



Occupational Safety & Health Circular

Safe Removal of Asbestos-containing Materials in Buildings



MINISTRY OF
MANPOWER

Safe Removal of Asbestos-containing Materials in Buildings

Unsafe work practices during demolition or renovation of buildings containing asbestos materials present a number of avoidable hazards. Workers are exposed to asbestos fibres and dust, which are a serious health hazard. In addition, they are at risk of falling from heights, especially when removing asbestos roof sheets. This circular aims to help contractors understand the dangers of removing asbestos, and provide ways to reduce the safety and health risks of such work.

What is asbestos?

Asbestos is a group of naturally occurring fibrous minerals with good thermal resistance, chemical and thermal stability, and high tensile strength. It is commonly used in sound and thermal insulation, fire proofing, gaskets and asbestos cloth. It can also be found in common building and construction materials, such as roof sheets, wall cladding and ceiling panels.

What are the health effects of asbestos?

Asbestos-containing materials can release fibres into the surroundings due to wear and tear and deterioration or when they are disturbed, damaged or broken. These fibres, when inhaled, may lead to serious lung diseases such as asbestosis (scarring and fibrosis of the lung tissues), mesothelioma (a cancer of the lining covering the surface of the lung and inside the chest wall) and lung cancer. The symptoms of these incurable diseases can take up to several years to appear after the first exposure to asbestos dust.

What are the safety measures that should be observed?

The use of asbestos in buildings has been banned in Singapore since 1989. However, many old buildings still have asbestos-containing materials, commonly in the form of corrugated roof sheets, ceiling boards, wall panels or partitions, floor tiles or pipe insulation. Care must be taken when removing, dismantling, demolishing, renovating, maintaining and altering structures in buildings containing asbestos.

Contractors should take all practicable safety precautions during the three main phases of asbestos removal work, namely when preparing the site, removing the asbestos and cleaning-up of the site after removal. Please refer to the MOM's Guidelines on the Removal of Asbestos Materials in Buildings (available at www.mom.gov) for more details.



Asbestos roof sheets (front & centre) and zinc roof sheets (back)

Asbestos removal work should only be carried out and supervised by a person trained in managing and removing asbestos. One such training course is the Asbestos Removal and Management Course conducted by the Singapore Environment Institute, National Environment Agency.



Asbestos used in building materials as roof sheets and ceiling panels

Preparation at Removal Site

- Establish an asbestos work area such that there is expected to be exposure to airborne asbestos fibres only within the boundary of this work area. Only workers who are directly involved in the asbestos work are allowed to enter this work area.
- Isolate the asbestos work area using enclosures (e.g. for indoor asbestos removal) or barriers (e.g. for roof sheet removal) made of impermeable polyethylene sheeting. For indoor asbestos removal, seal all openings, including doors and windows.
- Shut down any ventilation system in the asbestos work area, and seal all ventilation ducts to and from the asbestos work area.
- Display warning signs, preferably with pictures, at high-human traffic areas and at the entrance to the asbestos work area. These signs must remain posted until the work site has been cleaned up and is certified free of asbestos.



Example of a warning sign displayed at an asbestos work area

- Set up proper washing and changing facilities for decontamination purposes as close to the work site as possible. Establish three areas, a "clean area", "shower area" and "dirty area" in these facilities. These areas must be next to each other but separated by double curtains made of suitable impermeable materials.

During and After Asbestos Removal

- Ensure workers only enter and exit the asbestos work area through the washing and changing facilities. Workers must put on PPE inside the clean area before entering the work area.
- Provide access scaffolds⁴ or elevating work platforms (e.g. scissors lifts, boom lifts, cherry pickers, etc), for workers working at heights⁵, so they can access the roof or other work areas at height safely.
- Provide workers who are at risk from falling with safety harnesses with shock absorbers and double lanyards. Where harnesses are used, provide proper lifelines and anchorages for workers to secure their harnesses. For roof-top work, provide crawl boards in addition to harnesses and lifelines.
- Provide adequate ventilation to prevent heat discomfort and heat disorders for asbestos removal work in enclosed spaces. Do not use stand fans. Pass all exhaust air from the asbestos work area through a High Efficiency Particulate Air (HEPA) filter before releasing it into the open air.



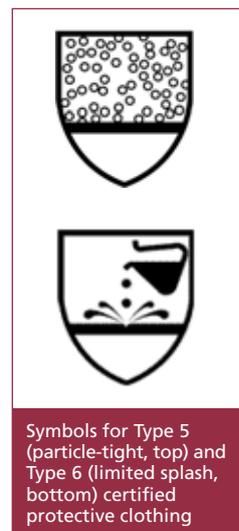
- Before and during asbestos removal, use low-pressure water sprays to wet all asbestos-containing materials. Cut all nails and screws securing the asbestos roof sheets or ceiling boards to the beams or ribs, and carefully lower the removed sheets to the ground to minimise breakage and dust generation.

Duties of Contractor and Occupier

- Ascertain whether the work to be carried out involves asbestos. This can be done by sending a sample of the building materials for laboratory analysis². This is required of the occupier and contractor under the Workplace Safety and Health (Asbestos) Regulations.
- Inform the Commissioner for Workplace Safety and Health at least 28 days before the commencement of any work involving asbestos.
- Conduct a risk assessment before carrying out any work involving asbestos. This risk assessment must identify all possible safety and health hazards from handling asbestos. This is required under the Workplace Safety and Health (Risk Management) Regulations³.

