



Asbestos Safety

This course covers employer and employee responsibilities related to working with asbestos. The course also covers safe work practices for employees who may be exposed to airborne asbestos. Emphasis is primarily given to construction operations.

This page intentionally blank

OSHAcademy Course 852 Study Guide

Asbestos Safety Basics

Copyright © 2017 Geigle Safety Group, Inc.

No portion of this text may be reprinted for other than personal use. Any commercial use of this document is strictly forbidden.

Contact OSHAcademy to arrange for use as a training document.

This study guide is designed to be reviewed off-line as a tool for preparation to successfully complete OSHAcademy Course 852.

Read each module, answer the quiz questions, and submit the quiz questions online through the course webpage. You can print the post-quiz response screen which will contain the correct answers to the questions.

The final exam will consist of questions developed from the course content and module quizzes.

We hope you enjoy the course and if you have any questions, feel free to email or call:

OSHAcademy

15220 NW Greenbrier Parkway, Suite 230

Beaverton, Oregon 97006

www.oshatrain.org

instructor@oshatrain.org

+1 (888) 668-9079

Disclaimer

This document does not constitute legal advice. Consult with your own company counsel for advice on compliance with all applicable state and federal regulations. Neither Geigle Safety Group, Inc., nor any of its employees, subcontractors, consultants, committees, or other assignees make any warranty or representation, either express or implied, with respect to the accuracy, completeness, or usefulness of the information contained herein, or assume any liability or responsibility for any use, or the results of such use, of any information or process disclosed in this publication. GEIGLE SAFETY GROUP, INC., DISCLAIMS ALL OTHER WARRANTIES EXPRESS OR IMPLIED INCLUDING, WITHOUT LIMITATION, ANY WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. Taking actions suggested in this document does not guarantee that an employer, employee, operator or contractor will be in compliance with applicable regulations. Ultimately every company is responsible for determining the applicability of the information in this document to its own operations. Each employer's safety management system will be different. Mapping safety and environmental management policies, procedures, or operations using this document does not guarantee compliance regulatory requirements.

Revised: July 25, 2018

This page intentionally blank

Contents

Introduction	1
Module 1: Asbestos Basics.....	2
What is Asbestos?.....	2
Historical Perspectives	3
Where Asbestos is Used.....	4
Did You Know?	6
Health Hazards of Asbestos	6
Lung Cancer.....	7
Mesothelioma	8
Module 1 Quiz.....	9
Module 2: Employer Responsibilities	11
Employer Duty to Keep Employees Safe.....	11
Establish an Asbestos Safety Program	11
Assessment and Analysis	11
How to Take a Sample to Send to a Lab	11
Exposure Monitoring	12
Communications	13
Medical Surveillance Program	14
Multi-employer Worksites	15
Recordkeeping	16
Module 2 Quiz.....	17
Module 3: Asbestos Exposure Control Plan.....	19
The Hierarchy of Controls	19

Elimination/Substitution	20
Engineering Controls.....	20
Administrative Controls	20
Regulated Areas	20
Work Classifications	21
Work Practice Controls	23
Respiratory Protection and Protective Equipment.....	23
Prohibited Activities.....	24
Module 3 Quiz.....	25
Module 4: Asbestos Training Program Requirements.....	27
Training for Work in Regulated Areas.....	28
Class I Training	28
Class II Training	28
Class III Training	29
Class IV Training	30
Training for Competent Persons in Construction	30
Class I and II Competent Person Training	30
Class III and IV Competent Person Training.....	30
Access to Training Materials	30
Module 4 Quiz.....	32
Module 5: Brake and Clutch Repair Work	34
Regulatory Requirement.....	34
Control Methods.....	34
Best Practices	35

Training	36
Module 5 Quiz.....	37
Glossary.....	39
Endnotes	47

This page intentionally blank

Introduction

This short course reviews some of the most important contractor requirements for asbestos safety. It provides emphasis on requirements and best practices in the construction industry, but we will also cover requirements common for employers and employees in general industry and maritime as well. The related OSHA standards we will discuss are:

- [1910.1001, Asbestos](#), which covers work in general industry, such as exposure during brake and clutch repair, maintenance work, and manufacture of asbestos-containing products.
- [1926.1101, Asbestos](#), which covers construction, alteration, repair, maintenance, or renovation and demolition of structures containing asbestos.
- [1915.1001, Asbestos](#), which covers construction, alteration, repair, maintenance, renovation and demolition of structures containing asbestos during work in shipyards.

You will also have the opportunity to view various optional videos on this topic that should prove informative and educational. Note: The videos do not contain material that will be included in quizzes and exams.

Module 1: Asbestos Basics

What is Asbestos?

Asbestos is the generic term for a group of naturally occurring highly toxic fibrous silicate minerals with high tensile strength, flexibility, and resistance to thermal, chemical, and electrical conditions.

Chemically, asbestos minerals contain silicon and oxygen atoms in their molecular structure. Asbestos is also resistant to heat and corrosion.



Asbestos fibers are 5 micrometers or longer with a length-to-diameter ratio of at least 3 to 1.

Asbestos includes the mineral fibers chrysotile, amosite, crocidolite, tremolite, anthophyllite, actinolite and any asbestos-containing material (ACM) or presumed asbestos-containing material (PACM) that have been chemically treated or altered

Asbestos may also be “friable” or “non-friable”:

- **Friable asbestos** is material containing more than 1% asbestos by weight or area that is crumbly, dusty or powdery. It can be crumbled, pulverized or reduced to powder form using the hands. Most asbestos-containing material is friable. Examples include: sprayed coatings or insulation, lagging, loose asbestos, or asbestos in its raw state.
- **Non-friable asbestos** is material containing more than 1% asbestos which is held within another material and cannot be crumbled, pulverized, or reduced to powder using the hands.

According to the Environmental Protection Agency (EPA), there are two major groups of asbestos:

- **Serpentine:** These fibers can be woven together and are flexible and long.
 - **Chrysotile**, or white asbestos, is the primary type of serpentine and is used in manufacturing processes. It is in over 95% of asbestos-containing materials and used in about 90% of all commercial processes.
 - **Amosite**, also called brown asbestos, is generally used in spray coatings, heat insulation, and cement products.

- **Crocidolite**, or blue asbestos, is not used much, but found in spray coatings on structure steelwork for fire protection and heat or noise insulation.
- **Amphibole:** These fibers are brittle, rod- or needle-shaped, straight and relatively stiff. These characteristics make this group, composed of actinolite, anthophyllite, and tremolite relatively useless for commercial processes.

When handled, asbestos can separate into microscopic-size particles that remain in the air and are easily inhaled. Persons occupationally exposed to asbestos have developed several types of life-threatening diseases, including asbestosis, lung cancer and mesothelioma. Although the use of asbestos and asbestos products has dramatically decreased in recent years, they are still found in many residential and commercial settings and continue to pose a health risk to workers and others. Check out this comprehensive list of [asbestos-containing-products](#).

Historical Perspectives

Asbestos has been used since the late 1800s in commercial applications and the use increased greatly throughout World War II.

Before experts knew that the inhalation of asbestos fibers caused several deadly diseases- including asbestosis, a progressive and often fatal lung disease, and lung and other cancers- asbestos was used in a large number of building materials and other products because of its strength, flame resistance, and insulating properties. Asbestos was used in asbestos-cement pipe and sheeting, floor and roofing felts, dry wall, floor tiles, spray on ceiling coatings, and packing materials.

Always presume building materials may contain asbestos. The U.S. has not banned asbestos entirely in all its forms, so employers must take caution when buildings, especially those built before 1980, are renovated or torn down. A commercial building or residence may still contain asbestos. Remember, when the asbestos-containing materials themselves are disturbed, fibers may be released into the air. The fibers are so small that workers cannot see it with the naked eye. The fact you can inhale these fibers without knowing it makes asbestos an even more dangerous hazard.

Asbestos may also still be found in some taping compounds, asbestos cement, pipes, and floor tiles. Vinyl asbestos floor tiles may be as much as 15% to 20% asbestos, which is released when old flooring is removed.

