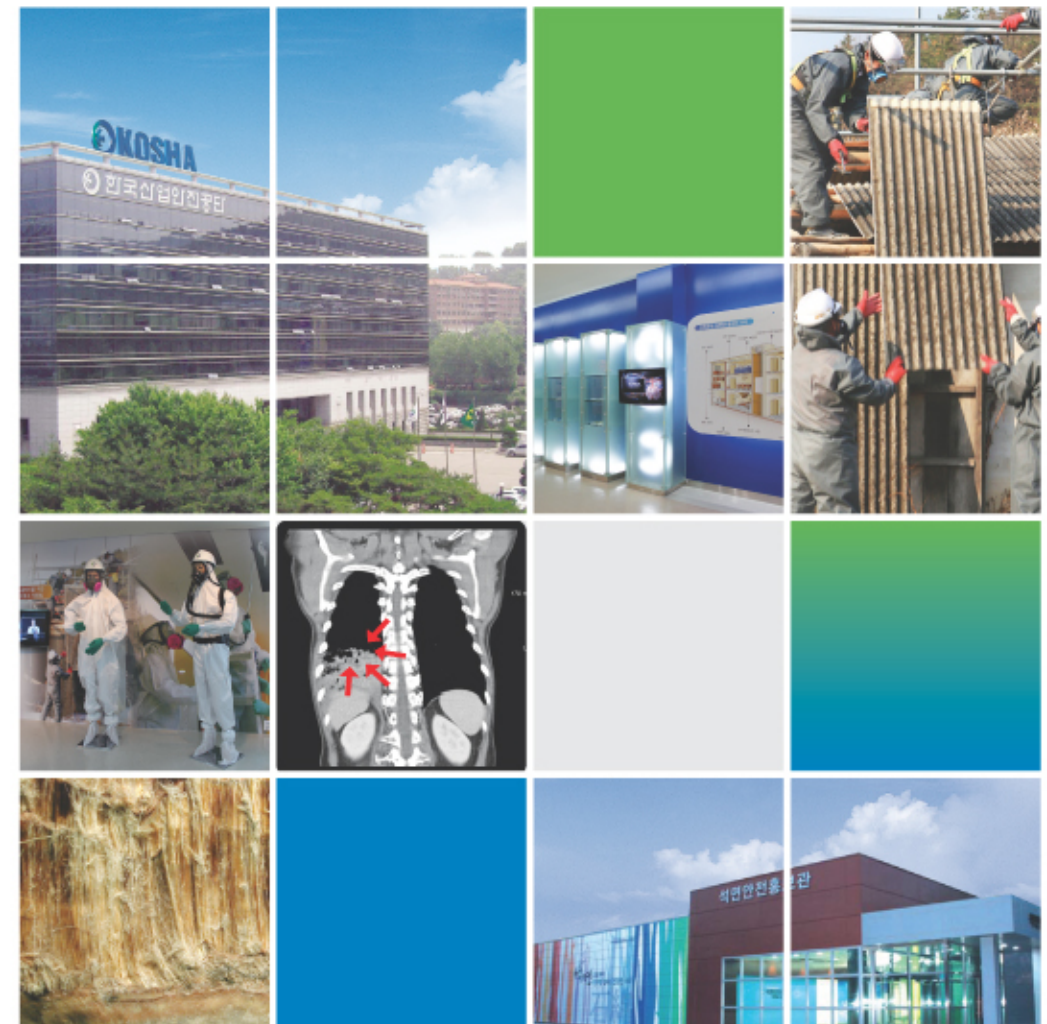




Asbestos Information Exhibition Hall

Towards a safer workplace and a healthier society



KOSHA

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KOSHA
KOREA OCCUPATIONAL
SAFETY & HEALTH AGENCY

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- What is Asbestos?
- Asbestos-Related Diseases
- Asbestos-Containing Materials (ACMs)
- Managing Asbestos-Containing Buildings
- Asbestos Inspection System
- Regulations on Asbestos Dismantlement & Removal
- Health Management for Workers Handling Asbestos





Message from the President

Asbestos has nicknames like the “silent killer” and the “immortal material.” Exposure to asbestos is causing fatal diseases such as mesothelioma, asbestosis, and lung cancer. Due to such serious health hazards, Korea has continuously strengthened the system of managing asbestos. In addition, the production, import, and use of products containing asbestos were totally banned since January, 2009. However, the threats of exposure still exists when dismantling, removing or repairing the asbestos-containing materials already installed.

Numerous asbestos-containing materials still exist in the buildings and industrial equipment nationwide, which cannot be eliminated all at once. Therefore, it is very important that asbestos is safely controlled in Korea until all asbestos-containing products are no longer present.

The Asbestos Information Exhibition Hall was established to provide information about asbestos, which workers and the general public need to correctly understand and properly manage it.

We hope that visiting this Exhibition Hall will contribute to making a workplace safe from the threats of asbestos, and thereby create a healthy society.

Thank you.

Noh, Min-Ki President
Korea Occupational Safety and Health Agency

Noh, Min-ki

Floor Plan



Orientation Room

Hazards of Asbestos

General information about asbestos through real and microscopic observations.

- How does asbestos enter a human body?
- What are the diseases associated with asbestos?

