

**GUIDELINES ON THE
HANDLING OF ASBESTOS
MATERIALS**

**OCCUPATIONAL SAFETY and HEALTH DIVISION
MINISTRY OF MANPOWER
SINGAPORE**

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1. INTRODUCTION

Asbestos is the name given to a group of naturally occurring minerals, known individually as crocidolite (blue asbestos), amosite (brown or grey asbestos), chrysotile (white asbestos), anthophyllite, tremolite and actinolite. A common feature of these materials is their fibrous nature which combines strength and flexibility with resistance to heat, fire and chemicals.

Asbestos is used in the manufacture of asbestos products such as textiles (cloth and padding), cement (sheets and pipes), friction materials (clutch plates, brake linings and gaskets), and insulation material. It is used in roofing, partitioning and fire proofing materials.

Exposure to asbestos dust occurs particularly during dusty operations such as the opening of bags of asbestos, or where handling, sawing, cutting, grinding, drilling, lagging and delagging are performed upon materials containing asbestos.

These guidelines are prepared by the Department of Industrial Health, Ministry of Manpower, for the guidance of those who undertake work with asbestos or asbestos containing materials, as in building and construction work, shipyards and manufacturing industries. It should be read in conjunction with the following regulations:

THE FACTORIES (ASBESTOS) REGULATIONS 1980;

THE FACTORIES (ASBESTOS)(AMENDMENT) REGULATIONS 1989;

THE FACTORIES (MEDICAL EXAMINATIONS) REGULATIONS 1985.

2 HEALTH RISKS

Inhalation of asbestos fibres can give rise to serious diseases. The finer fibres in the inhaled dust may be deposited in the lungs and give rise to asbestos induced diseases like asbestosis (fibrosis and scarring of the lung tissue), bronchial carcinoma (lung cancer) and malignant mesothelioma (cancer of the lining of the chest or abdomen). Pleural thickening (thickening of the lung wall) may also occur. Whenever feasible safer materials which do not contain asbestos should be used instead of asbestos-bearing materials. Special precautions are needed when handling asbestos containing materials to minimise the risk of inhaling asbestos.

Below are the guidelines to minimise this risk to workers who have to work with asbestos or materials containing asbestos.

3 IDENTIFICATION AND NOTIFICATION

The Factories (Asbestos) Regulations 1980 require any person who undertakes work involving asbestos to notify the Chief Inspector of Factories at least 28 days before the commencement of such work. The Notification Form is in Appendix I.

The Factories (Asbestos) (Amendment) Regulations 1989 require occupiers, contractors or employers to check if materials to be used or handled contain asbestos. If necessary, they have to send those materials suspected of containing asbestos for analysis. A list of laboratories that provide such analysis is given in Appendix II.

4 HANDLING OF ASBESTOS-BASED MATERIALS IN THE BUILDING AND ENGINEERING CONSTRUCTION INDUSTRIES

The following procedures should be followed when working with soft asbestos insulating boards and hard asbestos cement building boards and mouldings.

4.1 Workshop Conditions

- * When mechanical cutting, sawing or machining takes place, efficient local dust extraction equipment should be installed.
Alternatively, a wet method of machining by water type dust suppressed powered tools should be used to prevent dust emission.
- * Local exhaust equipment should always be used when cutting asbestos insulation boards with both circular and jig-saws. Disc sander, drills and other powered tools should also be fitted with a dust extraction system.
- * Workers must wear suitable dust respirators.
- * The best standards of good housekeeping and hygiene should apply to workshop mechanical cutting area. Such areas are best segregated and used

for no other purpose. In addition to dust exhaust on machines, adequate general ventilation of the workshop should be provided and maintained.

