

Industrial
Hygiene

TECHNICAL BULLETIN



FIREMAN'S FUND AMERICAN LOSS CONTROL

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RESPIRATORY PROTECTIVE DEVICES

INTRODUCTION:

In the control of occupational diseases and injuries caused by breathing air contaminated with harmful dusts, fumes, mists, gases or vapors, the primary objective should be to prevent air from becoming contaminated. This should be accomplished as much as possible by engineering controls. However, there may be circumstances in which applied engineering controls will not be practical or sufficiently effective. Protective respirators will be needed for these situations; either as primary means of control or as a supplement to other primary controls.

DEFINITION AND CLASSIFICATION:

Although by definition a "respirator" is any device used for providing respirable air, the use and connotation of the word "respirator" has become both more specialized and variable.

In order to promote greater uniformity in the name of the various devices that appear in the market and to provide a basis for a clearer understanding of the operating principles and uses of these devices, the U.S. Bureau of Mines and the American Standards Association have published standard definitions and classifications for respiratory protective devices.

Respiratory protective devices are grouped broadly according to their method of functioning. The basic classifications are:

AIR-PURIFYING RESPIRATORS.

Particulate -- removing (mechanical filter) type
Gas -- and vapor -- removing (chemical cartridge) type
Combination of the above

ATMOSPHERE-SUPPLYING RESPIRATORS

Hose-type atmosphere -- supplying respirators

Hose mask
Air line respirator
Continuous flow type
Demand type

Self-contained breathing apparatus

Recirculating type
Demand type

SELECTION AND USE:

The use of respiratory protective equipment is justified only after a consideration of the factors involved indicates that the device selected will provide satisfactory protection when properly used.

Selection of the proper type of respiratory protective equipment should be based on the following procedures:

Identification of the substance or substances against which protection is necessary.

Determination of the hazards and significant physical properties of each substance.

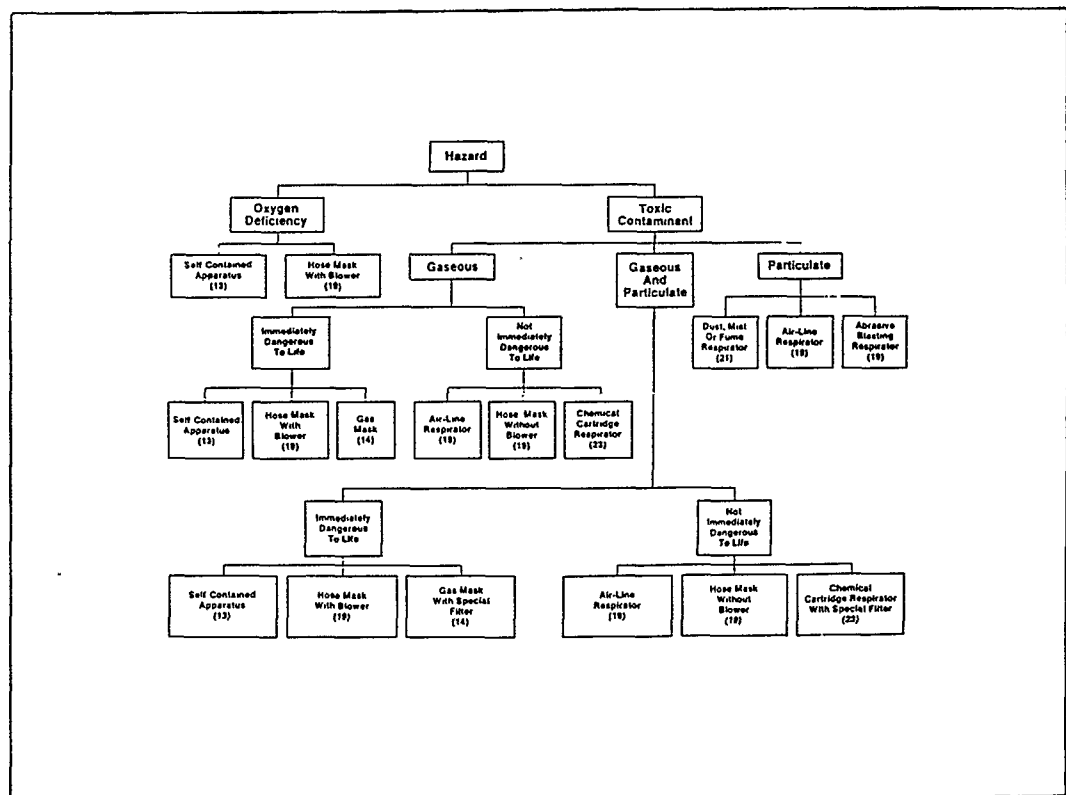
Determination of the conditions of exposure and the concentrations of air contaminant which may be expected.