Managing Asbestos-Containing Building Materials

Information about asbestos-containing materials that may exist in buildings and the methods of managing them. The methods of inspecting asbestos through real-size and miniature models.

Asbestos Removal Management

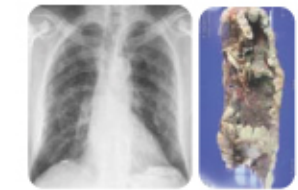
The devices, personal protective equipments and safe work practices for dismantling and removing asbestos-containing materials.

Health Management

What is the relationship between smoking and asbestos?
Health Management Pocketbook for asbestos workers.
Special health examination for Asbestos Workers.

Quiz on Asbestos

A review of information provided by Asbestos Information Exhibition Hall through a simple quiz.



What is asbestos?

- Classification of asbestos (real rocks)
- Microscopic observation of asbestos

Hazards of asbestos

- Pathology of asbestos inflow into human body
- Adverse effects of asbestos on human body

Asbestos-related diseases

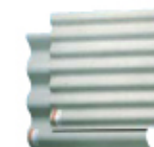
- Mesothelioma
- Asbestosis
- Lung cancer

Asbestos-containing materials

- Sprayed materials for preventing fire
- Thermal system insulation (TSI)
- Ceiling, wall, flooring, roofing, etc

Understanding asbestos

The **Asbestos Information Exhibition Hall** provides various information about asbestos



Maintenance of asbestos-containing buildings

- Asbestos inspection system
- Identification & maintenance of damaged asbestos-containing buildings

Information on proper handling of asbestos

Proper work practices of removing ACMs

- Safety and health measures for each asbestos type
- Reducing friability of and exposure to asbestos

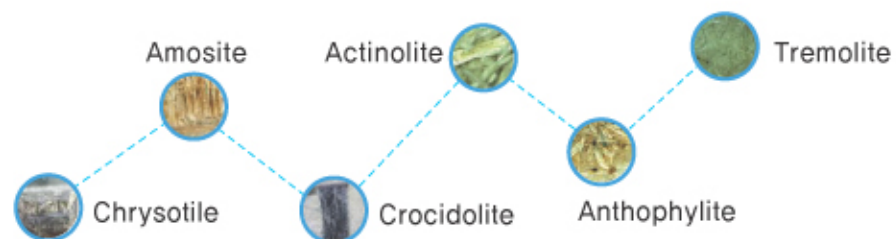
Devices & protective equipments for removing ACMs

- Negative pressure system, vacuum cleaner
- Respirators such as dustproof mask
- Practice of putting on dust respirators

Health management system for asbestos workers

- Importance of smoking cessation
- Providing Health Management Pocketbook to asbestos workers
- Special health examination for asbestos workers

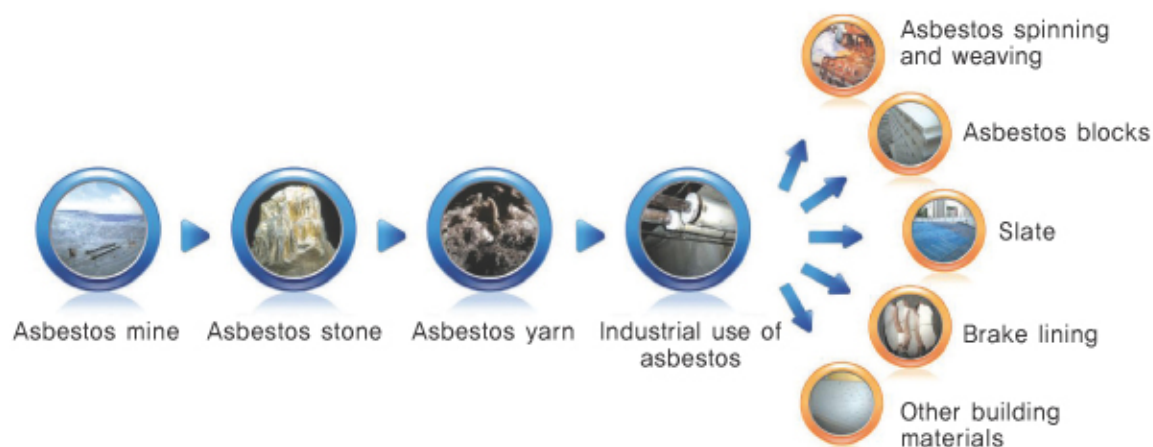




What is asbestos?

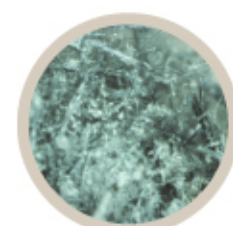
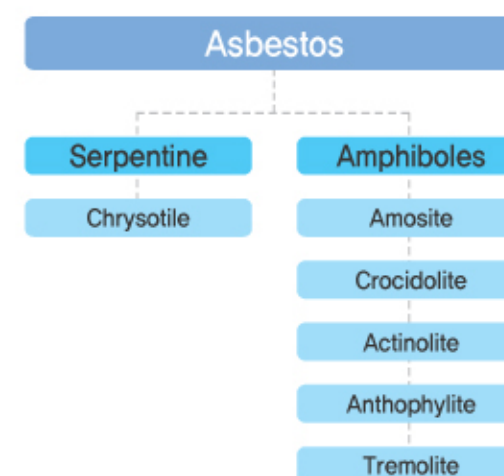
- Often referred to as an immortal substance, the word Asbestos originates from Greek words a (not) and sbestos (extinguishable)
- Asbestos is called *dolsom* (stone cotton) in Korean. It is a kind of volcanic rock created by volcanic activities more than a million years ago. Asbestos is a fibrous silicate collected from serpentine and amphiboles that exist in natural state.
- Asbestos has the shape of long and thin fibers and fiber bundle, easily split into thin fibers, pliable enough to be woven, and resistant to heat, acid, and alkali. It is widely used as industrial materials with its excellent insulation, durability, and abrasion resistance.