Common hazards in asbestos work arise from exposure to asbestos dust, machinery or equipment used, or working at heights. Using the risk assessment as a guide, inform all persons who are exposed to the hazards of the risk involved and any control measures to be taken.

- Develop and implement proper safe work procedures for the removal of asbestos. These procedures must address all the hazards identified in the risk assessment and include the control measures to eliminate or reduce the risk.
- Provide workers with suitable personal protective equipment (PPE), in quantities adequate for the entire period of work. Such PPE should include:
 - Personal fit-tested respirators with filters/ cartridges that are P3 type under the European (CEN) or Australian/New Zealand (AS/NZS) standards or N/R/P100 under the US (NIOSH) standard
 - Disposable coveralls of impermeable, breathable materials that are, at the minimum, resistant to dry particle penetration and limited water splash. Examples of such materials are those that have been certified against Type 5 (dry particle protection, prEN ISO 13982) and Type 6 (limited splash protection, ISO 13634/prEN 13034), or any other equivalent standards
 - Safety harnesses, lifelines and anchorages for any work carried out at heights
- Train workers on how to remove and handle asbestos-containing materials, as well as how to use and maintain the PPE. Supervise the workers at all times.
- Engage a designated factory doctor (DFD) to examine and certify the workers fit for work involving asbestos. This should be done before the asbestos work commences. The medical examination must consist of a clinical examination and a full-size chest X-ray. These workers must undergo repeat medical examinations at least once every three years.
- Submit a register of all the workers involved in asbestos work to the Occupational Safety and Health Division.



- Immediately wrap up the removed roof sheets or ceiling boards in impermeable polyethylene sheets while they are wet. It is best if the sheets are wrapped in a second layer of polyethylene sheets so there is little risk of asbestos debris or dust spillage. The wrapped asbestos waste must be affixed with proper warning labels.
- Wet and collect all broken pieces of asbestos debris in suitable impermeable disposal bags with a double lining. Do not leave them lying around in the work site where they may be further broken or crushed, thus creating more asbestos dust. These bags should also be properly sealed and affixed with proper warning labels.
- Break up asbestos sheets that are too large to fit into the disposal bags and cannot be wrapped properly. Do this only in an enclosed space (e.g. a tent) within the asbestos work area. Keep the sheets or ceiling boards wet throughout the breaking process.

Cleaning Up the Asbestos Work Site

End of each work-shift

- Wash or clean with a HEPA-filtered vacuum the asbestos work area and all surfaces that may be contaminated with asbestos.
- Wash or vacuum the dirty coveralls and all other PPE properly, except for the respirator, before taking off the coveralls in the dirty area of the washing facilities. Shower thoroughly and wash the respirator inside the shower area. Remove the respirator, only in the clean area before leaving the asbestos work site.
- Pack and seal used coveralls in impermeable bags, which are also affixed with proper labels, at the end of each work shift and dispose of them together with the asbestos waste.

End of the asbestos removal job

- Clean all equipment used in the asbestos removal work using water or a HEPA-filtered vacuum. This must be done before they can be removed from the asbestos work site. This includes the access scaffolds or elevating work platforms and cutters.
- Properly wash and clean with the HEPA-filtered vacuum all polyethylene sheets used as barriers and floor linings. Dispose of these sheets as asbestos waste.
- Wet-wipe or clean the outer surfaces of the disposal bags containing the asbestos waste before giving them to the Asbestos Disposal Contractors licensed by the NEA⁶.

Please take appropriate measures to protect workers from asbestos dust and other hazards when doing asbestos work. The Ministry will not hesitate to take stern action, including stopping work, imposing fines or prosecuting contractors found flouting safety and health rules.

Useful References & Contact

The following reference materials are available at www.mom.gov.sg/oshd:

- Guidelines on the Removal of Asbestos Materials in Buildings
- Guidelines on the Handling of Asbestos Materials
- Guide to Workplace Safety and Health (Risk Management) Regulations
- Workplace Safety and Health Risk Management: Risk Assessment Guidelines
- ProBE Technical Advisory for Falling from Height
- ProBE Technical Advisory for Scaffolds.

For enquiries:

Occupational Safety and Health Division

Ministry of Manpower
18 Havelock Road #03-02
Singapore 059764
mom_oshd@mom.gov.sg
www.mom.gov.sg

¹ For more information on this course, including the schedule for the next run, please check with NEA at http://www.nea.gov.sg/cms/sei/Courses_asbestos.html

² Refer to Appendix II •List of Asbestos Analysis Laboratories in the Guidelines on the Removal of Asbestos Materials in Buildings

³ Refer to Guide to WSH (Risk Management) Regulations and Risk Assessment Guidelines for more details on Risk Management

⁴ Refer to the ProBE Technical Advisories for Scaffolds

⁵ Refer to the ProBE Technical Advisories for Falling from Height

⁶ The list of licensed asbestos waste disposal contractors is available at Appendix VI in the Guidelines on the Removal of Asbestos Materials in Buildings or at <http://app.nea.gov.sg/cms/ntdocs/article.asp?pid=1736>