RESPIRATORS

The use of respirators as a means of protecting an operator against exposure to asbestos should be regarded as the last line of defense. The engineering approach to accident prevention is valid for the prevention of occupational disease, and control measures should be given consideration in the following sequence:

1. eliminate,
2. isolate,
3. minimize, and
4. protect the operator.

If a situation exists in which it is impossible or impractical to accomplish adequate control by means of the first three steps, protection of the operator is, of course, imperative. It should be recognized, however, that the acceptance of this last approach places additional responsibility upon the supervisor to insure that the protective device is consistently and properly used.

As with any other tool, respirators are designed for specific purposes and exposures and must be used accordingly. The United States Bureau of Mines is the agency which establishes the standards and specifications for respirator design and performance. Their circular #7636 contains a list of gas masks, supplied air respirators, dispersoid respirators and non-emergency gas respirators, approved for a variety of exposures.

Asbestos, being a particulate dust which is toxic through inhalation, falls into the category of pneumonoconiosis producing dust (defined on page 9 of circular #7636).

Among a number of criteria established by the U. S. Bureau of Mines is a requirement that resistance in the respirator to air flow at the rate of 3 cubic feet (85 liters) per minute for inhalation should not exceed 2 inches (50 millimeters of water), and for expiration should not exceed one inch (25 millimeters of water). Other criteria include specifications of the amount of dust of designated size which will pass through the filtering medium, as well as specifications of the fit of the respirator face piece on different facial contours.

There are a number of factors which should be given consideration for selecting the style and make of approved type respirators for plant use.

1. **Resistance**

   Most respirators on the market today have breathing resistance much lower than the U.S.B.M. standards. In a series of ten respirators from four major suppliers, the resistance rating ranges from 13.0 millimeters to 27.9 millimeters, compared to the standard of 50 millimeters. At best, the wearing of a respirator is a nuisance to the operator and the lowest possible breathing resistance minimizes this nuisance value.

2. **Filtering Capacity**

   The square inches of filtering surface varies considerably in different models of respirators. Given the same dust load, the respirator with a larger filtering surface will build up breathing resistance at a much

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H. M. Jackson, Respirators (1957)
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slower rate than one with a smaller filtering area. This facet would have its practical application in determining how frequently the respirator filtering medium would have to be changed.

3. Weight

In the same group of ten respirators, the weight of the various styles varied from 1.25 ounces to 9.0 ounces. In general, the lighter weight units have a smaller filtering area and, therefore, the weight factor, which is important to pperator comfort, must be balanced against the replacement requirements, predicated on the filtering capacity (Item 2 above.

4. Facial Fit

Although the U. S. B. M. specs require a tight fit on three standard types of facial contours, it is oftentimes difficult to obtain the tight fit essential for positive protection of any given individual. The operator usually needs considerable instruction regarding the placement and adjustment of the respirator to his particular features.

5. Distribution

One method of distribution is to have two respirators identified for each man. While one is being worn, the other is being cleaned and maintained and is returned to that individual. As can be readily appreciated, turnover and job transfer add complications to this method of distribution. A second technique is to arrange for daily or periodic pick-up and delivery of respirators to a given distribution point, (foreman's office, department store room). All respirators picked up after a period of use are cleaned and sanitized and redistributed without reference to the point of earlier use.

6. Maintenance

It is recommended that maintenance of respirators be done at a control location by an authorized individual. A regular schedule of pick-up, maintenance and distribution should be established. The regular maintenance should consist of washing and cleaning with a sanitizing compound recommended by the respirator manufacturer and the inspection and replacement of each of the functional or contact portions of the respirator. Certain of the filtering mediums can be cleaned and reused. Others are designed for one use application only. It is essential, therefore, that all working and contact parts be in first class order, otherwise the effectiveness of the respirator may be entirely negated.

7. Programming

Areas of exposure which cannot be satisfactorily controlled by other engineering means should be identified and the use of respirators in those portions be made a mandatory job requirement. Since the wearing of respirators does constitute an element of nuisance and fatigue, the job evaluation should provide appropriate allowance for this factor.

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Employees should be given sufficient knowledge of the nature of the exposure and potential hazard that they will understand and appreciate the value of the protective device. Discipline should be used to insure the correct and consistent use of respirators where such are a job requirement, in the same manner as would be the case for any other infraction of job methods.

Examples of respirators which have a breathing resistance in the 13 to 18 millimeter range and are light weight (1.25 to 3.8 ounces) are the Mine Safety Appliances Dustfoe #55, Pulmosan 600, American Optical R-2000 and Willson Mono-Mask #600. Each of the major respirator manufacturers offers cleaner-sanitizer products for respirator maintenance.

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