Asbestos: from mines to industrial use



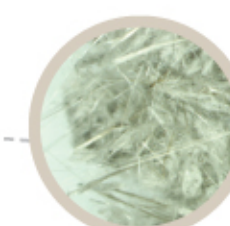
Types of Asbestos

- There are various kinds of asbestos, but in general it is mostly divided into the following 6 types : Chrysotile under serpentine family, and amosite, crocidolite, actinolite, anthophyllite, and tremolite under amphiboles family.
- Common types of asbestos are chrysotile, amosite, and crocidolite.



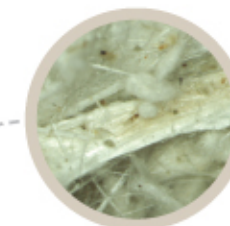
Crocidolite

Often used as sprayed asbestos in the past
Used as acid resistant packing materials
Assumes blue color due to a high level of iron content



Amosite

Often used as insulation materials in the past
More flexible and durable than crocidolite, and easily recovers its original state after being bent
Assumes brown or dark grey colors



Chrysotile

Most widely used for industrial purpose
Assumes white or light green colors. Durable and flexible.
Higher than iron in tensile strength
Accounts for 95% of the total asbestos

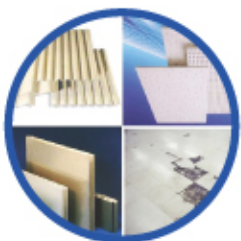
How was asbestos used?

History of Asbestos

Asbestos-related Diseases

History of the production and use of asbestos

- **Ancient Greece**
 - Used as the wick of golden lamp in the temple of Athena
- **Post Industrial Revolution**
 - With the improvement in asbestos spinning and weaving technology, asbestos yarn and asbestos cloth were mass produced.
- **The 1ST and 2ND World Wars**
 - Production of asbestos sharply increased as it was used as thermal insulating materials for warships, tanks, and warplanes.
 - Asbestos was mass produced in Korea by Japan.
- **Modern days**
 - Used in the production of about 3,000 kinds of asbestos-containing materials including building materials, automotive parts, etc.
 - Major producers are Russia and Canada.
 - Production has been on the decrease since 1980s as the hazards of asbestos have become well-known.

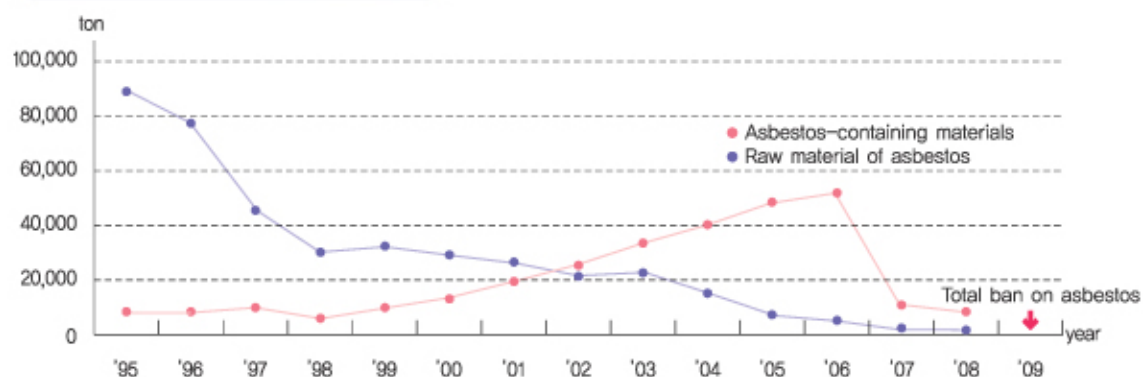


History of asbestos use in Korea

- **1930s**
 - Asbestos was first produced in mines in parts of Korea to be used in military supplies factories controlled by Japan.
- **1970s**
 - Asbestos-containing slates were heavily used as roofing materials for remodeling of old traditional houses.
- **1980s~1990s**
 - Widely used as industrial and building materials in times of economic development.
- **January, 2000**
 - Production, import, use, transfer, and supply of crocidolite and amosite were banned.
- **July, 2003**
 - Actinolite, anthophyllite, and tremolite were added to the list of banned materials.
- **January, 2009**
 - Total ban was imposed on production, import, use, transfer, and supply of asbestos-containing materials.
 - ※ Asbestos-Containing Materials :
Materials that contain more than 0.1% of asbestos by weight.



