

Asbestos: Managing and Preventing Occupational Exposures

Asbestos is a commercial term used to describe six types of fibrous minerals that occur naturally in the environment.

Asbestos fibers are separated into thin, durable threads for use in commercial and industrial applications. They are resistant to electricity, heat, fire and chemicals. Fibrous minerals have been used for many years in the production of pipes, brakes, textiles, flooring, paints, sealants, cement, drywall and plastics, and in insulation, fireproofing and soundproofing products.

More than 50 countries restrict asbestos production. In 2016, Russia, China, Brazil and Kazakhstan were the leading producers of asbestos in metric tons, [Statista reports](#).

In the U.S., there are strict environmental and workplace health and safety regulations in place to control mineral fiber use and manage abatement. Products are restricted to less than 1 percent of asbestos content. In 2002, the last U.S. asbestos mine to be closed was located in California.

Occupational Exposure Risk

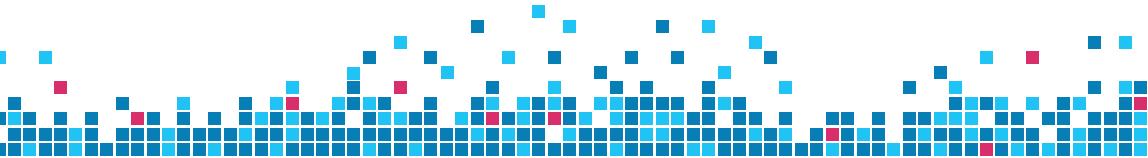
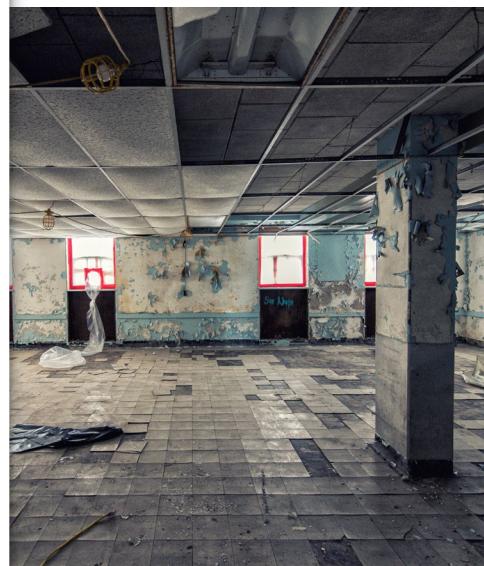
When left undisturbed, asbestos is not harmful to human health.

For U.S. workers, occupational exposure risk is greatest for those involved in the repair, renovation, removal or maintenance of asbestos-containing products installed years ago. The Occupational Safety and Health Administration (OSHA) estimates 1.3 million employees in construction and general industry have exposure risk. Others at risk of inhaling airborne particles include firefighters and workers in textile plants and automotive repair shops.

During renovations or asbestos abatement, materials should be encapsulated or removed by trained and certified contractors. Risk increases when an exposure hazard is not recognized or OSHA personal protection standards are not enforced, according to the [Agency for Toxic Substances and Disease Registry](#).

Health Effects

When it is mined, processed, handled or broken apart, mineral fibers release microscopic particles that can be inhaled and become lodged in the lungs. Asbestos is most hazardous to humans when it is friable, or easily crumbled. For example, asbestos contained in sprayed insulation would be friable, while mineral fibers in old floor tiles would not be friable.



The degree of health risk from occupational exposure to asbestos depends on a number of factors:

- Amount, size and type of fibers
- Duration, frequency and source of exposure
- Individual characteristics: smoking, lung disease, genetics

Asbestos-related diseases have long latency periods, typically decades. They include asbestosis, cancer, mesothelioma and pleural plaques.

Asbestosis is scarring in the lungs that occurs in people who have been exposed to high concentrations of asbestos over a long period of time. The risk of asbestosis is not significant for those who have not worked with asbestos. Asbestosis symptoms such as shortness of breath and dull chest pain usually do not appear until about 20 to 30 years after first exposure.

Lung cancer is associated with asbestos exposure. Those with higher exposures are more likely to get cancer than those with lower exposures. Symptoms do not usually appear until 10 to 20 years after first exposure.

Mesothelioma is a rare, malignant tumor that develops in the layer around the lungs (pleura) or intestine after prolonged exposure. It is unrelated to smoking. It develops 35 to 40 years or more after the time of first exposure, although shorter periods have been recorded. Miners and people exposed to dust on miners' work clothes are among those most affected. The survival rate three years post-diagnosis reportedly is below 10 percent.

Pleural plaques occur when there are large amounts of asbestos fibers in the lungs. They are not cancerous and usually do not cause symptoms. Plaques tend to develop more than 20 years after exposure, and are related to length, and possibly to peaks, of exposure.