- * Waste, dust residues, broken pieces and rejected asbestos materials should not be allowed to accumulate in the working area. They should be disposed of in such a manner as to avoid the escape of dust. Damping or wetting of waste before disposal is recommended.
- * A vacuum cleaning device with a High Efficiency Particulate Air (HEPA) filter should be used to keep floors, walls, ledges and fixtures free from dust accumulation. A list of vacuum cleaner suppliers is given in Appendix III.
- * When vacuum cleaning is impracticable all surfaces should be wiped clean using a wet rag and floors should be washed by means of a gently applied water spray.
- * Removal of dust by dry sweeping or compressed air blowing must never be used for cleaning asbestos dust from any surface.

4.2 Site Conditions

- * When working with asbestos insulating board and where a considerable run of cut or drilled material is required, it should preferably be supplied, pre-cut and prepared by the factory or workshop using a suitable type of dust control equipment.
- * Where on-site cutting or shaping is necessary it should, where possible, be performed in the open, or in a well ventilated area.
- When working in a relatively enclosed space, the work area should be so screened as to prevent the spread of dust to other areas. The screening should be of a material (e.g. polyethylene sheet) to which asbestos fibres will not readily adhere.

- * The asbestos worksite or area should be segregated by temporary barriers and restricted to authorised workers only. Entrances to restricted areas should be posted with signs bearing the legend:

Asbestos Working Area
Authorised Personnel Only
Do Not Inhale Dust
Respirators And Protective Clothing Required

- * If portable hand held power tools are used for cutting or drilling, an integral or attached dust extraction equipment with a HEPA filter for dust collection should be used. Alternatively, water should be used as a dust suppressant for power cutting. This method requires a properly designed water attachment and a portable water source.
- * When cutting is done by handsaw or other hand tools, the worker should wear a suitable type of dust respirator if portable dust extraction equipment is not provided.
- * At the end of each work shift and at the end of each job, dust which has fallen on the floor or ledges or other places should be collected by a suitable vacuum cleaner fitted with HEPA filter, or, if this is not available, should be swept up after being wetted.
- * The dust should then be put into a plastic bag or other sealable container. Where dry dust or debris is being transferred to the impermeable bag, a suitable respirator should be worn by the worker. Any off cuts, broken pieces and rejected materials should also be placed in an impermeable bag for disposal.

5 REMOVAL OF ASBESTOS-BASED INSULATING LAGGING

The removal of asbestos-based materials from pipe-work, boilers, turbines, equipment, etc., should be carried out by methods which will minimise or prevent the liberation of asbestos fibres into the air during and after the operation. Whenever asbestos lagging is removed, it should be replaced if possible by non-asbestos material.

- * The asbestos working area should be isolated from personnel not involved in the removal of asbestos. The boundary should be at a distance normally not less than 5 m or 15 ft from the asbestos work face.
- * The work area should be defined by barrier or rope and by appropriately placed signs indicating that it is an asbestos working area and warning against entry, with entry restricted to those directly involved in the work. The signs should be labelled:

Asbestos Working Area
Authorised Personnel Only
Do Not Inhale Dust

5.1 Spray Method

- * A spray method should be used on asbestos-based material which is not covered or coated by other materials such as paint or cladding which require prior removal.
- * The water spray should be applied in such a manner as to ensure that the entire surface of asbestos-based materials is wet but that minimal run-off occurs.
- * A manually controlled low pressure water spray could be used. The spray should be copious, but fine, so that the water droplets do not generate dust from the surface of the insulation material on impact.
- * The asbestos-based material should be wetted through its full depth. The spray should be directed at the cutting-up operation in progress and the wetted material removed.
- * The wetted asbestos-based material should be removed in sections and placed in labelled containers suitably sealed. All removed asbestos-based material should be properly wetted. Small section which may be dislodged should be properly disposed of.

- * Suitable respiratory protection is still necessary when using a water spray method because asbestos dust may not be fully suppressed or eliminated.