Korea's asbestos imports



Source: Korea Customs Service

Mesothelioma

- The cancer occurring on the mesothelium that covers the pleura surrounding the lung and the peritoneum that protects the stomach or the liver.
- It spreads rapidly with high mortality.
- Smoking is unrelated to mesothelioma. However, the duration and dose of asbestos exposure are linked to the disease.
- Normally, it occurs 30~40 years after the initial exposure, meaning it has very long latent period.
- Body movements and coughing cause chest pain.



Asbestosis

- In general, mainly strikes the workers who were heavily exposed to asbestos for a certain period of time.
- Causes severe difficulty in breathing due to reduction in pulmonary elasticity.
- All types of asbestos can cause asbestosis with 10~30 years of typical latent period.
- Symptoms include difficulty in breathing, restrictive pulmonary function, and dry coughs.



Lung Cancer

- As in the case of asbestosis, heavier exposure to asbestos leads to higher incidence of lung cancer.
- For smokers, exposures to asbestos sharply increase the risk of developing lung cancer.
- Lung cancers caused by asbestos exposure have about 30 years of latent period.



Cases of Asbestos Disease in Korea

Who are exposed to asbestos?

Case 1 Raw material mixing worker in slate production business who developed lung cancer (2000)

- A worker, working in the slate producing process mixing raw materials developed lung cancer after 12 years of exposure to asbestos.
- The cancer was caused by the worker's exposure to asbestos fiber in high concentration. His job was to tear off the threads of the cloths containing asbestos and putting them directly into the mixer.

Case 2 Asbestos factory worker who developed mesothelioma (2003)

- The worker who performed machinery and equipment maintenance work in an asbestos spinning and weaving factory for 2 years from 1978 was diagnosed with mesothelioma, which was caused by asbestos exposure. The worker died of mesothelioma in 2003.
- The worker had been exposed to asbestos in the processes of the repair and maintenance of spinning frame necessary for producing asbestos yarn and cloth.



Case 3 Boiler plumber who developed lung cancer (2000)

- A day laborer who worked for several companies as boiler plumber from 1978 was diagnosed with lung cancer in 2000 due to asbestos exposure and died.
- The cancer was caused by the worker's exposure to asbestos while using asbestos cloth and tape for performing boiler installations and maintenance.

Case 4 Ship dismantling worker who developed lung cancer (2003)

- A ship breaking worker, who had been working on the job for 28 years was diagnosed with lung cancer and died.
- The cancer was caused by the worker's heavy exposure to asbestos in the process of dismantling thermal insulating material used in the ship.

Occupational Exposure

Past Occupations exposed to asbestos when it was widely used

- Workers in asbestos mines
- Workers in asbestos spinning and weaving factories
- Workers manufacturing and producing asbestos-containing products
 - Asbestos-containing building materials like slate, brake lining, asbestos gaskets, and insulation materials.
- Workers who dismantle, remove, repair, or maintain asbestos-containing materials.
 - Plumbers, ship repairing workers, auto mechanics, and workers dismantling or removing asbestos-containing building materials.



Present and Future Occupations exposed to asbestos following the ban on its use

- Workers engaged in dismantling, removing, repairing, or maintaining asbestos-containing materials, which were used in the past.



Environmental Exposure

- People who are living near asbestos-related business establishments, such as asbestos mine, asbestos factory, etc.
- Family members of workers who are exposed to asbestos.

Asbestos-Containing Materials (ACMs)

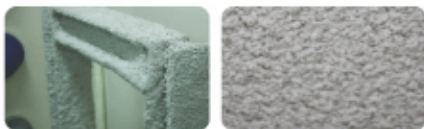
What are asbestos-containing materials?

- Asbestos-containing material (ACM) refers to any materials with some degree of asbestos content
- Materials produced with pure asbestos or a mixture of other fibers or nonfibers of asbestos

What are the types of asbestos-containing materials?

Sprayed materials

- Materials that are sprayed on the wall, ceiling, and steel structure for soundproof, ornamental, and heat insulation purposes.



Heat loss prevention and insulation materials

- Materials used in the pipes, ducts, boilers and warm water tanks for reserving or insulating heat.



Other materials

- Building materials such as slates, ceilings, walls, and floor tiles, which contain asbestos.
- Industrial materials such as gaskets, bearings, and automobile brake linings, which contain asbestos.



Management of Asbestos-Containing Building Materials

Procedure for managing asbestos-containing materials in buildings

Identifying materials suspected of containing asbestos

Building materials presumed to be or suspected of containing asbestos should be identified.



Asbestos inspection and assessment for the state of asbestos-containing materials

Any materials presumed to be or suspected of containing asbestos should undergo asbestos inspection. If asbestos are present in some materials, these materials should be tested to find out their state.



Drawing up an asbestos map

Based on the results of asbestos inspection, an asbestos map should be created.