Short-term acute exposure may affect respiratory function. For example, following the Sept. 11, 2001 terrorist attacks in New York City, emergency response, recovery and clean-up personnel were exposed to an asbestos-containing mixture of particulate matter released when the World Trade Center collapsed. Some workers who were exposed developed respiratory symptoms similar to asthma.

Disease risk from low-level, short-term exposure to airborne asbestos is considered negligible. However, it's advisable to let an examining physician know if a suspected low-level exposure has occurred. Asbestos particles cannot be detected in the lungs, and other factors may contribute to lung disease later in life. Asbestos-related diseases are often not diagnosed until they are in advanced stages. Not smoking and having regular checkups to assess lung function and overall health are recommended.



OSHA Standards

The following are links to asbestos-related OSHA standards for construction, general industry and shipyard employment sectors:

- Construction 29 CFR [1926.1101](#)
- General Industry 29 CFR [1910.1001](#)
- Shipyard Employment 29CFR [1915.1001](#)

The standards require employers to provide:

- Hazard awareness training and personal exposure monitoring
- Administrative, work practice and engineering controls
- Medical monitoring when legal limits and exposure times are exceeded

Required hazard awareness training topics include health effects; the relationship between lung cancer, smoking and exposure to asbestos; the nature of operations which could result in exposure to asbestos; and recommended controls and work practices. Requirements for posting warning signs and labels also must be covered.

Engineering controls include isolating the source and using ventilation systems. Administrative actions include limiting workers' exposure times and providing showers. Personal protective equipment includes respirators and protective clothing.

Covered employers must ensure no employee is exposed to an airborne concentration of asbestos in excess of 0.1 fiber per cubic centimeter of air as:

- An eight-hour time-weighted average determined by the method prescribed in the standard or an equivalent method.
- Averaged over a sampling period of 30 minutes determined by the method prescribed in the standard or by an equivalent method.



Medical Surveillance

All medical examinations and procedures must be performed by or under the supervision of a licensed physician, at a reasonable time and place, and at no cost to the employee. The physician has broad latitude in prescribing specific tests to be included in the medical surveillance program. OSHA requires:

1. Medical and work histories with special emphasis on respiratory and cardiovascular systems and the digestive tract.
2. Examinees to complete a respiratory disease questionnaire.
3. A physical examination including a chest roentgenogram (X-ray) and pulmonary function test that includes measurement of the employee's forced vital capacity (FVC) and forced expiratory volume at one second (FEV(1)).
4. Any laboratory or other test that the examining physician deems by sound medical practice to be necessary.

Employers are required to make diagnostic tests available at least annually to employees covered by standards, more frequently if recommended by the examining physician and upon termination of employment. They must give the physician:

- A copy of the standard and its appendices
- A description of the examinee's duties
- The employee's representative level of exposure to asbestos
- Personal protective and respiratory equipment to be used
- Information from previous medical examinations, as needed

The employer is required to obtain a written opinion from the examining physician. The opinion must contain:

1. Information about medical conditions that may place the examinee at increased risk of exposure-related disease.
2. Recommended physical restrictions for the employee or on the use of personal protective equipment.
3. A statement that the employee has been informed of exam results and any medical conditions that require further explanation or treatment.

The written opinion must not reveal specific findings or diagnoses unrelated to asbestos exposure. A copy of the opinion must be provided to the examinee.

People with diagnosed occupational asbestos-related diseases may qualify for workers' compensation and other benefits. Coverage varies by jurisdiction.

Tips for Preventing Non-Occupational Asbestos Exposures

At home, materials that may contain asbestos should be tested and removed by licensed asbestos abatement workers. It's important to be aware of places, such as attics and floor or ceiling tiles, where asbestos may be found.

Do not:

- Try to take a sample or disturb materials you suspect contain asbestos.
- Attempt to clean up potential asbestos material.
- Dust, sweep or vacuum debris that may contain mineral fibers.
- Saw, sand, scrape or drill holes in asbestos materials.
- Use abrasive pads or brushes on power strippers to strip wax from flooring.
- When old flooring needs replacing, install new floor covering over it, if possible.
- Do not track material that could contain asbestos through the house.

References

1. [Asbestos](#), National Institute for Occupational Safety and Health
2. [Asbestos](#), Occupational Safety and Health Administration
3. [Asbestos Toxicity: Who Is at Risk of Exposure to Asbestos?](#) Agency for Toxic Substances and Disease Registry
4. [Asbestos Advice for Householders](#), New Zealand Ministry of Health
5. [Asbestos Exposure and Cancer Risk](#), National Cancer Institute
6. [Mesothelioma](#), the Mesothelioma Center