Safe Working Procedures for Transportation of Large Liquid Nitrogen Tanks

Large liquid nitrogen tanks (> 50 L in volume, Figure 1) are explosion hazards during transportation and have to be handled carefully by professionally trained suppliers. Although the tanks are encased in cages with wheels, the tanks are very heavy and can cause severe injuries if they topple over and fall on someone. Moreover, any damage to the tank can result in uncontrolled release of liquid nitrogen, which can cause cryogenic burns.

![Figure 1. Examples of large liquid nitrogen tanks.](image)

General approach to order and receive liquid nitrogen tanks

If large liquid nitrogen tanks are required, the suppliers should be informed that the tanks have to be delivered directly to the laboratory unit. The suppliers will then send professional staff to handle the tanks, who will be responsible for unloading the tanks from the truck, pushing the tanks up any ramps into the building, transporting the tank via the cargo elevator to the appropriate level, transporting the tank to the correct laboratory unit, and collecting any used tanks.

Transportation of the liquid nitrogen tanks

Due to the heavy weight of the tanks (can be > 200 kg), they should be transported by at least 2, and preferably 3 people. The tank must be pushed from the back by 1 person, while another person guides the tank from the side. If the tank has to be transported up a ramp, the gradient of the ramp must be very gentle, such as those shown in Figure 2. These ramps can be found at the entrances to the CBC faculty and graduate student office areas, and directly leading into CBC on the ground floor (entrance between the NMR and mass spectrometry labs). The ramps illustrated in Figure 3 are too steep and should not be used. These ramps can be found leading up from the

![Figure 2. Examples of ramps that are not too steep and suitable as platforms for transporting large nitrogen tanks.](image)
parking lot at the CBC store to the intermediate platform at the CBC building entrance. In general, if 1 person cannot push the tank up the ramp, it is too steep.

Figure 3. Examples of ramps that are too steep and not suitable as platforms for transporting large nitrogen tanks.

To push a tank up the gentle ramp, 1 person must push the tank from the back, while the other person(s) guide the tank from the side to prevent the tank from toppling over. The tank must be pushed directly up the ramp, and not at an angle to the slope, to prevent the tank from toppling over sideways. No one should use any body parts, such as limbs, to support the tank from falling. When the supplier delivers the tank, they should be informed to deposit the tank on the platform at the direct entrance to the NMR labs (Figure 4). A gentle ramp will be installed at this entrance so that the liquid nitrogen tank can be pushed up the ramp into the NMR labs. The supplier should then be guided to transport the tank through and out of the NMR labs to the cargo elevator (Figure 5), where it can then be sent up to the correct level. Similar to the procedure for handling smaller liquid nitrogen Dewars, the large liquid nitrogen tanks must travel up the elevator with no other occupants. One of the suppliers must head up to the correct level, before the tank, to receive and roll the tank out of the elevator. The tank can then be delivered and handed over to the users in the laboratory unit.

Figure 4. Direct entrance to the NMR labs that should be used for transporting the large liquid nitrogen tanks into the CBC building.
Toppling tanks and accidental release of liquid nitrogen

If a tank is in danger of toppling over, the two (or three) people transporting the tank must stop pushing and try to gently pull the tank back instead. At no time should any body parts be in the way of the toppling tank to support it. If anyone's foot is accidentally caught and trapped by the fallen tank, the other person(s) should immediately help to gently lift the tank off, or seek additional help from the CBC store or the NMR labs.

The liquid nitrogen tanks are held in stable cages and should not leak. However, in the event of a leak, the people transporting the tank must quickly assess if the leak is from a venting valve or from an irreparable crack in the tank. If the leak arises from a venting valve, cryogenic gloves must be found and used to turn the valve off, before the tank is adjusted back to the upright position. If the leak arises from an irreparable crack in the tank, the surrounding area (especially if it is enclosed) must be evacuated until the tank is empty. In all cases, the tank must be returned to the supplier immediately and replaced.

DO NOT unload tank here  Tank unloaded outside this entrance

Figure 5. Recommended route on level 1 for unloading and transporting liquid nitrogen tanks into the CBC building.

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