Selecting and implementing proper management methods

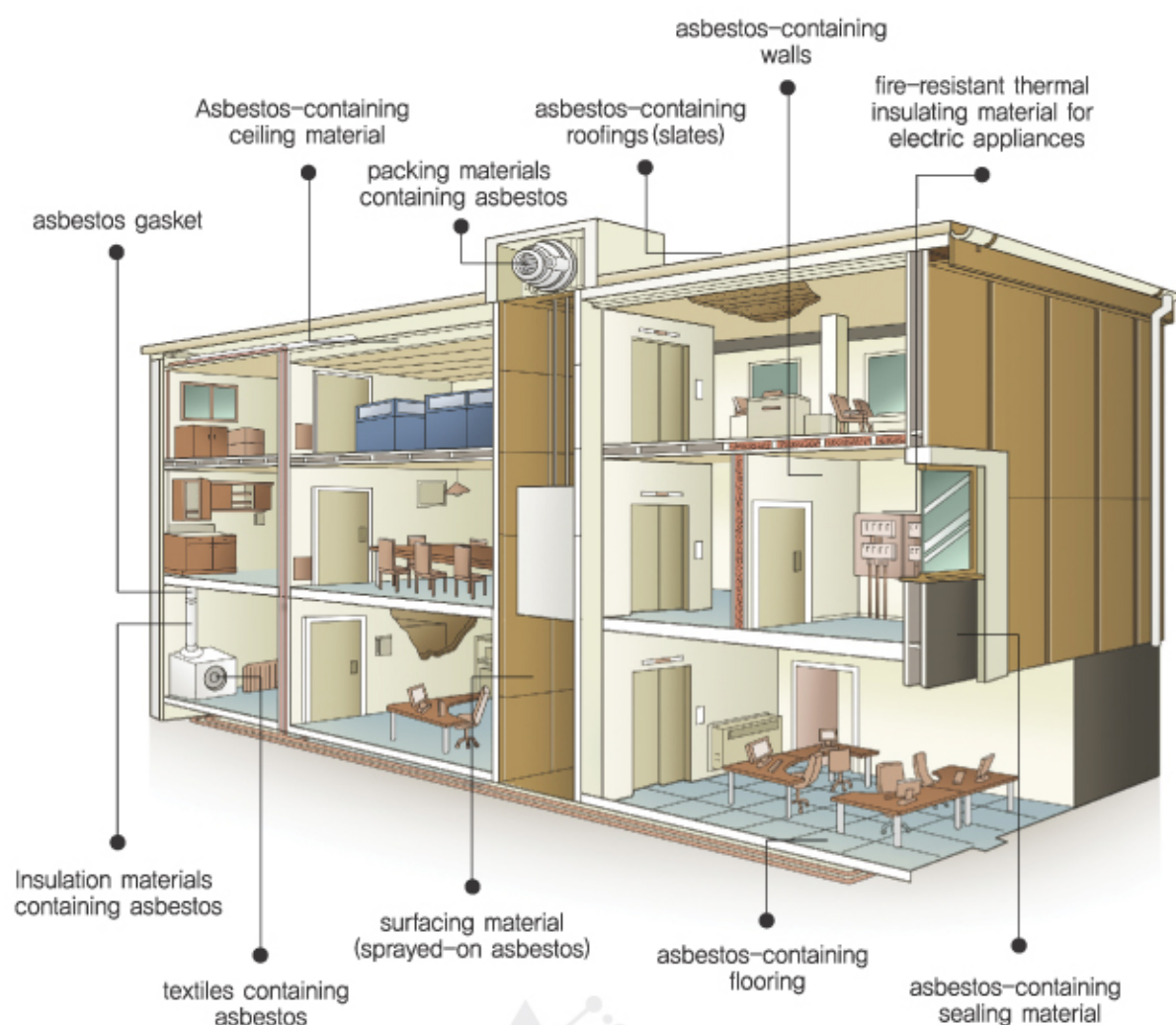
Proper methods for asbestos dismantlement, removal, sealing, stabilization, and maintenance should be selected and implemented in accordance with the state of each asbestos-containing material.



Continuous management

Continuous management of asbestos-containing materials are necessary until they are completely dismantled and removed.

Location of Asbestos-Containing Materials in a Building



Methods for Identifying Damaged Asbestos-Containing Materials

Significantly damaged state

Several parts of asbestos-containing materials are damaged or lost.

Dust-like particles are produced from the damaged part of asbestos-containing materials

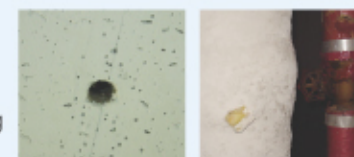
Broken pieces and scraps of asbestos-containing materials are found near the area



Moderately damaged state

A few parts of asbestos-containing materials are damaged or lost.

No dust-like particles are produced from the damaged part of asbestos-containing materials, but there is a possibility.



Fairly good state

Almost no damage has been done to the asbestos-containing materials and the generation of dusts and particles are unlikely.



Methods for Maintaining and Managing Damaged Asbestos-containing Materials

- Remove the asbestos-containing materials or replace them with asbestos-free materials.
- Spray or apply stabilizers that prevent tiny particles generated from the damaged asbestos-containing materials from being dispersed in the air.
- Completely seal the damaged part of asbestos-containing materials with other materials.



Guide to Asbestos Inspection System

What is asbestos inspection system?

- Asbestos inspection system aims to find out whether a building or equipment has asbestos-containing materials, their types, the amount of content, and their presence in relation to location and area.