Determine whether any human capabilities and limitations are essential to the safe use of the devices, i.e., restriction of movements.

Fit the respirator carefully and instruct the worker in its use.

Practically all applications of respiratory protective devices are specific and require individual attention. However, a classification of principal kinds of exposures and the preferred type of respiratory device is given in Figure 1.

FIGURE 1



Examples of several types of respiratory equipment are shown in Figure 2.

FIGURE 2



Respiratory protective devices are tested and approved by the U.S. Bureau of Mines (USBM) of the Department of the Interior for protection against a wide range of inhalation hazards, from oxygen deficiency and/or highly toxic atmospheres to those containing "nuisance" dusts. Not all respiratory protective devices meet USBM requirements. Select USBM tested and approved equipment. Such equipment conforms to OSHA requirements.

Examples of USBM approval labels are shown in Figures 3 and 4.

FIGURE 3

PERMISSIBLE GAS MASK FOR ORGANIC VAPORS	
APPROVAL	NO. 1400
	
ISSUED TO THE MANUFACTURER'S NAME Address	
Approved for respiratory protection in atmospheres containing not more than 2 percent by volume of organic vapors. The approved assembly consists of BM 1400 canister, BM 1400 facepiece, and BM 1400 canister harness.	
CAUTION	
1. This mask protects against organic vapors only. 2. This mask must not be used where the oxygen content of the air is less than 16 percent. 3. Renew exhausted canisters immediately. 4. Read cautions on the canister label, and instructions in the lid of the mask case.	

FIGURE 4

PERMISSIBLE RESPIRATOR FOR DUSTS	
APPROVAL	NO. 2100
	
ISSUED TO THE MANUFACTURER'S NAME Address	
Approved for protection against the inhalation of dusts that are not significantly more toxic than lead dispersoids or particulate matter formed by the disintegration of solid materials by such processes as crushing, grinding and abrading. The approved assembly consists of BM-2100 facepiece and BM 2100 filter. In making renewals or repairs, parts identical with those furnished by the manufacturer under the pertinent approval shall be maintained.	
CAUTION	
This respirator removes only dispersoids from the air. It gives no protection against gases, vapors, or an insufficiency of oxygen. Follow the manufacturer's instructions for fitting the respirator to the face, for changing the filter, for cleaning the respirator, and for caring for it while not in use.	

TRAINING AND EDUCATION:

For proper use of any respirator, it is essential that the user be properly instructed in its selection, use and maintenance if the device is to be used intelligently, confidently and safely. Training in the use of any respirator should cover the following:

1. Instructions in the nature of the hazard, whether acute, chronic, or both, and an honest appraisal of what may happen if the respirator is not used.
2. Discussion of why this is the proper type of respirator for the particular purpose.
3. Description of its construction, operating principles, and limitations.
4. Instruction in fitting the respirator properly and checking for adequacy of fit.
5. Instruction and training in actual use of the respirator and close and frequent supervision to insure that it continues to be properly used.

An important by-product of training is the sense of confidence that the employee should develop in his ability to use the respirator properly.

MAINTENANCE AND CARE:

A program for maintenance and care of respirators should be based on the type of plant, working conditions, and hazards involved.

All maintenance programs should include the following:

1. Regular inspection for defects (including a leak check)
2. Cleaning and disinfecting procedures
3. Repair responsibilities and facilities
4. Proper storage facilities

Equipment must be properly maintained to retain it's original effectiveness.

INSPECTION:

Respiratory protection is no better than the respirator in use, even though it is worn conscientiously. Frequent random inspections should be conducted by a qualified individual to assure that respirators are properly selected, used, cleaned and maintained.

Standards regarding respiratory protection enforced under the "Occupational Safety and Health Act of 1970" are quite extensive and outline specific requirements for certain operations. These should be reviewed whenever a *respirator program is planned*. Assistance in the interpretation of your responsibilities under these standards can be provided by Fireman's Fund American Loss Control Department.

Prepared by: Joseph Holtshouser
St. Louis Loss Control