Only specially trained asbestos workers may remove asbestos. Significant exposure to asbestos can cause breathing problems, lung cancer, and cancer of the lung lining many years after exposure.

Where Asbestos is Used

Asbestos was used in military ships, vehicles and aircraft until the 1970s and many thousands of those who served in the military were exposed.

Because asbestos is strong and resistant to heat, it has been used in many different types of products, such as insulation for pipes (steam lines for example), dry wall, ceiling and floor tiles, building materials, cement, and in vehicle brakes and clutches.

Commercial building and residential homes built prior to 1980 still contain asbestos, but exposure is not serious unless the asbestos has been disturbed in some way. If disturbed, asbestos fibers can go airborne and be inhaled.



In the construction industry, asbestos was used in more than 3,000 building products. Some materials are presumed to contain asbestos if installed before 1981. Examples of these materials, as well as other presumed asbestos-containing materials are:

- boiler, pipe, furnace, and water heater insulation,
- ceiling and wall texture “popcorn” and “orange peel,”
- taping mud compound, skim coat,
- acoustical tiles, sprayed-on insulation and fire proofing,
- vinyl floor tile, sheet vinyl and linoleum,
- mastics and glues, cement asbestos board,
- niccolite paper under wood roofing shingles, built-up roofing, roof felt and patch, paints, including silver roof paint, stucco and texture,
- vermiculite and blown-in building insulation, door and cover gaskets, window putty,
- insulation boards behind and under wood stoves, insulation within older dishwashers and ranges,
- older electrical wire, black tar coating on the underside of sinks, stove top pads, and ironing board covers

A common misconception is all asbestos-containing products are banned for use in the U.S. Actually, the only products banned from use are the following:

- fireproofing and insulating products,
- spray-applied surfacing materials,
- thermal system insulation (TSI),
- wet-applied and preformed pipe insulation,
- pre-formed block insulation for boilers and hot water tanks,
- corrugated paper, rollboard, commercial paper, specialty paper, flooring felt, and
- any new use of asbestos.

Did You Know?

Here's some interesting information obtained from [Sokolove Law](#) and highlights why asbestos in the U.S. is considered the Silent Killer:

- Between 1979 and 2001, there were 230,000 asbestos related deaths.
- Despite being a known carcinogen, asbestos is not banned.
- Asbestos consumption increased 35% between 2010 and 2011; roofing products account for 72% of consumption.
- One in every three deaths from occupational cancer is caused by asbestos.
- Several thousand deaths annually are attributed to asbestos exposure in the home.
- On average, there are 30 asbestos related deaths a day.
- Asbestos containing vermiculate insulation product called Zonolite is believed to be in 35 million homes, schools, and office buildings.
- Asbestos snow was used in the poppy scene in the Wizard of Oz.

Health Hazards of Asbestos

Exposure to asbestos increases your risk of developing lung disease as fibers become embedded and accumulate in lung tissue over time. There is no known safe level of exposure to asbestos, so contact with any amount of asbestos should be avoided. Disease symptoms may take several years to develop following exposure.

Health Effects of Asbestos

	Inhalation	Oral	Dermal
Death			
Systemic - Acute	●		●
Systemic - Intermediate	●		
Systemic - Chronic	●	●	
Immunologic/Lymphoretic	●		
Neurologic			
Reproductive			
Developmental			
Genotoxic	●		
Cancer	●	●	



www.oshatrain.org © 2016, OSHAcademy

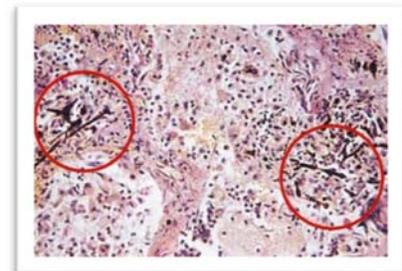
Asbestosis

Asbestosis is a serious, progressive, long-term non-cancer disease of the lungs. It is caused by inhaling asbestos fibers that lodge in the alveoli and cause the tissues to scar. The scarring makes it hard for oxygen to get into the blood.

Symptoms of asbestosis include shortness of breath and a dry, crackling sound in the lungs while inhaling. There is no effective treatment for asbestosis.

Lung Cancer

Lung cancer causes the largest number of deaths in the U.S. related to asbestos exposure. People who work in the mining, milling, manufacturing of asbestos, and those who use asbestos and its products are more likely to develop lung cancer than the general population.

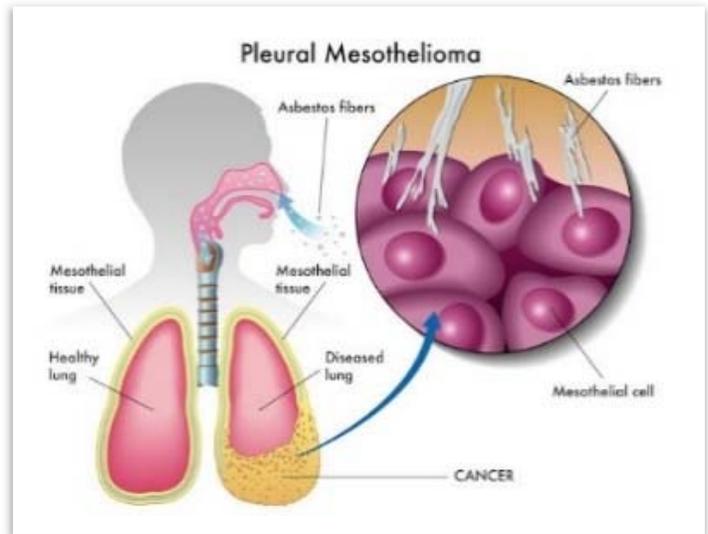


The most common symptoms of lung cancer are coughing and a change in breathing. Other symptoms include shortness of breath, persistent chest pains, hoarseness, and anemia.

Mesothelioma

Epidemiologic evidence has increasingly shown that all asbestos fiber types, including the most commonly used form of asbestos, chrysotile, causes mesothelioma in humans.

Mesothelioma is a rare form of cancer due to asbestos fibers lodging in the thin lining of the lungs causing tumors to grow in the lung, chest, abdomen, and heart. This disease may not show up until many years after asbestos exposure.



It is important to know the following things about exposure to asbestos:

- Airborne levels of asbestos are never to exceed legal worker exposure limits.
- There is no "safe" level of asbestos exposure for any type of asbestos fiber.
- Asbestos exposures as short in duration as a few days have caused mesothelioma in humans.
- Every occupational exposure to asbestos contributes to the risk of getting an asbestos related disease.

Module 1 Quiz

Use this quiz to self-check your understanding of the module content. You can also go online and take this quiz within the module. The online quiz provides the correct answer once submitted.

- 1. All buildings and homes, especially those built before _____ may contain asbestos-containing materials.**
 - a. 1970
 - b. 1980
 - c. 1990
 - d. 2000

- 2. Which term below describes material that contains more than 1% asbestos and is crumbly, dusty or powdery?**
 - a. Friable asbestos
 - b. Non-friable asbestos
 - c. Bonded asbestos
 - d. Actinolite asbestos

- 3. Which of the following is in over 95% of asbestos-containing materials and used in about 90% of all commercial processes?**
 - a. Amosite
 - b. Crocidolite
 - c. Chrysotile
 - d. tremolite

- 4. Why has asbestos been used in many different types of products?**
 - a. Asbestos does not rust or corrode.
 - b. Asbestos is inexpensive and light-weight
 - c. Asbestos is strong and heat resistant.
 - d. Asbestos is very resistant to UV radiation.

- 5. Which of the following is a disease of the lungs caused by inhaling asbestos fibers that lodge in the alveoli and cause the tissues to scar?**
- a. Mesothelioma
 - b. Lung Cancer
 - c. Melanoma
 - d. Asbestosis

Module 2: Employer Responsibilities

Employer Duty to Keep Employees Safe

OSHA's General Duty Clause states employers have a duty to provide a workplace and work that are safe and healthful to their employees. Employers are not supposed to expose employees to airborne asbestos fibers above OSHA's permissible exposure limit (PEL) or excursion limit (EL).