Objectives of Inspection

- To safely maintain and manage asbestos-containing buildings or equipment.
- To ensure that the dismantling, removal, or maintenance of asbestos is safely carried out to prevent workers and neighboring residents from exposure.

The subjects of Inspection and Inspectors

- Building owners seeking to dismantle or demolish their structures or equipment must record and store the results after the completion of asbestos inspection.
- Those that require compulsory inspection by an asbestos inspection agency designated by the Ministry of Employment and Labor.

Buildings :	A building that has the total floor area of 50m ² or larger, with the total areas to be dismantled or demolished being 50m ² or larger
Residential houses :	A house (including annex building) that has the total floor area of 200m ² or larger, with the total areas to be dismantled or demolished being 200m ² or larger.
Equipment :	<ol style="list-style-type: none"> Thermal insulation materials, sprayed materials, fire resistive coating materials, gaskets, packing materials, and sealing materials that have the total area of 15m² or larger, or volume being 1m³ or larger. Insulation materials for pipes with the length totaling 80m or longer, and the total length of the pipe to dismantle or remove being 80m or longer.

Methods of Asbestos Inspection

Procedure for asbestos inspection

Preparing asbestos inspection equipment

PPEs (e.g. respirators) for inspectors
Equipment for sample collection and storage Ladders, lifts, etc



Securing data on a building or equipment

Data on construction specifications, piping diagrams, and designs
Data on the ventilation system within a building Results of the past asbestos inspection

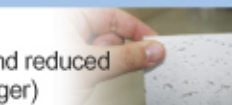
On-site inspection

Inspecting all accessible space
Inspecting the location, quantity, and unusual features of the materials suspected of containing asbestos
Identifying and recording the extent of damage done to the materials



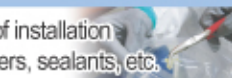
Assessing the friability

Assessing the friability of asbestos-containing materials
The definition of friable materials is any materials that are easily crumbled and reduced to powder in a dry state by a grip (usually by the force of thumb and forefinger)



Collecting sample

Collecting at least one sample for each material with different color, form, or the time of installation
Make sure no asbestos dusts are created from the sampling location by using stabilizers, sealants, etc.



Disposing of asbestos waste

Dispose of any materials used during the sampling process such as gloves and clothes, which are contaminated with asbestos in the process

Making requests for the analysis of asbestos sample

Analysis of the samples are to be conducted by asbestos inspection institutions designated by the Ministry of Employment and Labor.



Systems Guide to Asbestos Dismantlement and Removal

What is asbestos dismantlement and removal?

- Works that may involve scattering of asbestos dusts into the air during the process of demolishing or remodeling asbestos-containing buildings and equipment.

Dismantling and removing asbestos

- Proper work process must be observed when dismantling or removing asbestos, such as the sealing of the work area, wearing PPEs, and the use of wetting agents.
- Asbestos dismantling and removing operations that require the expertise of specialized workers registered to the Ministry of Employment and Labor.

Materials for walls, floors, ceilings, and roofings having higher than 1% of asbestos content and the area to be worked on is 50m² or larger.

Spraying material, fire resistant covering material containing more than 1% of asbestos.

Materials for thermal insulation, heat-loss prevention, sprayed-on fire resistant coverings, gaskets, packings, sealings, etc. with the total area to be worked on reaching 15m² or larger, or the total volume being 1m³ or larger.

Insulation materials for pipes having higher than 1% of asbestos content with the length totaling 80m or longer.

Compliance with the standards for asbestos concentration

- Professional asbestos dismantlement and removal workers must ensure that asbestos concentration in the air is less than 0.01f/cm³ after the completion of their work.

Preparations Prior to Asbestos Dismantlement and Removal

Preparations required before starting asbestos dismantlement and removal

- Making dismantlement and removal work plans
 - Asbestos inspection details (Types of asbestos-containing materials, location, quantity)
 - Procedures and methods for asbestos dismantlement and removal
 - Measures and treatment methods to prevent the release of asbestos into the air
 - Methods for protecting workers

- Installing warning label

Authorized Personnel Only

Asbestos dismantlement/removal Under Way

Wear protective equipments/clothing
Do not smoke or eat

- Providing and using PPEs
 - Respirators, goggles, protective clothing and gloves
 - Safety shoes, helmets, belts, etc.



- Preparing asbestos dismantlement and removal equipment
 - Negative pressure unit, negative pressure recorder, vacuum cleaner, wetting sprayer, etc.







- Installing hygiene facilities
 - Employers must install hygiene facilities such as locker room, shower room, changing room, etc. connected to or near the workplace where asbestos dismantlement or removal operations are taking place, and provide necessary items and tools.



PPEs for Asbestos dismantlement and removal

Respirators

- Only the respirators fitted with a HEPA filter certified by KOSHA can be used for works involving asbestos. The respirators prevent asbestos from entering workers' respiratory system.
- Selecting the right respirators for each type of work

Type of work	Types of protective gear
Dismantlement and removal of surfacing and insulation materials, which are highly likely to generate asbestos dust.	 Powered dust mask  Air-line respirator
Dismantlement and removal of ceiling material, roofing, flooring, etc.	 Dust mask (full Face-Piece)  Dust mask (half mask), goggles

Protective clothing, impermeable gloves and galoshes

- The protective clothing, gloves, etc are disposable. They prevent asbestos from penetrating into workers' skin and prevent leakages outside of the work space.
- It is ideal to wear protective clothing that covers the whole body.

