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### Abstract

Withdrawal Equipment includes devices utilized to obtain liquid nitrogen (LN) from a container or dewar. There are several types of withdrawal devices depending on the technology for LN storage and delivery. Less sophisticated devices include dippers, which are long thin steel rods attached to a steel cup. This device is immersed into the dewar to obtain small quantities of liquid nitrogen. Withdrawal tubes with a filter are also available for small quantities of LN. More sophisticated withdrawal devices include faucets with a switch and a LN filter. Withdrawal devices come in different sizes depending on the amount of LN that the dewar can store.

Withdrawal equipment are complimented with many accessories ranging from withdrawal stands in order to pour LN from larger dewars, to filters attached to the withdrawal device that clean the liquid nitrogen. Other accessories include replacement dewar caps and cores for dewars of different sizes that range from 4 to 50 l, dewar dippers for dispensing small quantities of LN, pouring spouts for dewars of all sizes and dewar dippers for dispensing bigger quantities from up to 35 l dewars. The dewar measuring rod is a helpful device that indicates the level of LN in the dewar and is available for the different dewar sizes.

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### Keywords

Withdrawal devices • Dewar • Liquid nitrogen • Dipper

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Withdrawal equipment includes devices to draw LN from a container or dewar. Less sophisticated devices include dippers, long thin steel rods with a steel cup at the bottom end to immerse into the dewar and obtain small quantities of LN. More

sophisticated devices include faucets with a switch and a filter. They come in sizes that depend on the amount of LN the dewar can store.

Accessories range from withdrawal stands that allow pouring LN from larger dewars to filters that clean the LN, replaceable caps with cores, pouring spouts, etc. A measuring rod is a helpful device that indicates the level of LN still in the dewar.

Smaller dewars can be carefully tilted by hand to allow pouring, but larger dewars require stands that can tilt or devices with which to withdraw. Several types of withdrawal devices are on the market; some have stems that reach deep into the container while the outer portion (resembling a lid), has a spout; increased pressure within the container due to the expansion of LN, or manually introduced via a pump, propels the LN from the container through the spout. These devices vary according to sophistication (i.e. incorporating a safety valve and pressure gauge on the device itself), how they attach to the dewar, flow rate through the spout, and necessity to warm up in between uses. Examples of withdrawal devices are shown below.



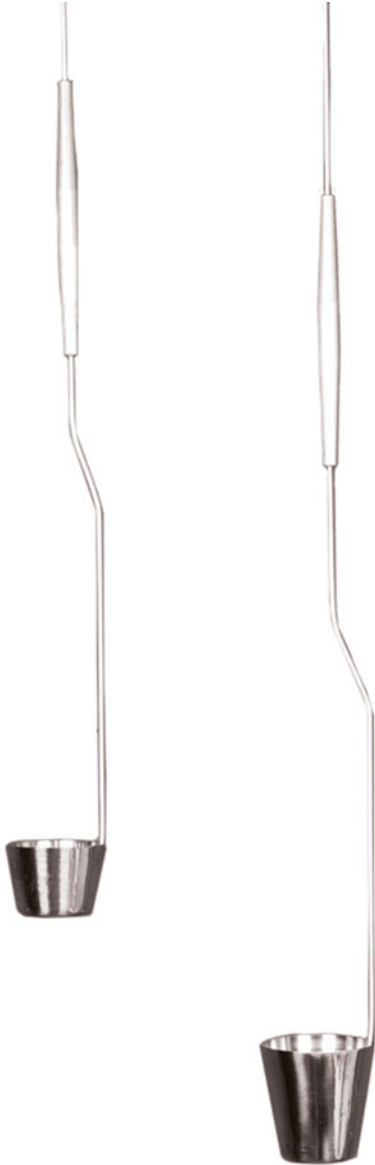
**Fig. 11.1** Withdrawal device for dewars of 20 l and over. (Brymill™): Conveniently fills multiple delivery units at a time. Affixes to the top of the dewar (i.e., is not removed after each use), has a simple on/off switch, and works like a faucet. Includes a filter that helps clean the LN before it is withdrawn



**Fig. 11.2** Withdrawal tube for dewars of 5–20 l. (Brymill™): Simple and efficient way to extract LN from a storage dewar. Fills one to a few delivery units at a time. The tube is removed from the dewar after each use. Offers quick pressurization. Includes a filter that helps clean the LN before it is withdrawn



**Fig. 11.3** Filters for withdrawal devices. (Brymill™)



**Fig. 11.4** On the *left*: Dipper for 10LD, LD10, or any 2 in. throat dewar (1 1/4 oz). On the *right*: Dipper for 25LD, LD25, 35LD, LD35, or any 2 1/2 in. throat dewar (2 oz). Rigid dippers are also available for the MVE5, MVE10, MVE20 and MVE50



**Fig. 11.5** Dippers rigid and swivel small for MVE® Dewars: 5, 10, 20, 30 and 50 l

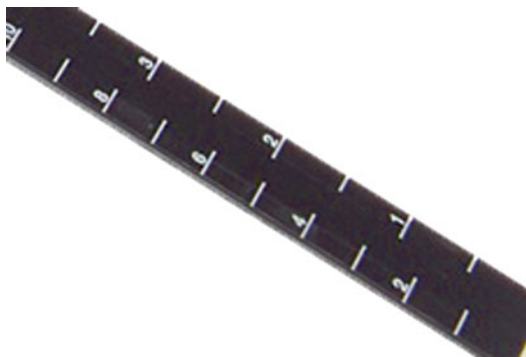
**Dewar Caps and Cores****MVE® Replacement Caps and Cores**

**Fig. 11.6** Replacement cap for 4LD and LD4 T&W, 5LD and LD5 T&W, 10LD and LD10 T&W, 25LD and LD25 T&W, 35LD, LD35, 50LD and LD50 T&W dewars



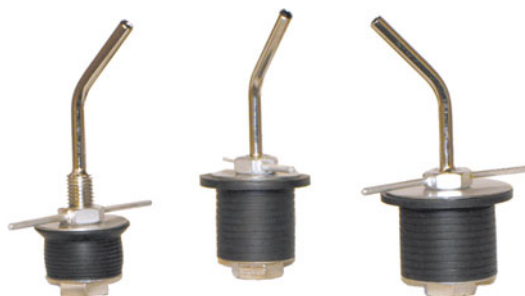
**Fig. 11.7** On the *left*: replacement cap and core for MVE4, MVE5, MVE10, and MVE20. On the *right*: replacement cap and core for the MVE30 and MVE50

**Measuring Rods** Low conducting plastic measuring rods clearly show LN level in a dewar (in inches and centimeters). 42" long.



**Fig. 11.8** Measuring rod for all size dewars DO-31

### Pouring Spouts



**Fig. 11.9** Pouring spout MVE5/PS for MVE5 and MVE10, MVE20/PS for MVE20, and MVE30/PS for MVE30 and MVE50 (MVE®)