GUIDELINES ON THE REMOVAL OF ASBESTOS MATERIALS IN BUILDINGS

OCCUPATIONAL SAFETY and HEALTH DIVISION
MINISTRY OF MANPOWER
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INTRODUCTION

The use of asbestos in buildings has been banned by the National Environment Agency since 1989. However, many old buildings in Singapore contain asbestos or have asbestos-containing materials. Special precautions are needed in the removal, repair, dismantling, demolition, renovation, maintenance and alteration of structures in buildings containing asbestos. These guidelines are prepared by the Occupational Safety and Health Division, Ministry of Manpower, for the guidance of those who undertake such work.

SOURCES OF ASBESTOS

Asbestos has in the past been widely used in a variety of building materials including floor tiles, ceiling tiles, asbestos-cement pipes or sheets, refuse chutes and fire-resistant structures. It may also be present in pipe lagging or heat insulation materials and in cladding or sprayed-on materials located on beams and between walls.

The potential for an asbestos-containing product to release respirable fibres depends largely on its degree of friability. Friable means that the material can be crumbled with hand pressure and is therefore likely to release fibres. The fibrous sprayed-on materials used for fireproofing, insulation or sound proofing are considered to be friable, and they readily release airborne fibres if disturbed. Materials such as vinyl-asbestos floor tiles and roofing corrugated sheets are considered non-friable if intact and generally do not emit airborne fibres unless subjected to sanding, sawing or other aggressive operations. Asbestos-cement pipes or sheets can liberate airborne fibres if the materials are cut or sawed, or if they are broken.

HEALTH EFFECTS

Asbestos fibres enter the body by inhalation of airborne dust or by ingestion, and can become embedded in the tissues of the respiratory or digestive systems. Exposure to asbestos dust can cause numerous disabling or fatal diseases. Inhaling or ingesting fibres from contaminated clothing or skin can also result in such diseases. Among these diseases are asbestosis (scarring and fibrosis of the lung tissues), lung cancer, mesothelioma - a cancer of the thin membrane lining of the chest and abdomen, and gastrointestinal cancer. The symptoms of these diseases generally do not appear for 20 or more years after initial exposure.

IDENTIFICATION AND NOTIFICATION

The presence of asbestos materials may be indicated in the original building plans or specifications. It is advisable to check these before work is carried out on a building.

The Factories (Asbestos) Regulations, 1980 require, among other things, 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, inter alia, 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.

**MEDICAL EXAMINATIONS**

Workers who have to handle or be exposed to asbestos in their work should have a medical examination conducted by a Designated Factory Doctor before they start such work. The medical examination should include a large-size chest X-ray examination, unless they have had one within the past 12 months. This is required under the Factories (Medical Examinations) Regulations.

A copy of the Summary Report on these X-ray examinations and a list of asbestos workers should be forwarded to:

Occupational Safety & 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.

Employers of asbestos workers who have resigned or left their employment should inform the Occupational Safety and Health Division.

**ENGINEERING AND WORK PRACTICE CONTROLS**

**Preparation And Demarcation Of Asbestos Work Area**

- An asbestos work area should be established within which there is expected to be exposure to airborne asbestos fibres during the asbestos removal work.

- Only persons who are directly involved in asbestos removal work should be allowed to enter the asbestos work area.

- Barriers or barricades should be erected to prevent unauthorised persons entering the asbestos work area.

- All movable objects, e.g., furniture, should be removed from the asbestos work area to prevent these from being contaminated with asbestos. Immovable objects should be covered completely with impermeable polyethylene sheeting. If objects have already been contaminated, they should be thoroughly cleaned with an industrial vacuum cleaner equipped with a High Efficiency Particulate Air (HEPA) filter or wet wiped before they are removed or covered.

- There should be no eating, drinking or smoking in the asbestos work area.

- Warning signs should be displayed at each asbestos work area, and posted at all approaches to the asbestos work area. Where necessary, signs should bear pictures and graphics, or be written in appropriate language so that all persons understand them. These signs should bear the following information:
Asbestos Work Area
Authorised Personnel Only
Do Not Inhale Dust
Respirators And Protective Clothing Required

- Any ventilation system serving the asbestos work area should be disabled and the ventilation ducts leading to and from the asbestos work area should be sealed.