Safety helmet, safety shoes, safety belt

- Be sure to wear the safety belt when working at the height such as eliminating slate roofing.



How to wear a respirator

Let's wear the respirator, which is the most important in asbestos removal work



Attach a new filter to the respirator.



Put the head band around the head, and tighten the face of mask to cover nose, mouth and chin.



Tighten the head and neck bands of the respirator.

How to dismantle and remove asbestos-containing materials

Basic measures to be taken

- The workplace must be isolated by sealing it with impermeable materials.
- The workplace must be made into a negative pressure enclosure system using the negative pressure unit equipped with a HEPA filter.
- If the work area is an outdoor workplace, proper measures, such as the use of asbestos dust capturing device, must be used to prevent the harmful dusts from being dispersed into the air.
- Wetting process must be carried out using water or wetting agent.
- Dismantled or removed asbestos-containing materials must be sealed in a bag made of impermeable material and disposed of as designated waste.

Working methods for each type of asbestos-containing material

Surfacing material, insulation material or fire resistant covering material

- Basic measures
- Glove Bagging is recommended when dismantling or removing insulation materials or fire resistant coverings that contain asbestos applied on the piping.
 - * Glove Bagging: An operation of removing insulation material using an impermeable plastic bag (hand shaped), which is suitable for the structure of asbestos-containing material.



Walls, floor tiles, ceiling materials

- Basic measures
- Negative pressure enclosure system must be installed when cutting or chipping asbestos-containing materials with a high-speed disk saw, ax, hammer, etc.
- If possible, avoid damaging asbestos containing materials by cutting, tearing, or breaking using electrical cutting tools.



Roofing materials

- Wetting process is required using water or wetting agent.
- If possible, avoid damaging asbestos containing materials by cutting, tearing, or breaking using electrical cutting tools.
- Dismantled or removed roofing materials must not be thrown on the ground.
- Ventilation or heating pipes located near the roof must be blocked and their operation must be stopped.

Smoking and Asbestos, How Are They Related?

Key devices to be used during asbestos dismantlement or removal work

● Negative pressure unit

- Negative pressure unit is designed to maintain the inside of the work space at negative pressure. This is done by ventilating the air out of the work space using a fan equipped with HEPA filter.

● Negative pressure recorder

- Negative pressure recorder checks the performance of the negative pressure unit. The device can measure and record the pressure difference between the inside and outside of the asbestos removing workplace.

● Vacuum cleaner

- Vacuum cleaner is fitted with a HEPA filter that can eliminate the residues from asbestos removal work.

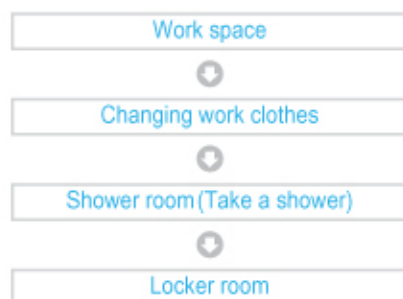
● Hygiene facilities

- The hygiene facilities must be composed of locker room, shower room, and changing room. Also, the facilities must be installed in a way that they are directly connected to the work space.

* The order of entrance prior to work



* The order of entrance after work



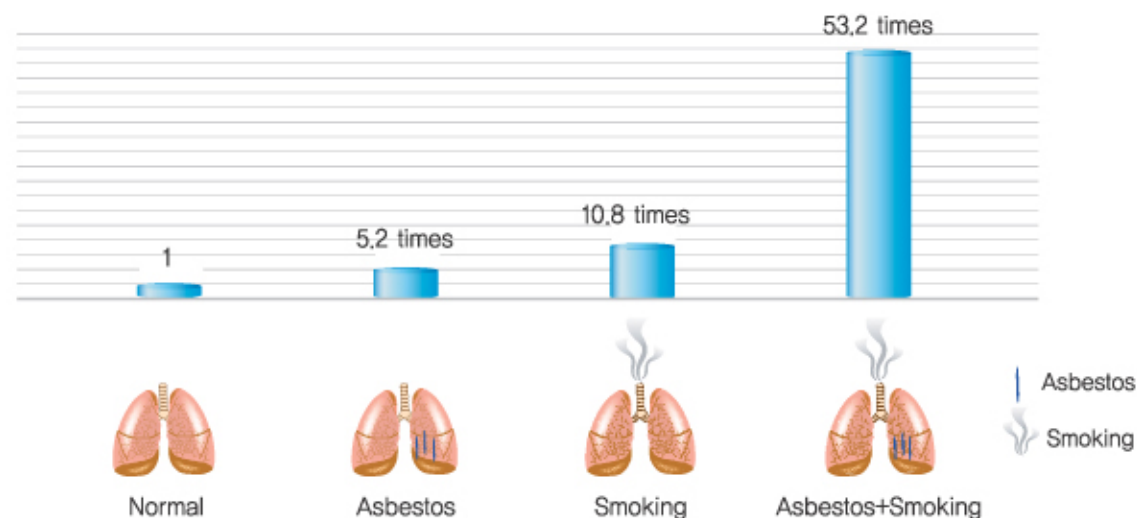
- Assuming that the incidence of lung cancer is 1 for people who have never experienced smoking or asbestos exposure :

- Exposure to asbestos alone, increased the incidence to : **5.2 times**
- Smoking alone, increased the incidence to : **10.8 times**
- The combination of smoking and asbestos exposure increased the incidence to : **53.2 times**

- If asbestos workers smoke, the incidence of lung cancer increases very sharply.