- the PEL is 0.1 fiber per cubic centimeter of air averaged over an 8-hour work period, and
- the EL is 1.0 fiber per cubic centimeter of air as averaged over a sampling period of thirty minutes.

It is important to know the employer must not use employee rotation as a means of compliance with OSHA's PEL or EL limits.

Establish an Asbestos Safety Program

When an employer knows that employees may be exposed to asbestos above the 8-hour PEL or 30-minute EL, it is important they develop and deploy an Asbestos Safety Program. Let's discuss some of the most important components of the Asbestos Safety Program.

Assessment and Analysis

Make sure to assess workplaces covered by the standards to determine if asbestos are present and if the work will generate airborne fibers.

How to Take a Sample to Send to a Lab

- Wet down the material with a light water mist before taking the sample. This reduces the potential release of asbestos fibers.
- Do not disturb the material any more than is necessary to take a small sample.
- Place the sample in a clean, "air-tight" container such as a zip-lock bag or small glass jar.
- Seal the container tightly.
- Use a damp paper towel to clean up any material on the outside of the container or that might have spilled onto the floor.
- Clearly label the container, stating where and when the sample was taken.

- Send the sample to a laboratory for analyses. Make sure to take one sample for each different type of suspect material.

You can inspect and analyze your company's asbestos safety program by checking out OSHA's [Asbestos Self-Inspection Checklist](#).

Exposure Monitoring

Employers should determine employee exposure to airborne asbestos by monitoring within the "breathing zone." The breathing zone is an area within 12 inches of the employee's nose and mouth. Air samples indicate:

- each employee's exposure averaged over an 8-hour work shift for each job classification in each work area, and
- the short-term 30-minute exposure in operations that are most likely to produce exposures over the excursion limit for each shift and in each work area.

Initial Monitoring: Employers should conduct initial monitoring if employees are, or expected to be, exposed to airborne asbestos at or above the PEL/EL.

Additional Monitoring: After initial monitoring, the employer should continue monitoring as frequently as necessary to assure accurate measurements. Conduct monitoring at least every six months if the employer expects employees to be exposed at or above the PEL/EL.

Changes in monitoring frequency: If the results of periodic monitoring statistically (repeatedly and accurately) indicates employee exposures are below the PEL/EL, the employer may discontinue the monitoring affected employees.

Changes in operations: The employer should begin additional monitoring if:

- a change in the production, process, control equipment, personnel or work practices that may result in new or additional exposures above the PEL/EL, or
- the employer has any reason to suspect a change may result in new or additional exposures above the PEL and/or excursion limit.



Notifying employees: The employer should notify the affected employee individually or by posting the results in an accessible area. The notification must:

- notify employees within 15 days,
- be in writing,
- include corrective actions to reduce employee exposure to or below the PEL/EL.

Observation of monitoring: The employer should provide affected employees and their designated representatives an opportunity to observe any monitoring of employee exposure to asbestos conducted.

When observation of the monitoring of employee exposure to asbestos requires entry into an area where the use of protective clothing or equipment is required, the observer must:

- be provided with and be required to use protective clothing and equipment, and
- comply with all other applicable safety and health procedures.

Communications

Hazard Communication: Proper hazard communication and demarcation with warning signs containing specified language in areas that have exposures above the PEL/EL is necessary. The same hazard communication provisions will protect employees who perform housekeeping operations in all three industries covered by OSHA standards.



Housekeeping Employees: Housekeeping employees, regardless of industry designation, should know whether building components they maintain might expose them to asbestos. Employees who perform housekeeping activities during and after construction activities are covered by OSHA's asbestos construction standard, [29 CFR 1926.1101](#). Building owners are often the only and/or best source of information concerning the presence of previously installed asbestos containing building materials. Therefore, they, along with employers of potentially exposed employees, must convey information and educate their employees.

Medical Surveillance Program

For employers in general industry, construction and shipyard operations, a Medical Surveillance Program is required for all workers who are or will be exposed to airborne concentrations of fibers of asbestos at or above the PEL/EL.



Questionnaires: Employees will complete medical questionnaires detailed in OSHA standards [1910.1001](#), [1926.1011](#), [1015.1001](#), Appendix D, if they are or will be exposed to airborne asbestos hazards above the PEL. These employees will also be included in their employer's medical surveillance program.

Examination: Employers need to provide a pre-placement exam before the employee begins work. Periodic examinations may also be required. The employer should make sure all medical examinations and procedures are performed by or under the supervision of a licensed physician. Here are some important points to remember about examinations:

- The employer must also pay for the examination.
- Properly train people who administer the pulmonary function in spirometry.
- The examination should be complete and emphasize the respiratory, cardiovascular, digestive systems, and a pulmonary function test.
- Perform periodic examinations at least annually and at the termination of employment.
- Examinations are not required if records prove the employee has successfully completed an examination, other than the pre-employment examination, within the past year.
- The physician performing the examination will provide a written opinion to the employer. The opinion will include recommendations and limitations placed on the employee.
- The employee will notify and provide the asbestos-exposure-related results of the examination to the employee within 30 days of receipt.

Multi-employer Worksites

On multi-employer worksites, an employer performing work requiring a regulated area should inform other employers of the following:

- the nature of the employer's work with asbestos and/or PACM,
- the existence of and requirements pertaining to regulated areas, and
- the measures taken to ensure that employees of such other employers are not exposed to asbestos.



The Creating/Controlling Employer. The contractor who creates or controls the source of asbestos contamination should abate the hazards. For example, if there is a significant breach of an enclosure containing Class I work, the employer responsible for erecting the enclosure should repair the breach immediately.

In addition, employers should comply with applicable protective provisions to protect their employees. For example, if employees working immediately adjacent to a Class I asbestos job are exposed to asbestos due to the inadequate containment of the job, their employer should either:

- remove the employees from the area until the enclosure breach is repaired; or
- perform an initial exposure assessment.

Other employers: All employers of employees working adjacent to regulated areas established by another employer on a multi-employer work site should daily check the following to make sure asbestos fibers do not migrate to adjacent areas:

- the integrity of the enclosure and/or
- the effectiveness of the control method

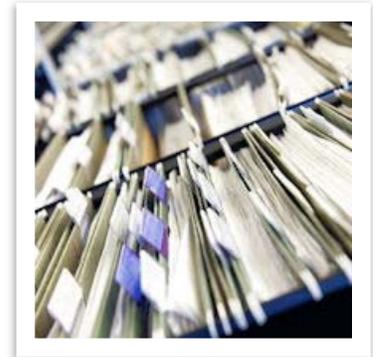
General contractors: All general contractors who expose workers to airborne asbestos are considered by OSHA to have supervisory authority over the work even though the general contractor is not qualified to serve as the asbestos "competent person."

As supervisors of the entire project, general contractors should:

- determine if the asbestos contractor is in compliance with OSHA standards, and
- require such contractor to come into compliance with this standard when necessary.

Recordkeeping

Keep records on exposure measurements obtained from monitoring for asbestos for at least 30 years. Retain worker medical surveillance records for the duration of employment plus 30 years. Recordkeeping requirements also include the following:



- Measurement records should include the date of the measurement, monitored operations, sampling and analysis methods, data on samples taken, type of respirators being worn, and employee personal information.
- Keep training records for at least one year beyond the last date of employment. Note: We recommend keeping training records for a longer period.
- If products made from or containing asbestos is exempted from OSHA standards, the employer should maintain records that support the exemption with accurate and objective data.

Module 2 Quiz

Use this quiz to self-check your understanding of the module content. You can also go online and take this quiz within the module. The online quiz provides the correct answer once submitted.

