robust, and dependable, but also have very high thermal efficiencies. When using liquid nitrogen, be sure to use the highest quality cryogloves that can be found anywhere. And for those wanting to keep prepared in the event of a surprise visit by the safety committee, don't forget the often overlooked fact that there is an MSDS for liquid nitrogen. While liquid nitrogen is often times belittled in terms of its real hazards, no mistake should be made about it, one can sustain very serious injuries if not handled properly. Before using any dewar, be it purchased from SPI Supplies or elsewhere, make sure you are familiar with the guidelines and recommendations for safe handling.

Other safety issues when using liquid nitrogen

We have been told by safety experts that nitrogen, as inert as it is, causes more fatalities than any other chemical in the laboratory. When someone is encased in a purely nitrogen atmosphere, oxygen flow is reversed from arterial blood and tissues back into the lungs and loss of consciousness follows within seconds. We have heard of incidents at plants,

for example one individual was working on top of a reactor, leaned over, got a blast of pure nitrogen, and pitched forward into the vessel unconscious.



Figure 1: Image of. SPI Liquid Nitrogen Dewars

In the laboratory, a similar event can occur when working with liquid nitrogen since the cold vapor concentrates at floor level, and a technician leaning down into this cloud can be overcome. Another too common mistake is to ride on a freight elevator with the container when transporting liquid nitrogen between floors (elevators should have warning signs posted to strictly prohibit this practice). The staff must also be trained to overcome their natural instinct to rush to assist an unconscious coworker since over half of workers who die in confined spaces are attempting to rescue other workers. Since nitrogen constitutes about 78% of the air that we breathe, it is easy to become complacent and to underestimate its dangers. If you use nitrogen in your lab, safe handling of this dangerous gas

should be an annual topic for a safety meeting to remind the staff of the risks.

Construction of the dewars offered by SPI Supplies

These dewars are of all metal construction and are glass-free. Those dewars that contain glass are much more fragile and less robust than the dewars described on this webpage.

Pressurized vs. Non-pressurized Dewars:

Always remember that there are two different ways to store liquid nitrogen. First, there are dewars of the type described on this note, which are vessels that are open to the atmosphere so that the liquid nitrogen becomes a boiling liquid at a pressure of one atmosphere. The other, a pressurized dewar and of a type that is not offered by SPI Supplies, is a closed vessel, where liquid nitrogen becomes a boiling liquid at a temperature determined by the pressure within the vessel. This type of dewar is regulated as pressure vessels, because there is the potential for a substantial pressure to develop within them, and generally they are protected by a pressure relief valve.

One should note however that there is no need to utilize a pressurized vessel for the local moving of the liquid, such as from the master supply tank (or dewar) to some laboratory application.

Also, we should point out that we do offer a liquid nitrogen withdrawal device that allows the boiling liquid to create a small pressure in the dewar, forcing liquid out through a tube; the amount of pressure buildup being controlled by safety valves.

Not for on-the-road use

These dewars are designed, engineered, and manufactured for the transportation and storage of liquid nitrogen within a laboratory facility. They are not designed for shipment of liquid nitrogen or for transportation in a closed vehicle on the road from one location to another. USA customers should note that they do not have a Department of Transportation (USDOT) number.

Special note about the "top"

The dewars (except for the 4 liter size) come with a standard lid, also called the "neck tube core". It is both a mechanical cover for the opening and an insulating cover for the top of the dewar, but it is loose enough for the nitrogen to be able to boil away without pressure buildup. The small 4 liter dewar comes with what is called a "cap". So it is not necessary to purchase an additional one. However, often times customers prefer to order spare neck tube cores or caps because they modify them so that different kinds of samples can be suspended into the dewar and kept at cryo temperatures.

Safety Considerations

Be sure you review the SDS information before using liquid nitrogen. This is a potential very hazardous material, yet often times it is not given the respect it deserves. We believe that risk is greatly reduced and minimized if cryo gloves are used when handling liquid nitrogen.

We also believe that open faced or canvas type shoes should not be worn when working with liquid nitrogen. Often times we hear hypothetical scenarios meant to describe situations where the wearing of canvas (or even open faced) shoes would be safe. But we believe it is much like the argument about automobile seat belts: One can make a sport out of creating scenarios where one might be safer in an accident not wearing seatbelts, but if you want the statistics to be on your side, then you would be wise to wear a seat belt. We believe that the same would be true for

the wearing of non-canvas and non-open-faced shoes, and indeed the best choice of shoes would be OSHA approved safety shoes.

Liquid Withdrawal Device

The SPI Liquid Nitrogen Withdrawal devices work much like a water faucet (water "tap" in some parts of the world). Open the valve, liquid comes out. Close the valve, the flow stops.

The liquid withdrawal device is designed for use with the 25, 35 and 50 liter dewars. It is installed on the top flange of any of these three dewars, using a V-band coupling with an "O" ring seal. The liquid nitrogen is forced out by the pressure build up of evaporating liquid nitrogen into the head space of the dewar. The device comes with a mating flange, about 4.5" diameter, a liquid valve, a fill valve, two small relief valves, a pressure gauge, and of course, the withdrawal tube with a phase separator head. These components are mounted on the flange, the withdrawal tube being mounted on the liquid valve. A flexible transfer hose may be used in lieu of the withdrawal tube.



Figure 2: Image of SPI Liquid Nitrogen Withdrawal devices

Recommended Vacuum Grease

When using the dewars as a "refrigerator" or when the need arises for other reasons, we recommend Apiezon® N Cryogenic High Vacuum Grease, which is both silicone and halogen free.

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