Isolation Of Asbestos Work Area

- Where walls, floors and ceilings do not completely enclose the asbestos work area, the asbestos work area should be isolated from the surrounding environment by means of impermeable polyethylene sheeting or other suitable materials.

- The polyethylene sheeting should be secured to the ceiling and floor using adhesive tape.

- For major asbestos removal work, the isolated asbestos work area should be maintained at a negative pressure of at least 5 Pascals, and supplied with an air exchange rate of at least 4 air changes every hour. Air that is removed from the asbestos work area should pass through a High Efficiency Particulate Air (HEPA) filter.

- On completion of the asbestos removal work, the polyethylene sheeting should be cleaned either by vacuuming or damp wiping, after which it should be placed in a dust-tight, appropriately-labelled container.

Safe Work Procedures

- Except for the removal of screws, power-operated tools should not be used to remove asbestos-containing material (unless they are incorporated with dust suppression or dust extraction attachments with a High Efficiency Particulate Air [HEPA] filter).

- Compressed air tools should not be used to remove asbestos-containing materials (unless they are used in conjunction with a ventilation system designed to capture the dust cloud created by the compressed air).

- Asbestos-containing sheets or panels should be removed with minimal breakage. The removed sheets or panels should be lowered to the ground to minimise dust generation.

Wet Methods

- Wet methods should be used where feasible to ensure that asbestos fibres do not become airborne.

- A wetting agent, e.g., water or poly vinyl acetate, should be applied by means of an airless sprayer to the entire surface and depth of the asbestos-containing materials.

- The water spray should be directed at the point of removal or breakage of the asbestos-containing materials.
Guidelines On The Removal Of Asbestos Materials In Buildings

- Wetting should be done at the beginning of the asbestos removal work as well as continually throughout the duration of the removal work.

- High pressure water or other fluids should not be used to clean up or remove asbestos dust from any surface.

- The removed asbestos-containing materials should also be wetted until disposal. These materials should not be left lying about the site where they may be crushed.

Personal Protective Equipment

**Respirators**

- Workers carrying out asbestos removal or any persons entering the asbestos work area should wear a respirator with a High Efficiency Particulate Air (HEPA) filter.

- Respirators should be properly maintained and regularly cleaned. The filters should be changed whenever an increase in breathing resistance is detected.

- Every asbestos worker should be instructed and trained in the use of respirators.

- Workers wearing respirators should be allowed to wash their faces and respirator facepieces whenever necessary to prevent skin irritation. This should be done outside the asbestos work area.

- Respirators should be issued to workers on a personal basis. The respirators should be tested for correct size and fit.

**Protective Clothing**

- Water-proof coveralls or similar full-body protective clothing including snug fitting wrist, ankle and neck cuffs, head coverings, gloves and foot coverings should be worn by all asbestos workers. Such protective clothing should not have pockets and should be made of a material which does not readily retain or permit penetration of asbestos fibres.

- Where there is a possibility of eye irritation, goggles should also be worn.

- On completion of the asbestos removal work, the work clothing should be vacuumed or wet wiped before removal to minimise the dispersion of asbestos fibres. Blowing or shaking should not be allowed to remove asbestos fibres from work clothing.

- The removed work clothing should be stored in closed, labelled containers that prevent the dispersion of the asbestos fibres into the surrounding environment.

- The removed work clothing should either be disposed of or washed on-site. No worker should be allowed to bring his work clothing home for laundering.

- Contaminated work clothing taken out of change rooms or the asbestos work area should be transported in sealed impermeable bags, or other closed impermeable containers. These containers should be appropriately labelled.
Washing / Changing Facilities

- Change rooms should be provided for workers to remove asbestos-contaminated work clothing. This room should be supplied with impermeable, labelled bags and containers for the containment and disposal of contaminated work clothing and equipment.

- Shower facilities should be provided for workers to wash themselves and change into street clothing after the asbestos removal work.

- The change room and shower room should be contiguous, and isolated from each other by a double curtain of polyethylene sheeting or other suitable material. They should be located as near as practicable to the asbestos work area.

- Laundering of contaminated clothing should be done so as to minimise the release of airborne asbestos fibres.

- Laundries engaged in the cleaning of protective clothing should be informed of the precautions needed to prevent exposure to asbestos fibres, and warned against shaking or brushing prior to laundering.