5.2 Soaking Method

- * Soaking method with total saturation should be used if the asbestos-based material is so thick that the spray method will not suppress the dust significantly.
- * The insulation is soaked by the introduction of water or other wetting agents through an appropriate applicator that consists of an injection head with numerous side holes or outlets through which the water or wetting agent is fed to the insulation.
- * To facilitate more rapid wetting of the insulation material, holes or cuts should be made in the outer covering to enable water or wetting agent to be injected in such a manner as to ensure that asbestos-based material is saturated but not just washed out through a liquid passage.
- * Where coating or cladding has to be removed before access is obtained to the asbestos-based material, the coating or cladding should be removed carefully to avoid dust generation, and the surfaces vacuum cleaned or where practicable, sprayed with water.
- * The soaking should be done shortly before removal, the quantity of water or wetting agent and the time to soak will depend on the thickness of material, access, location of holes, etc. Water or wetting agent application should be controlled so that slurries are not produced.
- * The saturated asbestos-based material should be removed in sections and placed in properly labelled containers and suitably sealed. Any asbestos-based material that may be removed into appropriate containers and properly disposed of.

5.3 Dry Method

- * This method should be used only where the spray or soaking method cannot be used.
- * The area where the asbestos-based material is to be removed should be fully isolated using plastic screening or other suitable material.
- * The outer surfaces of insulation should, if possible, be cleaned by efficient vacuum cleaners fitted with HEPA filters to remove the loose asbestos-containing dust.
- * The asbestos-based material should be removed in small pre-cut sections in such a manner as to minimise airborne fibre generation.
- * Alternatively, the asbestos-based material should be removed by using portable local exhaust equipment placed close to the removal operation. Local exhaust equipment should have an adequate capacity matched to the duty. It should be fitted with a HEPA filter.
- * When work is being done on upper levels, impermeable sheeting should be used to ensure that asbestos dust does not fall to work areas below.
- * Asbestos dust residues on floors should be cleaned by a vacuum cleaner fitted with a HEPA filter or by sweeping after wetting. The waste should be placed in air-tight plastic bags or containers and properly disposed of.
- * When engaged in dry removal operations, positive supplied air respirators or other suitable type of dust respirators must be used by workers.

6 REMOVAL OF ASBESTOS-BASED MATERIALS FROM BUILDINGS

- * The water spray method should be used for the removal of asbestos-based material from buildings. Dry removal methods should only be used where absolutely necessary.

- * The work area should be completely segregated and isolated to prevent the escape of asbestos dust to any other place. Access to this area should be restricted to authorised workers.

- * A suitable type of protective equipment and protective clothing must be worn by all workers or other persons entering the restricted area.

- * All movable furniture and fittings should be removed from the asbestos work area. The floor, walls, windows and doors should be covered with plastic sheeting so as to prevent the escape of dust from the working area. All non-removable furniture and fittings should also be covered with plastic or other impervious sheeting.

- * Air conditioning systems must be isolated from the asbestos removal area or closed down to prevent circulation of asbestos dust throughout the building.

- * Before removal or stripping the asbestos, insulation coatings should be thoroughly soaked with water or wetting agent. After the removal job has been completed, the asbestos contaminated space should be thoroughly cleaned by wet washing to remove all asbestos fibres and dust. A suitable vacuum cleaner fitted with a HEPA filter may also be used for the purpose, when dry removal methods is used.

- * Dry demolition of asbestos should be avoided but if unavoidable, a portable exhaust extraction plant fitted with a HEPA filter should be used to capture and collect the dust at the immediate place of asbestos dust removal. The residual settled dust should be removed by an effective vacuum cleaner.

- * All asbestos waste and plastic sheeting used to limit the spread of asbestos dust should be disposed of in airtight plastic bags or containers.

- * An effective vacuum cleaner with a HEPA filter should be provided for removal of asbestos dust from protective equipment and protective clothing.

7 HANDLING OF RAW ASBESTOS AND PRODUCTS CONTAINING ASBESTOS IN PLANTS AND FACTORIES

* The handling of asbestos and asbestos products should be limited to as few workers as possible. Only essential workers should be allowed to work in the asbestos working area.