- 1. Employers should not expose employees to airborne asbestos fibers above a PEL of _____ fiber per cubic centimeter of air averaged over an 8-hour work period.**
 - a. 0.1
 - b. 0.5
 - c. 1.0
 - d. 1.5

- 2. Where should employers monitor to determine employee exposure to airborne asbestos?**
 - a. Within an area 3 feet in front of the worker
 - b. Anywhere in the 5-foot work zone
 - c. Within the 12-inch breathing zone
 - d. Outside the 24-inch work perimeter

- 3. When should the employer begin additional monitoring for asbestos exposure?**
 - a. When the employer receives notice from the EPA a test is required
 - b. When the employer has not measured exposure within 3 months
 - c. If an OSHA inspection cites the employer for related violations
 - d. If a change in the work process may result in exposures above the PEL/EL

- 4. How soon must the employer notify employees about the results of the asbestos-exposure-related examination.**
 - a. Immediately upon receipt
 - b. Within 5 days of receipt
 - c. No later than 15 days of receipt
 - d. Within 30 days of receipt

5. Who is responsible for abating the source of asbestos hazards on multi-employer worksites?

- a. The creating or host contractor
- b. The creating or controlling contractor
- c. The exposing or controlling contractor
- d. The exposing or host contractor

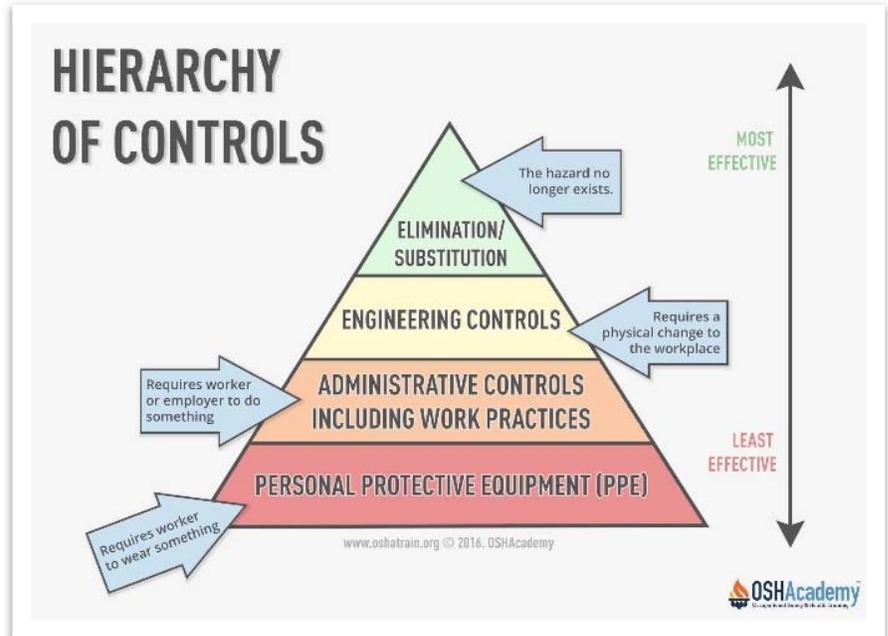
Module 3: Asbestos Exposure Control Plan

A very important major component of the Asbestos Safety Program is the written Asbestos Exposure Control Plan. This module will discuss some of the strategies in controlling exposure to airborne asbestos.

The Hierarchy of Controls

Controlling exposure to asbestos at work follows the same “Hierarchy of Controls” strategy that is common in all industries. Typically, a combination of these controls may be required in order to adequately manage and control worker exposure to asbestos.

If employees are exposed to asbestos above the PEL or EL, employers should protect those employees by using one or more of the following hierarchy of exposure controls:



Hazard controls: The first three controls focus on eliminating or reducing the asbestos hazard, itself:

1. eliminate the asbestos
2. substitute the asbestos
3. engineer design features in equipment

Exposure controls: The next three control strategies do not do anything to the hazard, but they do influence behavior to eliminate or reduce exposure to the hazard:

- a. develop administrative programs, etc.
- b. develop safe work practices

- c. provide respiratory protection and personal protective equipment

Elimination/Substitution

Use or replace materials containing asbestos with non-asbestos-containing material. For instance:

- Construct buildings that are completely asbestos-free.
- Replace old insulation with new non-asbestos-containing materials.

Engineering Controls

Equipment design such as isolation through enclosure, encapsulating, or using wet methods.

- **Encapsulation** by applying a thick, paint-like substance on material containing asbestos. Once, encapsulated, the asbestos fibers cannot become airborne.
- **Enclosure** by placing an airtight barrier around the asbestos.

Administrative Controls

Administrative controls do not reduce or eliminate the hazard. Rather, they attempt to control behaviors with safety programs, training, policies, procedures, and rules. Administrative controls include:

- programs for training, accountability, incident investigation, etc.
- policies for supervision of employees working in regulated areas such as a “no smoking” policy
- procedures for removing, handling, and storing asbestos containing materials
- mandatory safety rules to ensure employees are not exposed to airborne asbestos

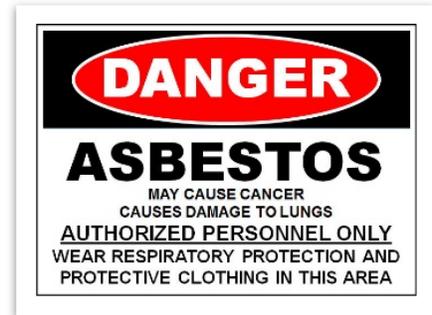
Regulated Areas

Establishing regulated areas is the primary administrative control used to control behaviors to reduce exposure to asbestos.

Demarcation: A demarcation fixes a boundary or limits of something. The regulated area should be demarcated in any manner that minimizes the number of persons within the area and protects persons outside the area from exposure to airborne asbestos. Where critical barriers or negative pressure enclosures are used, they may demarcate the regulated area.

Warning Signs: Provide warning signs like that shown in the image to the right and display them at each regulated area. Here are some points to remember with warning signs:

- Post warning signs at all approaches to regulated areas so an employee may read the signs and take necessary protective steps before entering the area.
- If the use of respirators and protective clothing is required in the regulated, the warning signs should include the phrase: “WEAR RESPIRATORY PROTECTION AND PROTECTIVE CLOTHING IN THIS AREA.”
- Ensure employees working in and contiguous to regulated areas comprehend the warning signs. Means to ensure employee comprehension may include the use of foreign languages, pictographs, and graphics.



Access: Access to regulated areas is limited to authorized persons and to persons authorized by OSHA standards.

Respirators: Supply all persons entering a regulated area where employees are required to wear respirators with a respirator selected in accordance with OSHA standards.

Prohibited activities: The employer should ensure employees do not eat, drink, smoke, chew tobacco or gum, or apply cosmetics in the regulated area.

Qualified Persons: The employer should have a qualified person supervise all asbestos work performed within regulated areas.

Work Classifications

All Class I, II and III asbestos work discussed below should be conducted within regulated areas. Perform all other operations within a regulated area if airborne concentrations of asbestos exceed, or there is a reasonable possibility they may exceed a PEL.

Class I work is the most hazardous class of asbestos jobs because it releases asbestos fibers into the air. This work involves the removal, encapsulation, or enclosure of asbestos-containing material (ACM) or presumed asbestos-containing material (PACM).



Class 1 work usually involves removal of thermal insulation. Thermal insulation includes asbestos-containing materials applied to pipes, boilers, tanks, ducts, or other structural components to prevent heat loss or gain. Surfacing materials may include decorative plaster on ceilings, acoustical materials on decking, or fireproofing on structural members.

Employees performing work in a Class 1 regulated area should wear suits and respirators. A decontamination area should be at the containment site. Consider all waste materials as hazardous asbestos waste and carefully dispose of it.

Class II asbestos work includes the removal of ACMs other than thermal insulation, such as flooring and roofing materials. Removing intact incidental roofing materials such as cements, mastics, coatings, and flashings is not regulated as Class II. Examples of Class II work include removal of floor or ceiling tiles, siding, roofing, or transite panels.

When a designated competent person deems roofing material being removed as intact, the roofing contractor may make a negative exposure assessment and avoid initial monitoring if it meets the following conditions:

1. Employees have been trained.
2. The work practices described in the rule are strictly followed.

Class III asbestos work includes repair and maintenance operations where ACM or PACM are disturbed. The primary purpose of the work is not to remove or disturb asbestos, although some removal or disturbance may occur.

