breathing apparatus This can be either a compressed-air type of self-contained breathing apparatus, or self-generating or air supplied type The fit of the facepiece should be carefully checked before the workman enters the tank If the environment contains a substance that is dangerously irritant or corrosive to the skin (lead tetraethyl, for example), the breathing apparatus may be supplemented by complete attire of impervious clothing

Some medical authorities advise that individuals with broken eardrums not work in vapor-laden atmospheres, because no mask will protect these abnormal openings

The supplied fresh-air hose mask with blower is generally the best type of respiratory equipment for continuous use inside a tank

Proper procedures

A tank should be gas freed before any work is performed inside it

A worker should not be allowed to enter a gassy or oxygen-deficient tank unless absolutely necessary, such as in an emergency When this is necessary, the man should be attended on the outside by another worker who is similarly outfitted with appropriate respiratory protection and protective attire as needed so that the latter can rescue the man in the tank if necessary In some states this is a legal requirement

Men engaged in tank cleaning should be instructed in the method of giving artificial respiration, and should be retrained periodically If a tank cleaner is overcome by vapor or gas, he should be removed to fresh air immediately and given artificial respiration until he resumes breathing A physician should be summoned, and the resuscitated man kept quiet and warm until breathing and circulation are normal

The sense of smell cannot be relied upon for an accurate estimate of the amount of flammable vapor present in a tank It does, however, give warning that vapors of some kind are present Symptoms of dizziness, nausea, and headache indicate that a dangerous concentration of flammable and toxic vapors is present Exposed workers should leave the contaminated area immediately and not return until vapors have been cleared

Workers should always have a clear path of escape from a tank and should bear in mind that they may have to use it in a hurry A ladder should always be used when a tank must be entered from above, and it should be left secured in place until the last man is out of the tank Under severe conditions, a lifeline is recommended to assist with rescue work

Burning, welding, cutting, and spark-producing operations should not be permitted in a tank until the area to be heated has been thoroughly cleaned and tests have determined that the tank atmosphere is vapor free Where any vapor is present, further ventilation will be required to remove the vapor from the tank

Hot work repairs (welding and cutting) should not be made whenever other means can be used more safely Even after a tank has been freed of vapor, combustible mixtures again may be formed through admission of flammable vapors or liquids from other sources, such as an unblanked line or connection, a break in the bottom of the tank, sludge, sediment, or sidewall scale, or wood structures soaked with the liquid The interior framing of floating tank roofs can trap quantities of liquids that will release vapors Therefore, periodic tests with a combustible gas indicator should be made during the hot work

Burning or cutting may release lead fumes from paint on either the inner or outer surface of the tank or from some other source An approved mask for protection against lead may be necessary, or it may be advisable to exhaust the fumes Wood supports inside the tank should be protected or removed before hot work is begun

Some companies use low-voltage transformers to eliminate the danger of electric shock, especially when men are required to work in wet areas All portable electrical equipment should be grounded

Cold work in a tank may present a dust problem, and approved dust respirators and goggles should be worn if tests definitely show that wearing of a hose mask is not necessary

Gas tests should be made frequently if the presence of gas is suspected The concentration of gas or vapor in a tank or vessel may increase as work progresses, especially if the inside of the tank is scraped or heated during the operation