* Sufficient notices or signs should be displayed at the entrance of every asbestos working area to prohibit unauthorised entry and to warn against the health hazard from inhalation of asbestos dust. A sign worded as follows could be used:

Asbestos Working Area
Authorised Personnel Only
Do Not Inhale Dust
Respirators And Protective Clothing Required

* Manufacturing and processing of asbestos or asbestos products should be carried out in workrooms which have interior surfaces that are impervious to dust and have as few surfaces as possible on which dust can settle.

* Wherever possible, equipment designed specifically for asbestos work should be installed and constructed so that it does not permit the escape of dust. Wet methods of work, segregation, enclosure and the use of local exhaust ventilation are often required to ensure that dust concentrations are kept within the recommended hygienic standard.

* Where asbestos dust is generated and when the dust control measures are not feasible or cannot be applied effectively, suitable personal protective equipment, including respiratory protective devices should be worn by all exposed workers.

* All loose asbestos materials should be transported and stored in closed containers which are impermeable to asbestos dusts and to prevent the escape of asbestos dust into the air.

* The transport and storage containers should be clearly labelled:

Asbestos Material
Do Not Inhale Dust

- * The opening and the emptying of bags of raw asbestos fibres should be carried out in an exhaust ventilated booth.
- * When removing raw asbestos material from storage containers, care should be taken not to generate dust into the atmosphere. A suitable dust respirator should be worn when an effective exhaust ventilated booth is not provided.
- * Asbestos material should be carefully handled to prevent spillage on floors and other surfaces which are not in the exhaust ventilation enclosures. Any spilt material should be cleaned up by suitable vacuum equipment or other dust free method. Collected waste should be placed in airtight plastic bags or containers for disposal.
- * Dust generated by working asbestos-bearing materials with machine tools should be captured at the point of generation by effective local exhaust ventilation systems. Alternatively, a wet method of machining should be used to limit dust emission.
- * The dust extraction system should be maintained and inspected at least once a month. It should be thoroughly examined and tested by a competent person at least once in every twelve months.

8 PROTECTIVE CLOTHING AND EQUIPMENT

- * For persons engaged in removal of asbestos-based insulation or coatings, full body protective clothing or coveralls without pockets or cuffs fitting closely at the neck, together with a head covering to give full protection to hair and cover the neck and ears should be provided and worn.
- * Protective clothing should also be issued to and worn by every person in any area into which asbestos dust is liable to escape.

- * The clothing is best made of synthetic fibre such as nylon and PVC. Wet weather overalls which can be hosed down may be used.
- * The use of suitable working clothing may not be necessary when minor handling of asbestos-containing insulation is carried out provided the adequate dust control techniques are employed and the permitted asbestos dust exposure levels are not exceeded.
- * Wherever work methods create asbestos dust during working of asbestos-containing material, suitable protective respiratory equipment must be used.
- * Where dust control by local exhaust ventilation or wetting techniques or other means does not remove asbestos dust adequately from the respirable air, a suitable type of respiratory protection must be worn.
- * Respiratory protective equipment must be issued to all persons exposed, be properly maintained, regularly cleaned and serviced. Every person required to use protective equipment must be fully instructed and trained in its use.
- * Protective clothing and protective equipment should be regarded as the means of last resort and used as a back-up for other techniques or where effective asbestos dust control cannot be achieved by other means.

9 CHANGING AND SANITARY FACILITIES

- * Changing room, shower and toilet facilities should if possible be provided for the exclusive use of persons working in an asbestos working area.
- * Locker accommodation should be provided for every person required to wear respirators and protective clothing. They should be situated in a conveniently accessible changing room.
- * The lockers for work clothes should be separated from those for ordinary or street clothes.