Examples of Class III work include repairing broken pipes that have asbestos wrapping, installing floor anchors in an area with asbestos floor tile, or installing electrical conduit through walls with asbestos insulation.

Class IV operations include maintenance and custodial activities in which employees contact but do not disturb ACM. These activities must be related to the construction project or to Class I, II, or III activities. Custodial work that is not related to a construction project or Class I, II, or III work is covered by the asbestos [general industry](#) standard.

OSHA standards cover more specific requirements for regulated areas in [general industry](#), [construction](#), and [shipyard operations](#). Be sure to reference OSHA standards for these requirements.

Work Practice Controls

Work procedures include one or more safe practices to make sure employees are not exposed airborne asbestos fibers. Work practice controls include:



- Use wet methods to handle, mix, apply, remove, cut or score asbestos containing material.
- Never remove materials containing asbestos from bags, cartons, or other containers in which they are shipped, without being either wetted, or enclosed, or ventilated,
- Never use compressed air to remove asbestos or materials containing asbestos, unless you are using the compressed air in conjunction with a ventilation system, which effectively captures the dust cloud created by the compressed air.
- Never sand asbestos-containing material.
- Properly remove contaminated clothing and shower only in approved change rooms.
- Store contaminated clothing only in closed, impermeable and properly labeled bags or containers to prevent dispersion of asbestos.
- Clean contaminated clothing in a manner that prevents exposure to asbestos to employees and others.
- Never smoke in areas where it is possible to be exposed to airborne asbestos.

Respiratory Protection and Protective Equipment

Respiratory Protection: The employer should implement a respiratory protection program. Under this program, the employer should do the following:

- Select, and provide to employees, the appropriate respirators. Employers should not select or use filtering face piece respirators for protection against asbestos fibers.
- Provide High Efficiency Particulate Air (HEPA) filters for powered and non-powered air-purifying respirators.
- Provide an employee with a tight-fitting, powered air-purifying respirator (PAPR) instead of a negative pressure respirator when the employee chooses to use a PAPR and it provides adequate protection to the employee.

- Make employees are not assigned to tasks requiring the use of respirators if, based on their most recent medical examination, the examining physician determines that:
 - the employee will be unable to function normally using a respirator, or
 - the safety or health of the employee or other employees will be impaired by the use of a respirator.
- Assign employees to another job or given the opportunity to transfer to a different position not requiring the use of respirators if they cannot wear a respirator.

Protective Equipment: The employer should provide personal protective equipment including coveralls, gloves, head and foot covering, face shields, and vented goggles.

Prohibited Activities

Do not use the following work practices and engineering controls for work related to asbestos or for work that disturbs ACM or PACM, regardless of measured levels of asbestos exposure or the results of initial exposure assessments:

- high-speed abrasive disc saws that are not equipped with point of cut ventilator or enclosures with HEPA filtered exhaust air
- compressed air used to remove asbestos, or materials containing asbestos, unless using the compressed air in conjunction with an enclosed ventilation system designed to capture the dust cloud created by the compressed air
- dry sweeping, shoveling or other dry cleanup of dust and debris containing ACM and PACM
- rotating employees as a means of reducing employee exposure to asbestos
- vacuuming with non-HEPA filtered equipment or emptying vacuum equipment in a manner that allows reentry of asbestos into the workplace
- sanding of asbestos-containing flooring/deck material

For more information on general respiratory protection requirements, see [OSHAcademy Course 756, Respiratory Protection](#).

Module 3 Quiz

Use this quiz to self-check your understanding of the module content. You can also go online and take this quiz within the module. The online quiz provides the correct answer once submitted.

- 1. Given the control strategies listed below, which control strategy should be the employer's highest priority?**
 - a. Administrative controls
 - b. Engineering controls
 - c. Safe work practices
 - d. Respiratory protection

- 2. Which of the following is the term to describe applying a thick, paint-like substance on material containing asbestos?**
 - a. Coating
 - b. Frillation
 - c. Isolation
 - d. Encapsulation

- 3. Working in which of the following work classes is the most hazardous because asbestos fibers will be released into the air? a. Class I.**
 - a. Class I
 - b. Class II
 - c. Class III
 - d. Class IV

- 4. Wet methods to handle, mix, apply, remove, cut or score asbestos-containing-material is an example of using ____.**
 - a. Elimination and Substitution
 - b. Administrative controls
 - c. Engineering controls
 - d. Work practice controls

5. Which of the following is a prohibited work practice unless it is used in conjunction with an enclosed ventilation system?

- a. Using compressed air to remove asbestos
- b. Using wet methods to control asbestos dust
- c. Grinding ACM outdoors
- d. Using dust vacuum systems indoors

Module 4: Asbestos Training Program Requirements

Asbestos training is an extremely important component of the Asbestos Safety Program. The employer should develop it so employees know why it is important to be protected against airborne asbestos. Some important things to remember are:

- The training program should include initial training before the employee is exposed at or above the PEL and/or EL, and annual training thereafter.
- Provide the training at no cost to the employee.
- Employers must ensure employee participation in the program.

Conduct all training in a manner and language in which the worker is able to understand and includes the following topics:

- health effects of asbestos exposure;
- the relationship between smoking and asbestos in producing lung cancer;
- methods for recognizing asbestos, to presume certain building materials contain asbestos;
- the quantity, location, manner of use, release, and storage of asbestos, and the specific nature of operations which could result in exposure to asbestos;
- the engineering controls and work practices associated with the employee's job assignment;
- the specific procedures implemented to protect employees from exposure to asbestos, such as appropriate work practices, emergency and clean-up procedures, and personal protective equipment to be used;
- the purpose, proper use, and limitations of respirators and protective clothing, if appropriate;
- the purpose of, and a description of the medical surveillance program;
- the content of OSHA's asbestos standards for [general industry](#), [construction](#), or [shipyard operations](#), as appropriate;
- smoking cessation program material and other public health organization information; and,
- posting signs and affixing labels and the meaning of the required sign and label legends.

Training for Work in Regulated Areas

When OSHA requires training for work in regulated areas, the employer should train each employee who is likely to be exposed in excess of a PEL and each employee who performs Class I through IV asbestos operations.

Class I Training

Employees removing asbestos-containing materials (ACM) or presumed asbestos containing materials (PACM) such as thermal system insulation must be trained in accordance with EPA's Model Accreditation Plan (MAP) for asbestos abatement worker. This training is outlined in [40 CFR 763](#). This is a four-day training course that includes lectures, demonstrations, at least 14 hours of hands-on training, individual respirator fit testing, course review, and an examination. This level requires eight-hour annual refresher training.

Class II Training

Employees engaged in work involving ACM or PACM, such as roofing, flooring, siding materials, ceiling tiles, or transite panels, must be trained in:

- the methods of recognizing asbestos,
- the health effects of asbestos,
- the relationship between smoking and asbestos in producing lung cancer,
- the nature of operations that could result in exposure to asbestos, and
- the importance of all protective controls to minimize exposure (including engineering, work practice, PPE, etc).

Training must also include:

- the use and limitations of control measures;
- medical surveillance program requirements;
- the content of the asbestos standard, including appendices, smoking cessation programs, and
- the requirements for posting signs and affixing labels; and the meaning of any legends on those signs and labels.

This training must last at least eight hours and include hands-on training. Employees must have an annual refresher, although there is no specific time duration for the refresher training.

Class III Training

Maintenance and repair work where ACM or PACM may be disturbed requires training that includes:

- information regarding asbestos and its various uses and forms;
- the health effects associated with asbestos exposure;
- the location of ACM and PACM identified throughout each building in which the employee works;
- recognition of damage, deterioration, and delamination of ACM and PACM;
- information on respiratory protection; information from [40 CFR 763.91](#), [40 CFR 763.92](#), [40 CFR 763.93](#); and
- information in the Hazard Communication Standard.

The training must include hands-on of work practices, control measures, and protective equipment. This training must be at least 16 hours. Employees must have an annual refresher, although there is no specific time duration for the refresher training.