Housekeeping

- During and after the asbestos removal work, the asbestos work area and all other asbestos-contaminated surfaces should be kept as free as possible from accumulations of asbestos-containing waste or dust by the use of industrial vacuum cleaners equipped with High Efficiency Particulate Air (HEPA) filters or by wet cleaning methods.

- Compressed air should not be used to clean surfaces contaminated by asbestos.

- Dry sweeping should not be carried out to clean any area or surface contaminated with asbestos.

Waste Disposal

- Asbestos waste, debris, bags, containers, equipment and asbestos-contaminated clothing and sheeting consigned for disposal should be collected into sealed, labelled, impermeable bags or other closed, labelled, impermeable containers.

- Warning labels should be affixed to all containers of asbestos-containing material. These labels should contain the following information:

  Asbestos Material
  Do Not Inhale Dust

- All bags or containers of asbestos-containing material should be consolidated and stored in a designated asbestos waste area. This area should be distinguished from other areas by means of warning labels.

- An application for written permission to dispose of the asbestos waste should be made to the Ministry of the Environment. The application form is given in Appendix III.
Transportation Of Asbestos Waste

- Containers of asbestos waste should be loaded onto the transport vehicle in a careful manner so as to prevent damage to the containers.

- The vehicles used to transport containers of asbestos waste should have enclosed compartments or canvas sheets to prevent damage to the containers and also to prevent fibre release.

- Transportation of large quantities of asbestos waste should be in a 20 m³ “roll-off” box in which the asbestos waste should be sealed.

- Compactors should not be used as they may cause rupture to the containers of asbestos waste.

- At the disposal site, the asbestos waste should be off-loaded into an excavated pit to avoid dust generation and release of asbestos fibres.

- The Ministry of the Environment should be consulted on the proper disposal and transportation of asbestos materials.
Guidelines On The Removal Of Asbestos Materials In Buildings

Figure 3: Cleaning up with HEPA-filtered vacuum

Figure 4: Worker placing asbestos waste in container. Note plastic bag inside drum.
EXAMPLES OF IMPROPER WORK PRACTICES AND CONDITIONS ON ASBESTOS REMOVAL

WARNING:
Stop Work Order can be issued and legal action can be taken against the demolition company or contractor if any of the above occurs. If removal of asbestos material is done within a factory premises, legal action can also be taken against the factory occupier.
Poor housekeeping — Asbestos debris is not immediately collected into impermeable bags or other impermeable containers. Some debris are not cleared, but are left lying around the ground.

Note: Asbestos-containing sheets or panels should be removed with minimal breakage. The removed sheets or panels should be carefully lowered to the ground to avoid breakage, so as to minimise dust generation.

WARNING:
Stop Work Order can be issued and legal action can be taken against the demolition company or contractor if any of the above occurs. If removal of asbestos material is done within a factory premises, legal action can also be taken against the factory occupier.
Guidelines On The Removal Of Asbestos Materials In Buildings

Leakages:- Plastic sheets are not properly secured. Hence, asbestos fibres generated during the removal work can escape into the outer atmosphere.

Note: On completion of the asbestos removal work, the canvas sheets should be cleaned either by vacuuming or damp wiping prior to dismantling, after which they should be placed in dust-tight, appropriately-labelled container(s) for disposal.

WARNING:
Stop Work Order can be issued and legal action can be taken against the demolition company or contractor if any of the above occurs. If removal of asbestos material is done within a factory premises, legal action can also be taken against the factory occupier.
Note: On completion of the asbestos removal work, the canvas sheets should be cleaned either by vacuuming or damp wiping, after which they should be placed in dust-tight, appropriately-labeled container(s) for disposal.

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EXAMPLES OF PROPER WORK PRACTICES AND CONDITIONS

Warning sign displayed at the asbestos work area

Removed asbestos sheets are wrapped with polyethylene sheeting and labelled prior to disposal

Warning label affixed on disposal bag containing asbestos waste.
Asbestos sheets are wrapped with polyethylene sheeting and the asbestos fragments are collected into impermeable disposal bags. Both the wrapped asbestos sheets and disposal bags are affixed with warning labels.