- * Contaminated clothing should be placed in an airtight container or suitable receptacle immediately on removal.
- * Arrangement for disposal or laundering of work clothing should be made. Clothing sent to commercial laundries should be soiled or wetted before despatch in plastic bags.
- * Laundries engaged in the cleaning of protective clothing should be informed of the precautions needed to prevent exposure of asbestos fibre, and warned against shaking or brushing prior to laundering.

10 WASTE DISPOSAL

- * Disposal of wastes should be carried out in such a manner so as not to cause unnecessary exposure of workers to excessive asbestos dust. The Ministry of the Environment should be consulted on the proper disposal of asbestos materials.
- * All work benches, equipment, floors, fixtures and other internal surfaces should be kept free of asbestos dust by vacuum cleaning fitted with HEPA filters, or wetting with gently applied water spray to avoid dust dispersion, or wiping with damp cloths.
- * The waste should be kept in airtight plastic bags or containers. These bags or containers should not be allowed to overfill and care should be taken to avoid damage or spillage before disposal.
- * Loose asbestos or low density asbestos waste, e.g. asbestos boards likely to produce asbestos dust should be similarly bagged or kept in closed containers impermeable to asbestos dust and conspicuously marked to identify the contents and to warn against the health hazard from inhalation of asbestos dust. Damping or wetting of waste before disposal is recommended.

- * High density asbestos waste, e.g. asbestos cement products could be safely stored pending disposal without recourse to special receptacles unless a high concentration of dust is released.

- * Containers of asbestos waste should be labelled:
 - Asbestos Material
 - Do Not Inhale Dust

- * The filter bags used in a dust extraction system should be impermeable and capable of being readily sealed and disposed of without further treatment. Suitable dust respirators should be worn by workers when collecting or replacing filter bags in dust collectors system.

11 PERSONAL HYGIENE

- * A high standard of personal hygiene and meticulous house-keeping should be observed by persons working with asbestos to ensure that asbestos dust is not transferred or carried from the asbestos working area to other areas.

- * Food or beverages should not be handled, stored or consumed in the asbestos work area. Smoking should be prohibited.

- * Contaminated clothing or belongings should not be shaken, brushed or dusted by an air blast. However, clothing should be superficially cleaned, before removal from the person, by vacuum cleaning or hosing down with water.

- * In all cases, contaminated clothing or belongings should be placed in airtight containers and dampened prior to dispatch to a laundry.

- * Persons engaged in the removal of asbestos-containing insulation or other dusty work should shower before changing back into their own clothing. Work clothing should not be taken home.

- * Hands and face or any parts of the body which have been exposed to asbestos dust should be thoroughly washed after completion of the job or before any meal is taken.

12 DUST MONITORING

- * When asbestos work is in progress, regular dust monitoring is required in order to define asbestos exposure levels, identify occupational groups, improve dust control measures and ensure compliance with the hygiene standard.
- * Exposure to all forms of asbestos dust should be reduced to a minimum that is practicable. In any case, occupational exposure to asbestos dust should not exceed the permitted asbestos dust exposure levels specified in Appendix IV.
- * The membrane filter method should be used for asbestos dust monitoring. Phase contrast counting method should be used for determining the asbestos in air concentration.
- * Sampling should include general environment samples as well as personal breathing zone samples. The number of samples taken (either short or long term) should be sufficient to enable a valid assessment of the actual dust concentration or exposure.
- * Dust monitoring should be carried out by suitably trained personnel who have been trained or instructed in the sampling techniques and in the analytical procedures.

13 MEDICAL EXAMINATIONS

- * Workers who have to handle or be exposed to asbestos in their work should have a large-size chest X-ray before they start such work, unless they have one within the past 12 months. This is required under the Factories (Medical Examinations) Regulations, 1985.
- * Such workers should also have large-size chest X-rays every 3 years.

- * A copy of the summary report on these X-rays and a list of asbestos workers should be forwarded to:

Occupational Safety and Health Division

Ministry of Manpower

18 Havelock Road #03-02

Singapore 059764

The chest X-ray films and original reports should be kept for at least 5 years by the employer and produced for inspection at any time.