The competent person can decide that this training is inappropriate for workers, in which case employers can use an alternative training method. The training must also include:

- methods of recognizing asbestos,
- the health effects of asbestos,
- the relationship between smoking and asbestos in producing lung cancer,
- the nature of operations that could result in exposure to asbestos, and
- the importance of all protective controls to minimize exposure (including engineering, work practice, PPE, etc).

Training must also include:

- the use and limitations of these controls;
- medical surveillance program requirements;
- the content of the asbestos standard including appendices,
- smoking cessation programs, and

- the requirements for posting signs and affixing labels; and the meaning of any legends on those signs and labels.

Class IV Training

Training for employees performing Class IV operations should be consistent with EPA requirements for training of local education agency maintenance and custodial staff. Conduct two-hour initial and annual refresher training and include information concerning:

- the locations of thermal system insulation and surfacing ACM/PACM, and asbestos-containing flooring material, or flooring material where the absence of asbestos has not yet been certified;
- the recognition of damage, deterioration, and delamination of asbestos containing building materials (such a course shall take at least 2 hours)

Training for Competent Persons in Construction

A competent person is someone who is capable of identifying existing and predictable hazards in the surroundings or working conditions that are unsanitary, hazardous, or dangerous to employees, and who is authorized to take prompt corrective measures to eliminate them.

For asbestos work, in addition to the above, the competent person is capable of identifying existing asbestos hazards in the workplace and selecting the appropriate control strategy for asbestos exposure, and has the authority to take prompt corrective actions to eliminate them.

Class I and II Competent Person Training

Competent persons supervising Class I or Class II work must be trained in accordance with EPA's Model Accreditation Plan (MAP) for asbestos supervisors. This training is outlined in [40 CFR 763](#). This is a five-day training course includes lectures, demonstrations, at least 14 hours of hands-on training, individual respirator fit testing, course review, and an examination. This also requires eight-hour annual refresher training.

Class III and IV Competent Person Training

Train competent persons for Class III and Class IV work at the same level as a Class III worker.

Access to Training Materials

The employer should make a copy of OSHA's asbestos standard available to employees. The employer should also provide, when requested, all materials related to the information and training program to OSHA. The following requirements also apply:

- The employer or building owner does not have to provide asbestos-related information to employees if:
 - they can prove through inspection results that PACM does not contain asbestos, or
 - tests on PACM proves that no ACM is present in the material.

Module 4 Quiz

Use this quiz to self-check your understanding of the module content. You can also go online and take this quiz within the module. The online quiz provides the correct answer once submitted.

- 1. Which of the following is not true about asbestos safety training?**
 - a. Training must occur prior to exposure to asbestos
 - b. The employer must ensure employee participation
 - c. Initial and annual training is required
 - d. Participation may be voluntary as needed

- 2. Employees removing asbestos-containing materials (ACM) or presumed asbestos containing materials (PACM) must receive Class I training in accordance with_____.**
 - a. ANSI 490.1, Section 3, Asbestos Training Requirements
 - b. OSHA's Course 7500, Asbestos Worker training
 - c. EPA's Model Accreditation Plan (MAP) for asbestos abatement worker
 - d. DHS Training Requirements for Asbestos Workers

- 3. When OSHA requires training for work in regulated areas, the employer should train each employee who is likely to be exposed in excess of a PEL and each employee who _____**
 - a. perform Class I through IV asbestos operations
 - b. is exposed to silica dust in addition to asbestos
 - c. must perform cleanup work outdoors
 - d. may be exposed to an EL of 0.1

- 4. For asbestos work, the competent person must be able to do each of the following except _____.**
 - a. identify existing asbestos hazards
 - b. select the appropriate control strategy
 - c. implement corrective actions
 - d. report violations to OSHA

- 5. The employer should make a copy of OSHA's asbestos standard available to _____ and all materials related to the information and training program to _____.**
- a. NIOSH, OSHA
 - b. physicians, employees
 - c. employees, OSHA
 - d. OSHA, EPA

Module 5: Brake and Clutch Repair Work

Note: We know you all don't do the work discussed in this module, but we think it's important that we all have a general awareness of the hazards associated with brake and clutch repair work.

Workers who service and repair automotive brakes and clutches may face significant exposure to asbestos, especially when using an air hose to clean brake drums. Many brakes and clutches used in new and recent model automobiles do not contain asbestos. However, it has not been totally eliminated. Some reports have indicated that many mechanics and employees in the automotive repair shops as well as do-it-yourselfers are unaware asbestos may be present in both old and replacement brakes and clutches.



Regulatory Requirement

OSHA's asbestos standard requires the use of controls and safe work practices when employees work with brake shoes and clutches that contain asbestos. This module covers some of the basic requirements in the standard. To obtain detailed information on these requirements check out [1910.1001\(f\)\(3\)](#) and [Appendix E](#), Work Practices and Engineering Controls for Automotive Brake and Clutch Inspection, Disassembly, Repair and Assembly.

Control Methods

All automotive brake and clutch repair facilities must comply with the OSHA asbestos standard. The proper use of engineering controls and work practices by properly trained employees working on automotive brakes and clutches will reduce their asbestos exposure below the PEL.

Respiratory protection is not required during brake and clutch jobs where the control methods are used and the PEL is not exceeded.

OSHA requires one of the following work methods (or an equivalent method) if a shop works on more than five pairs of brakes or five clutches per week:

- **Negative-Pressure Enclosure/HEPA Vacuum System Method:** This type of enclosure and vacuum system has a special box with clear plastic walls or windows, which fits tightly around a brake or clutch assembly to prevent asbestos exposure.

- **Low Pressure/Wet Cleaning Method:** This specially designed low-pressure spray equipment wets down the brake assembly and catches the runoff in a special basin to prevent airborne brake dust from spreading in the work area.
- **Wet Wipe Method:** If a shop works on no more than five pairs of brakes or five clutches per week, OSHA allows this method instead. It involves using a spray bottle or other device capable of delivering a fine mist of water, or amended water (water with a detergent), at low pressure to wet all brake and clutch parts. The brakes can then be wiped clean with a cloth. The use of dry brushing during wet method operations is prohibited.

To learn more about the specific procedures for the above methods, check out OSHA's [Asbestos-Automotive Brake and Clutch Repair Safety Bulletin](#).

Best Practices

Mechanics should assume all brakes have asbestos-type shoes. Worn non-asbestos-type brake shoes cannot be readily distinguished from asbestos-type shoes. If a mechanic assumes incorrectly a shoe is a non-asbestos-type and fails to utilize brake dust control procedures, increased asbestos exposure may result. Follow these practices when working on automotive brakes or clutches:

- Be trained in the correct and most effective way to use the control system selected by the facility manager or owner. The danger of increased exposure to asbestos as the result of improper work practices should be explained. Examples of improper work practice include: directing an air nozzle at an enclosure seal, placing the nozzle of a spray mist too close to the work surface, not placing the vacuum nozzle close enough to the contaminated surface, turning on the vacuum pumps before positioning the vacuum enclosure over the wheel and leaving them on when removing the enclosure, and splashing or spilling contaminated solutions on the floor. A control system must always be used and consistent work procedures are essential.
- Use pre-ground, ready-to-install parts when possible. If asbestos-containing friction materials must be drilled, grooved, cut, beveled, or lathe-turned, low speeds should always be used to keep down the amount of dust created. All machinery should have an adequate, HEPA equipped local exhaust dust collection system to prevent asbestos exposures and shop contamination. Immediately clean spills of brake dust or contaminated solutions by HEPA vacuuming or wet mopping.
- Develop a maintenance program for the system used to control brake dust. Maintenance should include checking and replacing seals, nozzles, other hardware,

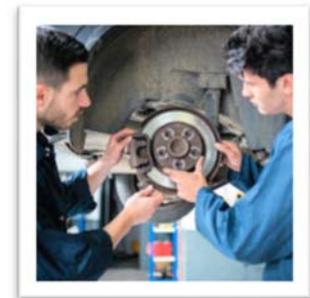
contaminated filters and solutions. Any deficiencies such as ineffective seals, or air nozzles should be repaired.