Barriers are erected to isolate the asbestos waste. Warning signs are displayed on the barriers.
Guidelines On The Removal Of Asbestos Materials In Buildings

Note: On completion of the asbestos removal work, the canvas sheets should be cleaned either by vacuuming or damp wiping prior to dismantling, after which they should be placed in dust-tight, appropriately-labelled container(s) for disposal.

Windows and entrances to asbestos work areas are properly sealed with plastic sheets. The entrance openings are properly closed after entry or exit by worker(s).
Spray-bottle with water can be used to wet the joints of screws, bolts or nuts (which secure the asbestos sheets) prior to removal. This is to prevent asbestos fibres from becoming airborne during removal.

Isolated changing room with shower facilities is provided for the workers to remove asbestos-contaminated work clothing. The room is supplied with impermeable, labelled bags and containers for the containment and disposal of contaminated work clothing and equipment. Asbestos particulate is removed from the wastewater by means of a suitable filter fixed at the outlet of the discharge pipe prior to release into the sewage drain. Alternatively, the asbestos-containing wastewater could be collected in a suitable container and disposed as asbestos waste.

Worker is provided with proper respirator (with high-efficiency particulate filters). Fit test is conducted to ensure that the respirator provided is of correct size and fit on the day of purchase. In addition, the worker has been instructed and trained in the use of the respirator.
**IMPROPER WORK PRACTICE**

Incorrect work practice — Unnecessary breaking of asbestos sheets into fragments could result in asbestos dust generation. In addition, the sheets are not wetted prior to breaking.

Note: Asbestos removal work is done in an open area in this case.

**PROPER WORK PRACTICE**

Breaking of asbestos sheet is done inside a tent. Water is applied at the point of breakage of the sheet throughout the whole breaking process. The pieces of asbestos fragment are immediately collected into a disposal bag. Suitable personal protective appliances are used during all asbestos-handling tasks.

Note: Breaking of asbestos sheets should be avoided unless it is necessary (e.g. The asbestos sheet accidentally dropped onto the ground during removal from the roof and broke into fragments. It is thus not practical to wrap the broken pieces. In addition, the broken pieces are too big to be contained in the disposal bag.) Breaking of large asbestos sheets into smaller pieces should never be done in an open space.

Note: On completion of the asbestos removal work, the canvas sheets and metal frames of the tent and the wooden board should be cleaned either by vacuuming or damp wiping prior to dismantling. The canvas sheets
are then placed in dust-tight, appropriately-labelled container(s) and the wooden board is wrapped with plastic sheeting for disposal. The metal frames are washed again for re-use.
Asbestos removal work is done inside an enclosed/sealed workplace. Wetting of the asbestos-containing materials is done throughout the asbestos removal work. Water is applied by means of an airless sprayer to the entire surface and depth of the materials. The water spray is especially directed at the point of removal or breakage of the materials. The removed asbestos-containing materials are kept wet until disposal. (High pressure water or other fluids should not be used.) Asbestos materials is collected into a disposal bag on the same day after removal, and not be postponed until the next day. Suitable personal protective appliances are used during all asbestos-handling tasks.

Note: Breaking of large asbestos sheets into smaller pieces may only be allowed in a confined and enclosed space with restricted movement or conveying of the large sheets. It should not be done in an open space.
IMPROPER WORK PRACTICE

Disposal chute containing asbestos debris is not properly covered. In addition, there is no warning labels affixed on the chute.

PROPER WORK PRACTICE

Disposal chute is properly covered and affixed with warning labels.
REMOVAL OF ASBESTOS MATERIAL – THINGS TO NOTE

To facilitate the notification process, please submit the following documents with two copies of the notification form (Appendix 1):

1. Specifications / receipt of types of respirators and cartridges purchased
2. Respirators fit test certificate of workers
3. Specifications / receipt of work clothing purchased
4. Register of persons employed
5. Medical summary report
6. X-ray summary report
7. Work procedures, diagrams of shower areas and structure to be removed etc

Work involving asbestos must be notified 28 days prior to commencement. Please make sure that the forms are filled up correctly. Incomplete forms will not be processed.
### Appendix I

THE FACTORIES ACT  
(ACT 6)  

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

NOTIFICATION OF PROCESS INVOLVING ASBESTOS

The notice shall be completed in DUPLICATE 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 059764.

