



Guide for the Safe Storage, Handling, and Use of Portable Liquid Oxygen Systems

Presented courtesy of the Chino Valley Fire District

Many persons suffer severe respiratory ailments which require them to use oxygen on a regular basis. Until recently, often the mobility of these people was severely limited because of the size and weight of the oxygen equipment they would need to take with them. However, thanks to modern medical technology, small, lightweight units containing liquid oxygen are available, providing the needed oxygen in a way that provides much more freedom of movement to the resident.

However, liquid oxygen also contains significant hazards in terms of increased fire danger and potential cold burns due to the cryogenic temperature of liquid oxygen. These hazards can be greatly reduced when the liquid oxygen is stored, transferred and used safely. While this guide does not provide all information on the hazards of liquid oxygen, it should help you understand key ways for you to use liquid oxygen safely. It is based on requirements found in the Compressed Gas Association's pamphlet P-2.7-2000, *Guide for the Safe Storage, Handling, and Use of Portable Liquid Oxygen Systems in Health Care Facilities*, and on changes proposed for Section 4006 of the International Fire Code.

LIQUID OXYGEN GUIDELINES

1. Store Liquid Oxygen in a safe place

- a. Place cryogenic reservoirs where they will not block a path to an exit in an emergency, or be bumped or tipped over.
- b. Do not place reservoirs where opening doors could knock them over, or where they could be hit by a falling object.
- c. Store at least 5 feet away from electrical appliances, flames, or heating sources.
- d. Only store in a well-ventilated location. Do not store in a closet or a trunk of a car.
- e. Store on tile or on top of a non-combustible drip pan at least 18 inches by 18 inches in size (not on carpet).



- f. Liquid oxygen base units should be restrained to prevent falling caused by contact or earthquakes, through one of the following methods:
 - i. Restraining containers to a fixed object with one or more restraints; or
 - ii. Restraining containers within a framework designed to secure the container; or
 - iii. Restraining containers by locating a container against two points of contact like the walls of a corner of a room or a wall and a secure object like a desk.

2. Amount of Liquid Oxygen Stored in Group I-1, I-4, & R Occupancies

- a. The largest single container should not exceed 15.8 gallons (60 liters). The maximum total quantity of liquid oxygen stored per dwelling unit shall be 31.6 gallons (120 liters).
- b. Where individual sleeping rooms are separated from the remainder of the dwelling unit by 1-hour construction in accordance with the California Building Code, the maximum quantity can be increased to 31.6 gallons (120 liters) of liquid oxygen per sleeping room.

3. Store Liquid Oxygen in a safe way

- a. Always keep liquid oxygen units upright and on level surfaces, or they could leak. If a unit is turned over, cautiously upright the unit, ventilate the area, and call the responsible authorities and the equipment installer.
- b. The base reservoir shall be contained by a tip resistant holder at all times.



4. Maintain your Liquid Oxygen Containers Safety

- a. Never use aerosol sprays containing oils or waxes near liquid oxygen systems, and never attempt to lubricate the oxygen equipment. (Hydrocarbons become highly flammable in the presence of liquid oxygen).
- b. Do not cover the base unit with a covering of any kind. This can cause the accumulation of high concentrations of oxygen, resulting in an increased fire hazard.
- c. Follow the manufacturer's instructions on how to use the equipment.

5. Filling Liquid Oxygen Containers

- a. Filling the Base Reservoir -- The base unit should only be filled by a trained person, and never filled in the resident's room. It is best filled:
 - i. Outdoors in a well-ventilated area where there is no significant likelihood that liquid oxygen could spill onto asphalt or a combustible surface; or



- b. Filling the Portable Unit – The portable unit can be filled in the resident’s room. It can be filled by the resident, but only after the resident has been trained in filling the unit, and can demonstrate that they know how to fill the unit.
 - i. Fill the portable unit over a noncombustible surface, such as a tile floor, and not over carpet. A spill of liquid oxygen on carpet could make the carpet highly flammable.
 - ii. Do not fill the unit within 5 feet of an electrical appliance or flame.

6. Handling a Leak

- a. It is normal to see a slight puff of white vapor when filling, connecting, or disconnecting the portable unit from the base unit. This is not a significant leak.
- b. If the liquid oxygen container has fallen over, cautiously turn the unit upright, ventilate the area, and call the responsible authorities and the equipment supplier.
- c. If leakage is to the point that a stream of liquid oxygen is present or a dense white vapor plume appears, immediately evacuate the area, and call the facility manager and the system supplier. **Do not touch the liquid**, as it is hundreds of degrees F below freezing, and can cause freeze burns to you. Spills also increase the risk of fire. Note that just stepping or dropping something on a floor soaked with liquid oxygen could start a fire or explosion!



7. Fire Safety

- a. Post the rooms containing liquid oxygen with signs stating “No Smoking and No Open Flames – Oxygen Present”.
- b. Never permit oxygen equipment to be carried under clothing. It can trap high levels of oxygen, increasing the danger of fire. If clothing becomes soaked with spilled liquid oxygen, it becomes highly flammable. Take off any oxygen-soaked clothing, and do not put on again for at least a half an hour.
- c. If clothing ignites in an oxygen-enriched atmosphere, use a flood of water to extinguish the flame. Attempting to smother a fire in an oxygen-enriched atmosphere is not effective.
- d. No source of open flame should be allowed in a room where liquid oxygen systems are used, stored, or filled.
- e. No smoking is allowed in the same room where liquid oxygen systems are used, stored, or filled.
- f. If a fire occurs where liquid oxygen is present, **immediately call 911**, and advise them that oxygen is on the premises, even though it may not be involved in the fire. If a fire extinguisher rated “A”, “AB”, or “ABC”



is readily available, it can be used to extinguish the fire. If none is available, immediately exit the area. Alert the managers of the facility as well.

8. Training

- a. The responsible authority of the health care facility must insure that all involved persons (residents and employees) have received instructions in the potential hazards and recommended safety precautions.
- b. Residents should not be permitted to transfill portable liquid oxygen units from the base units until they are:
 - i. Instructed in the potential hazards of transfilling, and
 - ii. Able to demonstrate the procedure safely.
- c. If liquid oxygen is present in rooms where multiple residents reside, all occupants of the shared room should be instructed concerning the potential hazards and safety precautions to be observed. If one or more occupants of a room are unable to understand these precautions and safety procedures, liquid oxygen systems should not be used in that room.



9. Questions?

If you have any questions concerning this safety guide, please call the Chino Valley Fire District Fire Prevention Division at (909) 902-5280.