- Collect, recycle, and dispose of asbestos contaminated waste, scrap, debris, bags, containers, equipment, and clothing in sealed impermeable bags, or other closed, impermeable containers.
- To reduce the possibility of asbestos contamination, periodically clean workbenches, floors, etc.
- Perform brake and clutch work in an area isolated from other work areas.
- Post signs informing employees not to eat, drink, or smoke in the brake and clutch work area. Asbestos and other potentially toxic materials can be ingested or inhaled during these activities.
- Stress personal hygiene, such as frequent hand washing with soap or detergent.
- Provide a laundry service with facilities for cleaning asbestos contaminated work clothing.
- Change from soiled, contaminated work clothes into clean clothes before leaving work. Removing clothing provides protection against bringing asbestos into the home environment.

Training

Effective asbestos safety training should include at least the following:

- how to properly perform a task,
- how each work practice reduces potential exposure, and
- how employees can benefit from these practices.



No matter which control system is used, employees must be trained in how to use it properly. Employees who can recognize and control hazards can better protect themselves from asbestos exposure. Training will also be more effective when supervisors frequently reinforce the training and work practices by providing feedback and recognition.

Module 5 Quiz

Use this quiz to self-check your understanding of the module content. You can also go online and take this quiz within the module. The online quiz provides the correct answer once submitted.

- 1. Respiratory protection is not required during brake and clutch jobs where the control methods are used and the _____.**
 - a. MUC is less than the PEL
 - b. STIL is 1.0 ppm or less
 - c. SKEL is .5 ppm or greater
 - d. PEL is not exceeded

- 2. OSHA requires approved work methods (or an equivalent method) if a shop works on more than _____ of brakes or five clutches per week.**
 - a. three
 - b. five
 - c. five pairs
 - d. two pairs

- 3. Which work method is approved by OSHA if a shop works on no more than five pairs of brakes or five clutches per week?**
 - a. Wet Wipe Method
 - b. Negative-Pressure Dry Spray Method
 - c. Low Pressure/Wet Foaming Method
 - d. Non-HEPA Vacuum System Method

- 4. Mechanics should assume _____ brakes have asbestos-type shoes**
 - a. some
 - b. all
 - c. no
 - d. many

5. Effective asbestos safety training should include all of the following, EXCEPT ____.

- a. how to properly perform a task
- b. how to report non-compliance to supervisors
- c. how employees can benefit from these practices
- d. how each work practice reduces potential exposure

Glossary

Abatement means the removal, encapsulation, enclosure, repair or demolition of ACM.

Accessible when referring to ACM means that the material is subject to disturbance by school building occupants or custodial or maintenance personnel in the course of their normal activities.

ACM waste. Asbestos-containing materials. Waste materials that contain friable asbestos in an amount of 1% or greater by weight, area, or count, and asbestos-contaminated materials (e.g., protective clothing and equipment).

Accredited. The analytical laboratory used for asbestos analysis must participate in a quality-assurance program administered by the American Industrial Hygiene Association (AIHA) or the National Institute of Occupational Safety and Health (NIOSH)

Air erosion means the passage of air over friable ACBM which may result in the release of asbestos fibers.

Amended water means water to which surfactant (wetting agent) has been added to increase the ability of the liquid to penetrate ACM.

Aggressive method means removal or disturbance of building material by sanding, abrading, grinding or other method that breaks, crumbles, or disintegrates intact ACM.

Asbestos is a generic term referring to naturally occurring fibrous mineral silicates including chrysotile, amosite, crocidolite, tremolite asbestos, anthophyllite asbestos, actinolite asbestos, and any of these minerals that have been chemically treated and/or altered.

Asbestos-containing material (ACM) means any material containing more than 1% asbestos by weight, area, or count.

Asbestos-containing building material (ACBM) means surfacing ACM, thermal system insulation ACM, or miscellaneous ACM that is found in or on interior structural members or other parts of a school building.

Asbestos debris means pieces of ACBM that can be identified by color, texture, or composition, or means dust, if the dust is determined by an accredited inspector to be ACM.

Authorized person means any person authorized by the employer and required by work duties to be present in regulated areas.

Bonded asbestos is held within another material and cannot be crumbled, pulverized or reduced to powder using the hands.

Building/facility owner is the legal entity, including a lessee, which exercises control over management and record keeping functions relating to a building and/or facility in which activities covered by this standard take place.

Certified Industrial Hygienist (CIH) means one certified in the practice of industrial hygiene by the American Board of Industrial Hygiene.

Class I asbestos work means activities involving the removal of TSI and surfacing ACM and PACM.

Class II asbestos work means activities involving the removal of ACM which is not thermal system insulation or surfacing material. This includes, but is not limited to, the removal of asbestos-containing wallboard, floor tile and sheeting, roofing and siding shingles, and construction mastics.

Class III asbestos work means repair and maintenance operations, where "ACM", including TSI and surfacing ACM and PACM, is likely to be disturbed.

Class IV asbestos work means maintenance and custodial activities during which employees contact but do not disturb ACM or PACM and activities to clean up dust, waste and debris resulting from Class I, II, and III activities.

Clean room means an uncontaminated room having facilities for the storage of employees' street clothing and uncontaminated materials and equipment.

Closely resemble means that the major workplace conditions which have contributed to the levels of historic asbestos exposure, are no more protective than conditions of the current workplace.

Competent person means, in addition to the definition in 29 CFR 1926.32 (f), one who is capable of identifying existing asbestos hazards in the workplace and selecting the appropriate control strategy for asbestos exposure, who has the authority to take prompt corrective measures to eliminate them, as specified in 29 CFR 1926.32(f): in addition, for Class I and Class II work who is specially trained in a training course which meets the criteria of EPA's Model Accreditation Plan (40 CFR 763) for supervisor, or its equivalent and, for Class III and Class IV work, who is trained in a manner consistent with EPA requirements for training of local education agency maintenance and custodial staff as set forth at 40 CFR 763.92 (a)(2).

Composite means several individual parts combining to form one integral system. For example, a composite asbestos sample of a Sheetrock wall system with asbestos-containing joint compound would be a sample of the entire wall material, (i.e., joint compound, tape, and wallboard combined).

Containment means the construction of an impermeable barrier around ACM to prevent the release of fibers into occupied areas during abatement. In addition, a containment controls the amount of incoming air so that a negative pressure in the work area can be maintained.

Critical barrier means one or more layers of plastic sealed over all openings into a work area or any other similarly placed physical barrier sufficient to prevent airborne asbestos in a work area from migrating to an adjacent area.

Damaged friable miscellaneous ACM means friable miscellaneous ACM which has deteriorated or sustained physical injury such that the internal structure (cohesion) of the material is inadequate or, if applicable, which has delaminated such that its bond to the substrate (adhesion) is inadequate or which for any other reason lacks fiber cohesion or adhesion qualities. Such damage or deterioration may be illustrated by the separation of ACM into layers; separation of ACM from the substrate; flaking, blistering, or crumbling of the ACM surface; water damage; significant or repeated water stains, scrapes, gouges, mars or other signs of physical injury on the ACM. Asbestos debris originating from the ACBM in question may also indicate damage.

Damaged friable surfacing ACM means friable surfacing ACM which has deteriorated or sustained physical injury such that the internal structure (cohesion) of the material is inadequate or which has delaminated such that its bond to the substrate (adhesion) is inadequate, or which, for any other reason, lacks fiber cohesion or adhesion qualities. Such damage or deterioration may be illustrated by the separation of ACM into layers; separation of ACM from the substrate; flaking, blistering, or crumbling of the ACM surface; water damage; significant or repeated water stains, scrapes, gouges, mars or other signs of physical injury on the ACM. Asbestos debris originating from the ACBM in question may also indicate damage.

Damaged or significantly damaged thermal system insulation ACM means thermal system insulation ACM on pipes, boilers, tanks, ducts, and other thermal system insulation equipment where the insulation has lost its structural integrity, or its covering, in whole or in part, is crushed, water-stained, gouged, punctured, missing, or not intact such that it is not able to contain fibers. Damage may be further illustrated by occasional punctures, gouges or other signs of physical injury to ACM; occasional water damage on the protective coverings/jackets; or exposed ACM ends or joints. Asbestos debris originating from the ACBM in question may also indicate damage.