<table>
<thead>
<tr>
<th>Name and Address of person undertaking or about to undertake a process involving asbestos:</th>
<th>Tel No: 67894561</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABC PTE LTD, 27 Henderson Industrial Park, Singapore 123456</td>
<td>Fax No: 67894562</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Address of place where process involving asbestos is being undertaken or about to be undertaken:</th>
<th>Tel No: 61234567</th>
</tr>
</thead>
<tbody>
<tr>
<td>XYZ PRIMARY SCHOOL, 5 BEDOK ROAD, SINGAPORE 456123</td>
<td>Fax No: 61234568</td>
</tr>
</tbody>
</table>

| No. of workers employed in the process: | 10 |

<table>
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<tr>
<th>How asbestos is used (brief description of process):</th>
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<tbody>
<tr>
<td>Asbestos roof sheets, wall panels, roof panels, pipe lagging</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Type(s) of asbestos used: White / Blue / Red asbestos (Chrysotile, Amosite, Crocidolite)</th>
</tr>
</thead>
</table>

<table>
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<tr>
<th>Duration of Process (if process is temporary):</th>
<th>Commencement Date:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Months 2 Days</td>
<td></td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Date</th>
<th>Name, Designation and Signature of Person Undertaking the Process</th>
</tr>
</thead>
</table>
THE FACTORIES ACT
(Act 6)

THE FACTORIES (ASBESTOS) REGULATIONS, 1980
(Regulation 5)

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Factories (Asbestos) Regulations, 1980, and forwarded to the Chief Inspector of Factories,
Ministry of Manpower, 18, Havelock Road #05-01, Singapore 059764.

| Name and Address of person undertaking or about to undertake a process involving asbestos: | Tel No: |
| Address of place where process involving asbestos is being undertaken or about to be undertaken: | Fax No: |

| No. of workers employed in the process: | How asbestos is used (brief description of process): |

<table>
<thead>
<tr>
<th>Type(s) of asbestos used:</th>
<th>Duration of Process (if process is temporary):</th>
<th>Commencement Date:</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>Months Days</td>
<td></td>
</tr>
</tbody>
</table>

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
Appendix II

LIST OF ASBESTOS ANALYSING LABORATORIES

1. Analytical Laboratory (S) Pte Ltd
   134 Genting Lane
   Singapore 349580
   Tel: 6746 0886
   Fax: 6746 3830

2. Department of Community, Occupational
   and Family Medicine
   National University of Singapore
   Faculty of Medicine MD3
   16 Medical Drive
   Singapore 117597
   Tel: 6874 4999
   Fax: 6779 1489

3. SETSCO Services Pte Ltd
   18 Teban Gardens Crescent
   Singapore 608925
   Tel: 6566 7777
   Fax: 6566 7718

4. SGS Testing & Control Services
   Singapore (Pte) Ltd
   Blk 26 Ayer Rajah Crescent
   #03-07
   Singapore 139944
   Tel: 6778 1550
   Fax: 6779 0527

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 Ministry of Manpower (MOM) of their services. MOM expressly disclaims all responsibilities and liabilities of every kind and nature.
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: 6299 1966
   Fax: 6295 0207

2. Klenco (S) Pte Ltd
   18 Gul Crescent
   Singapore 629527
   Tel: 6862 3388
   Fax: 6861 7575

3. Nilfisk-Advance Pte Ltd
   22 Woodlands Industrial Park E1
   #02-00
   Singapore 757740
   Tel: 6365 3395
   Fax: 6368 4110

4. Performance Janitorial Supplies Pte Ltd
   7 Kallang Place
   #05-08
   Singapore 339153
   Tel: 6296 8886
   Fax: 6292 0065

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 Ministry of Manpower (MOM) of their services. MOM expressly disclaims all responsibilities and liabilities of every kind and nature.