**THE FACTORIES ACT
(ACT 6)**

**THE FACTORIES (ASBESTOS) REGULATIONS, 1980
(REGULATION 5)**

NOTIFICATION OF PROCESS INVOLVING ASBESTOS

The notice shall be completed in triplicate by the person undertaking or about to undertake in a factory, a process involving asbestos, in pursuant to Regulation 5 of the Factories (Asbestos) Regulations, 1980, and forwarded to the Chief Inspector of Factories, Ministry of Manpower, 18, Havelock Road #05-01, Singapore 0105.

Name and Address of person undertaking
or about to undertake a process
involving asbestos:

Tel No:

Fax No:

Address of place where process
involving asbestos is being undertaken
or about to be undertaken:

Tel No:

Fax No:

No. of workers employed in the process:

How asbestos is used (brief description of process):

Type(s) of asbestos used:

Duration of Process (if process is
temporary):

_____ Months _____ Days

Commencement Date:

I hereby certify that, to the best of my knowledge, the particulars given above are correct.

Date

Name, Designation and Signature of
Person Undertaking the Process

LIST OF ASBESTOS ANALYSING LABORATORIES

- | | | |
|---|--|----------------------------------|
| 1 | Department of Community, Occupational
68744988/9
and Family Medicine
National University of Singapore
Faculty of Medicine (MD3)
Lower Kent Ridge Road
Singapore 119260 | Tel :

Fax : 67791489 |
| 2 | Department of Scientific Services
62290735
Institute of Science and Forensic
62290749
Medicine
Industrial Health Laboratory
Ministry of Health
National Blood Centre Building
11 Outram Road
Singapore 169078 | Tel :

Fax : |
| 3 | SETSCO Services Pte Ltd
18 Teban Gardens Crescent
Singapore 608925 | Tel : 65667777
Fax : 65667718 |
| 4 | S.G.S. Testing & Control Services
67781550
Singapore (Pte) Ltd
Blk 26 Ayer Rajah Crescent #03-07
Ayer Rajah Industrial Estate
Singapore 139944 | Tel :

Fax : 67795805 |
| 5 | Singapore Productivity and Standards Board
68701171
Environmental Technology Centre
67729549
1 Science Park Drive
67794359
Singapore 118221 | Tel :

Fax : |

Note: This list is not exhaustive and will be updated from time to time. Inclusion of companies in this list does not in any way imply recommendation on the part by the Occupational Safety and Health Division (OSHD) of their services. OSHD expressly disclaims all responsibilities and liabilities of every kind and nature.

23-2-1999

LIST OF COMPANIES DEALING WITH INDUSTRIAL VACUUM CLEANERS (WITH HIGH-EFFICIENCY PARTICULATE AIR FILTERS) & DUST EXTRACTING SYSTEMS

- | | | |
|----|---|--------------------------------|
| 1. | Atoz Performance Pte Ltd
11 Kallang Place #06-02
Singapore 339155 | Tel: 62991966
Fax: 62950207 |
| 2. | Klenco (Singapore) Pte Ltd
7 Tuas Avenue 1
Singapore 639492 | Tel: 68623388
Fax: 68617575 |
| 3. | Nilfisk-Advance Pte Ltd
10 Woodlands Loop
Singapore 738388 | Tel: 67599100
Fax: 67599133 |
| 4. | Performance Janitorial Supplies Pte Ltd
7 Kallang Place #05-08
Singapore 339153 | Tel: 62968886
Fax: 62920065 |

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27th May 2000

THRESHOLD LIMIT VALUES FOR ASBESTOS

<i>Type of Asbestos</i>	<i>Threshold Limit Value (fibres/cc)</i>
<i>Chrysotile</i>	<i>2</i>
<i>Amosite</i>	<i>0.5</i>
<i>Crocidolite</i>	<i>0.2</i>
<i>Other forms</i>	<i>2</i>