

Flammable and Combustible Liquids

Forced ventilation may be required in many cases where repair work is to be done inside a tank

Where fumes develop from welding or other repair work, mechanical air movers should be used or the workmen should wear fresh air hose masks. On a large tank, a door sheet or sheets may be removed for ventilation after the tank has been made gas free. The opening also can be used to expedite removal of sediment and to increase illumination.

If a tank has been closed for some time, there may be a deficiency of oxygen due to rusting (oxidation) of the metal of the tank. In that case, no one should enter the tank without a supplied air mask or, for a relatively brief stay, a self-contained or self-generating breathing apparatus.

Cleaning aboveground tanks

Here in step-by-step form is a summary of a typical procedure for cleaning tanks that have contained flammable or combustible liquids.

- 1 Remove all sources of ignition (matches, open flames, smoking, gas engines, welding, exposed electrical wiring and equipment) from the vicinity of the tank.
- 2 Empty the tank by pumping, draining, and floating tank contents with water, introducing the water through fixed tank connections.
- 3 Disconnect and blank all product, steam smothering, foam, and similar lines. Do not rely on valves.
- 4 Open all manholes and allow the tank to air thoroughly. Ventilate or steam the tank for the number of hours required by its size. If steam is used, cool and ventilate afterward.
- 5 Have available the required personal protective equipment: fresh air hose masks, approved flashlights, safety belts and lifelines, rubber boots and gloves.
- 6 If light is needed, use only flashlights or electric lanterns approved for combustible atmospheres by Underwriters' Laboratories, Inc.
- 7 Test for vapor content with a combustible

gas indicator. For entering the tank before it tests vapor-free, wear a fresh air hose mask, air supply tanks, and safety belt and lifeline if the tank atmosphere contains more than the maximum acceptable concentration of the vapor. Have ample help available outside for the number of men inside.

- 8 If a storage tank has contained leaded gasoline subsequent to its last thorough cleaning, follow instructions of suppliers of tetraethyl lead.
- 9 Bond steam lines and water wash nozzles to the tank.
- 10 Wash sludge, sediment, and scale from the tank through the drain or remove it with a pump. Flush out well and overflow the tank with water if necessary.
- 11 Make a gas test and, if the tank is found vapor-free, check conditions inside the tank before issuing an OK for the work. Otherwise, clean and ventilate further as required.
- 12 Continue ventilation for duration of the work in the tank, and make periodic tests for the presence of gases or vapors as the work progresses.

Ventilation by air instead of steaming is used more widely where deposits of iron sulfide are not present and where a source of power supply for mechanical air removers is available. Special precautions are required for the servicing of tanks which contain pyrophoric iron sulfide. (See the API accident prevention manual, *Cleaning Petroleum Storage Tanks*, listed in "References.")

Cleaning small tanks and containers

General precautions. Work on containers that have held flammable or combustible liquids or gases shall be supervised by a trained foreman capable of maintaining a high degree of safe operations. If the container has held such unstable compounds as nitrocellulose, pyroxylin solutions, nitrates, chlorates, perchlorates, or peroxides, which may mean that it contains enough oxygen to support combustion, special precautions should be taken. Contact the manufacturer or supplier for specific information regarding