Updated on 27th January 2005
### Appendix IV

**THRESHOLD LIMIT VALUES FOR ASBESTOS**

<table>
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<tr>
<th>All forms of Asbestos</th>
<th>0.1 fibres/cc</th>
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Guidelines On The Removal Of Asbestos Materials In Buildings

Fibrous Structures of Asbestos
APPLICATION OF WRITTEN PERMISSION TO DISPOSE OF TOXIC
INDUSTRIAL WASTES AT SEMAKAU LANDFILL

1 Name of generator: ______________________________________________________

2 Address: _______________________________________________________________

3 Waste to be disposed of: __________________________________________________

4 Process from which the waste is being generated: ____________________________

5 Site Address (asbestos waste only): _______________________________________

6 Type of container used: __________________________________________________

7 Is this a one-time disposal? * Yes / No
   a) If Yes, state quantity: ________________________________________________
   b) If No, what is the frequency and quantity to be disposed of during each disposal?
      i) ______________ times per * month / year
      ii) ______________ metric tonnes per disposal

I, ______________________________________________________________________.
    (Name of Declarant)                  (Designation)

__________________________________________________________________________
    (Name of Generator)

hereby declares that the above waste has been treated/tested to comply with the EPA Leaching Test Standard and rendered safe to be landfilled with other general wastes at Semakau Landfill.

__________________________________________  __________________________
    Date                                      Signature

Company’s Stamp

* Please delete accordingly.

WP-DUMPING GROUND (0599)
Appendix VI

LIST OF COMPANIES TO CONTACT FOR DISPOSAL OF ASBESTOS WASTE AT SEMAKAU LANDFILL

<table>
<thead>
<tr>
<th>Company Name</th>
<th>Address</th>
<th>Telephone No.</th>
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<tbody>
<tr>
<td>ECO Industrial Environmental</td>
<td>23 Tuas View Circuit</td>
<td>68633323</td>
</tr>
<tr>
<td>Engineering Pte Ltd</td>
<td>Singapore 637768</td>
<td></td>
</tr>
<tr>
<td>North Shipyard Pte Ltd</td>
<td>23 Tuas Crescent</td>
<td>68622606</td>
</tr>
<tr>
<td></td>
<td>Singapore 638717</td>
<td></td>
</tr>
<tr>
<td>Purechem Onyx Pte Ltd</td>
<td>7 Tuas Avenue 10</td>
<td>68616668</td>
</tr>
<tr>
<td></td>
<td>Singapore 639131</td>
<td></td>
</tr>
<tr>
<td>Singaport Cleanseas Pte Ltd</td>
<td>2 Maritime Square</td>
<td>62755868</td>
</tr>
<tr>
<td></td>
<td>#03-01 SPI Building</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Singapore 099255</td>
<td></td>
</tr>
<tr>
<td>YLS Steel Pte Ltd</td>
<td>30 Tuas South Avenue 8</td>
<td>68613183</td>
</tr>
<tr>
<td></td>
<td>Singapore 637653</td>
<td></td>
</tr>
</tbody>
</table>

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Updated on 27th January 2005
Guidelines On The Removal Of Asbestos Materials In Buildings

AIR-PURIFYING & SUPPLIED - AIR RESPIRATORS

NOTE:-

1. Always choose a respirator which satisfies the standards of the approving authorities of the country of origin such as NIOSH/MSHA (USA), CEN (Europe), AS/NZS (Australia/New Zealand) and JIS (Japan), etc.

2. The Non-powered Air-Purifying Respirators and Powered Air Purifying Respirators do not provide protection against the following atmospheres:
   a) Atmosphere containing less than 19.5% oxygen;
   b) Atmosphere with unknown air contaminants or concentrations;
   c) Atmosphere Immediately Dangerous to Life and Health (IDLH);
   d) Atmosphere with levels exceeding the maximum-use concentration established by the approving authorities of the country of origin.

3. Use Supplied-Air Respirators (Airline Respirators or Self-contained Breathing Apparatus [SCBA] ) for chemical vapours/gases which do not have adequate warning properties or which cannot be removed by any available cartridge/canister filters. However, Airline Respirators alone are NOT to be used in oxygen-deficient atmospheres, IDLH or emergency situations.

4. Use only SCBA or Full-face Airline Respirators (Positive pressure) with Escape SCBA or Helmet/Hood Continuous Flow Airline Respirators with Escape SCBA for oxygen-deficient atmospheres, IDLH or emergency situations.