Decontamination area means an enclosed area adjacent and connected to the regulated area and consisting of an equipment room, shower area, and clean room, which is used for the decontamination of workers, materials, and equipment that are contaminated with asbestos.

Demolition means the wrecking or taking out of any load-supporting structural member and any related razing, removing, or stripping of asbestos products.

Disturbance means activities that disrupt the matrix of ACM or PACM, crumble or pulverize ACM or PACM, or generate visible debris from ACM or PACM. Disturbance includes cutting away small amounts of ACM and PACM, no greater than the amount which can be contained in one standard sized glove bag or waste bag in order to access a building component. In no event should the amount of ACM or PACM so disturbed exceed that which can be contained in one glove bag or waste bag which should not exceed 60 inches in length and width.

Employee exposure means that exposure to airborne asbestos that would occur if the employee was not using respiratory protective equipment.

Encapsulation means the treatment of ACBM with a material that surrounds or embeds asbestos fibers in an adhesive matrix to prevent the release of fibers, as the encapsulant creates a membrane over the surface (bridging encapsulant) or penetrates the material and binds its components together (penetrating encapsulant).

Enclosure means an airtight, impermeable, permanent barrier around ACBM to prevent the release of asbestos fibers into the air.

Equipment room (change room) means a contaminated room located within the decontamination area that is supplied with impermeable bags or containers for the disposal of contaminated protective clothing and equipment.

Fiber means a particulate form of asbestos 5 micrometers or longer, with a length-to-diameter ratio of at least 3 to 1.

Friable when referring to material in a school building means that the material, when dry, may be crumbled, pulverized, or reduced to powder by hand pressure, and includes previously nonfriable material after such previously nonfriable material becomes damaged to the extent that when dry it may be crumbled, pulverized, or reduced to powder by hand pressure.

Friable asbestos is crumbly, dusty or powdery. It can be crumbled, pulverized or reduced to powder form using the hands. Examples include: sprayed coatings or insulation, lagging, loose asbestos or asbestos in its raw state.

Functional space means a room, group of rooms, or homogeneous area (including crawl spaces or the space between a dropped ceiling and the floor or roof deck above), such as classroom(s), a cafeteria, gymnasium, hallway(s), designated by a person accredited to prepare management plans, design abatement projects, or conduct response actions.

Glovebag means not more than a 60 x 60-inch impervious plastic bag-like enclosure affixed around an asbestos-containing material, with glove-like appendages through which material and tools may be handled.

High-efficiency particulate air (HEPA) filter means a filter capable of trapping and retaining at least 99.97 percent of 0.3 micrometer diameter mono-disperse particles.

Homogeneous area means an area of surfacing material or thermal system insulation that is uniform in color and texture.

Industrial hygienist means a professional qualified by education, training, and experience to anticipate, recognize, evaluate and develop controls for occupational health hazards.

Intact means that the ACM has not crumbled, been pulverized, or otherwise deteriorated so that the asbestos is no longer likely to be bound with its matrix.

Miscellaneous ACM means miscellaneous material that is ACM in a school building.

Miscellaneous material means interior building material on structural components, structural members or fixtures, such as floor and ceiling tiles, and does not include surfacing material or thermal system insulation.

Modification means a changed or altered procedure, material or component of a control system, which replaces a procedure, material or component of a required system. Omitting a procedure or component, or reducing or diminishing the stringency or strength of a material or component of the control system is not a modification.

Negative Initial Exposure Assessment means a demonstration by the employer, that employee exposure during an operation is expected to be consistently below the PELs.

Non-friable means material in a school building which when dry may not be crumbled, pulverized, or reduced to powder by hand pressure.

Operations and maintenance program means a program of work practices to maintain friable ACBM in good condition, ensure clean up of asbestos fibers previously released, and prevent further release by minimizing and controlling friable ACBM disturbance or damage.

PACM means presumed asbestos containing material.

Potential damage means circumstances in which:

- (1) Friable ACBM is in an area regularly used by building occupants, including maintenance personnel, in the course of their normal activities.
- (2) There are indications that there is a reasonable likelihood that the material or its covering will become damaged, deteriorated, or delaminated due to factors such as changes in building use, changes in operations and maintenance practices, changes in occupancy, or recurrent damage.

Potential significant damage means circumstances in which:

- (1) Friable ACBM is in an area regularly used by building occupants, including maintenance personnel, in the course of their normal activities.
- (2) There are indications that there is a reasonable likelihood that the material or its covering will become significantly damaged, deteriorated, or delaminated due to factors such as changes in building use, changes in operations and maintenance practices, changes in occupancy, or recurrent damage.
- (3) The material is subject to major or continuing disturbance, due to factors including, but not limited to, accessibility or, under certain circumstances, vibration or air erosion.

Presumed asbestos containing material means thermal system insulation and surfacing material found in buildings constructed no later than 1980.

Preventive measures means actions taken to reduce disturbance of ACBM or otherwise eliminate the reasonable likelihood of the material becoming damaged or significantly damaged.

Project Designer means a person who has successfully completed the training requirements for an abatement project designer established by 40 U.S.C. Sec. 763.90(g).

Regulated area means an area established by the employer to demarcate areas where airborne concentrations of asbestos exceed, or there is a reasonable possibility they may exceed, the permissible exposure limits.

Removal means:

- (1) All operations where ACM and/or PACM is taken out or stripped from structures or substrates, and includes demolition operations.

(2) The taking out or the stripping of substantially all ACBM from a damaged area, a functional space, or a homogeneous area in a school building.

Renovation means the modifying of any existing structure, or portion thereof.

Repair means:

(1) Overhauling, rebuilding, reconstructing, or reconditioning of structures or substrates, including encapsulation or other repair of ACM or PACM attached to structures or substrates.

(2) Returning damaged ACBM to an undamaged condition or to an intact state so as to prevent fiber release.

Response action means a method, including removal, encapsulation, enclosure, repair, operations and maintenance, that protects human health and the environment from friable ACBM.

Routine maintenance area means an area, such as a boiler room or mechanical room, that is not normally frequented by students and in which maintenance employees or contract workers regularly conduct maintenance activities.

Significantly damaged friable miscellaneous ACM means damaged friable miscellaneous ACM where the damage is extensive and severe.

Significantly damaged friable surfacing ACM means damaged friable surfacing ACM in a functional space where the damage is extensive and severe.

Surfacing ACM means surfacing material which contains more than 1 percent asbestos.

Surfacing material means material that is sprayed, troweled-on or otherwise applied to surfaces (such as acoustical plaster on ceilings and fireproofing materials on structural members, or other materials on surfaces for acoustical, fireproofing, and other purposes).

Thermal System Insulation (TSI) means ACM applied to pipes, fittings, boilers, breeching, tanks, ducts or other structural components to prevent heat loss or gain.

Thermal System Insulation ACM means thermal system insulation which contains more than 1 percent asbestos.

Threshold-limit value – short term exposure level (TLV-STEL) means the maximum concentration to which workers can be continuously exposed for a period of up to 15 minutes without suffering irritation, chronic or irreversible tissue change, or narcosis of sufficient degree to increase accident proneness, impair self-rescue, or materially reduce work efficiency,

provided that no more than four excursions per day are permitted, with at least 60 minutes between exposure periods, and provided that the daily PEL also isn't exceeded. The STEL is a maximum allowable concentration, or ceiling, not to be exceeded during the 15-minute excursion.

Vibration means the periodic motion of friable ACBM which may result in the release of asbestos fibers.

Endnotes

1. OSHA Publication 35-7, OSHA Fact Sheet – Asbestos, OSHA (2014), OSHA. Retrieved from: <https://www.osha.gov/Publications/OSHA3507.pdf>
2. No Safe Level of Asbestos Exposure, Asbestos Network. Retrieved from: <http://www.asbestosnetwork.com/Worker-Safety/>
3. When is Asbestos Dangerous? Oregon State University. Retrieved from: <http://oregonstate.edu/ehs/asb-when>