Asbestos workers must not smoke!

- The incidence of lung cancer associated with smoking and asbestos



Source: Selikoff, 1968

Health Management Pocketbooks for Asbestos Workers

What is the Health Management Pocketbook for asbestos workers?

- The Health Management Pocketbooks are issued to asbestos workers who have experienced asbestos exposures for certain period time during dismantling or removing works. Holders of the Pocketbooks can receive free special health examination on yearly basis, which helps to discover occupational cancers on early stages.

Workers who are issued Health Management Pocketbooks

Types of work requiring the issuance of pocketbooks

Work associated with manufacturing asbestos or asbestos textiles.

Work associated with manufacturing , cutting, or processing asbestos containing materials.

Work associated with dismantling, removing or repairing sprayed asbestos, asbestos-containing insulation materials or fire resistant covering materials.

Work associated with dismantling, removing or repairing asbestos cement, asbestos friction material or other asbestos-containing products.

Work period

Over 3 months

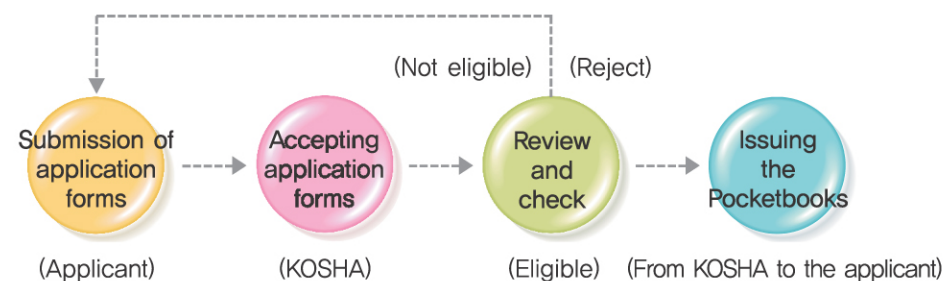
Over 1 year

Over 1 year

Over 10 years

Procedure for receiving Health Management Pocketbooks

- Who can apply?: Workers can apply for the pocketbooks by themselves, or their employers can apply for the pocketbooks on their behalf.
- Apply to: Regional/ Area offices of KOSHA
- Application and issuance procedure



Special Health Examination

Workers engaged in dismantling, removing or maintaining asbestos-containing materials must receive special health examination.

What is Special Health Examination?

- It is intended to detect occupational diseases early on, and provide health care for workers who are engaged in work exposed to harmful agents like asbestos by conducting special medical checkups targeting specific hazards.

Subjects of special health examination

- Workers engaged in work exposed to asbestos or those who have been suggested by their doctors.

Frequency of special health examination

- One or more times in each year.

Asbestos specific check-up items

Primary items for the check-up

Investigation of the history of work and exposure
Investigation of disease history associated with major target institutions
Clinical test and examination
* Respiratory organs: Auscultation, chest radiograph (back and front), sputum cytology, breathing capacity examination

Secondary items for the check-up

Clinical test and examination
* Respiratory organs: Chest radiograph (side), T/B smear test, Thoracic C/T

Designated clinics: Special health examination clinics designated by the Ministry of Employment and Labor

- KOSHA provides financial assistance to asbestos workers, to help them get special health examination.
- Apply to: KOSHA homepage (www.kosha.or.kr)

Recommended visitors to the Exhibition Hall

The general public	Business owners/workers handling asbestos
Local government employees	Institutions and organizations associated with asbestos
Undergraduates, graduate school students studying occupational health	Elementary, middle, and high School students

Information about the Exhibition Hall

Opening hours	■ Mon. to Fri. 09:00 ~ 18:00
Phone	■ +82-(0)32-5100-720
Location	■ 478, Munemi-ro, Bypyeong-gu, Incheon, Korea
Operated by	■ Korea Occupational Safety and Health Agency (KOSHA)
Applying for a visit	■ Please visit KOSHA homepage at : www.kosha.or.kr

Directions to the Exhibition Hall



Guide to transportation

By subway

- Take the NO.1 line for Dongincheon Take off at the Songnae Station Exit 1
a 15 minute walk
- Take the NO.1 line for Dongincheon Take off at the Songnae Station Exit 1
Take the NO. 20 town Bus Take off at the Korea Polytechnic College

By car

- Seoul Ring Expressway Songnae JCT to Bucheon to the left on the first intersection
U-turn before the first traffic light KOSHA
- Singal Ansan Expressway to Bucheon 3 kilometers more from the end of the
expressway KOSHA behind K-medi hospital
- Gyeonginro to the left on the Songnae intersection after Bucheon and Jungdong
U-turn before the first traffic light KOSHA

A booklet on Asbestos Information Exhibition Hall

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