5. Always check with the manufacturers/vendors on the appropriate type of respirators to be used.
Guidelines On The Removal Of Asbestos Materials In Buildings

- Half-face Air-purifying Respirator with Cartridge filters
- Full-face Air-purifying Respirator with Cartridge filters
- Full-face Air-purifying Respirator with Gas-canister filter
- Powered Air-purifying Respirator
- Airline Respirator
- Self-contained Breathing Apparatus
- Airline Respirator with Escape SCBA

Connects to compressor
MECHANICAL-FILTER ELEMENT

A mechanical-filter element provides protection against particulate matter such as dusts, mists, or metal-fumes. This type of element “filters” particulate matter by physically trapping it in the fibrous filter material.

In addition, the wool-felt filters possess an electrostatic charge that increases filter efficiency by electrostatically attracting the particles to the fibres. Although mechanical filters become more efficient as they are used, they should be changed when breathing resistance becomes excessive.

CHEMICAL-CARTRIDGE ELEMENTS

Chemical-cartridge elements are filled with a specially treated activated-carbon with a very high absorption capacity. Gases and vapours passing through the chemical cartridges are attracted and held to the surface of the carbon. In the case of acid and alkaline gases, a chemical reaction and/or absorption occurs.

Unlike mechanical-filters, chemical cartridges do not become more efficient with use. Their absorption capacity is limited; thus when wearers detect any taste, odour, or irritation, they should leave the contaminated area and change the cartridges.
### CLASSIFICATIONS OF FILTERS, CARTRIDGES & CANISTERS FOR AIR-PURIFYING RESPIRATORS UNDER EUROPEAN (CEN) & AUSTRALIAN/NEW ZEALAND (AS/NZS) STANDARDS

<table>
<thead>
<tr>
<th>CARTRIDGE/CANISTER/FILTER TYPES</th>
<th>USE FOR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type 'A' Cartridge/Canister</td>
<td>Vapours of Organic-solvents with high boiling point (&gt; 65°C) such as Trichloroethylene (TCE), Perchboroethylene/Tetrachloroethylene (PCE), Toluene, Xylene, Hexane, etc.</td>
</tr>
</tbody>
</table>
| Type 'AX' Cartridge/Canister    | Vapours of Organic-solvents with low boiling point (≤ 65°C) such as Acetaldehyde, Butane, Ethyl formate, Vinyl chloride, etc.  
  Note: 'AX' Gas Filter shall be used only for protection against a single contaminant, and NOT against mixtures of low boiling compounds and other organic compounds. This is to prevent desorption effect. |
| Type 'B' Cartridge/Canister     | Certain inorganic gases and vapours, such as Chlorine, Formaldehyde, Hydrogen sulfide, Hydrogen cyanide, etc. 
  Excluding Carbon monoxide. |
| Type 'E' Cartridge/Canister     | Sulfur dioxide, Hydrogen chloride, and other acid gases and vapours. |
| Type 'G' Cartridge/Canister     | Certain organic compounds with vapour pressures less than 1.3 Pa (0.01 mmHg) at 25°C. (Under AS/NZS standard) |
| Type 'K' Cartridge/Canister     | Ammonia, Methylamine and organic ammonia derivatives. |
| Type 'CO' Cartridge/Canister    | Carbon monoxide gas. |
| Type 'Hg' Cartridge/Canister    | Metallic mercury vapour. |
| Type 'MB' Cartridge/Canister    | Methyl bromide. (Under AS/NZS standard) |
| Type 'NO' Cartridge/Canister    | Nitrous fumes and Oxides of nitrogen, such as Nitric Oxide, Nitrogen dioxide, etc. |
| Type 'P1' Particulate Prefilter | Solid particles of inert substances. Can be used alone or together with Vapours or Gases cartridges. |
| Type 'P2' Particulate Prefilter | Solid and liquid particles of harmful substances. Can be used alone or together with Vapours or Gases cartridges. |
| Type 'P3' Particulate Prefilter/Cartridge | (1) Solid and liquid particles of toxic and very toxic substances. 
  (2) Radionuclides, Radon daughters and Asbestos-containing dusts and mists. |
| Paint-Spray Prefilter ( Usually type 'P1' ) | Use together with Organic-Vapours cartridge for SPRAY-PAINTING. |
| Pesticide Filter/Prefilter ( Usually type 'P1' ) | Use alone for dry-powdered PESTICIDES or together with Organic-Vapour cartridge for protection against solvent-based PESTICIDES. 
  NOT for use against FUMIGANTS. |
<table>
<thead>
<tr>
<th>CARTRIDGE/CANISTER/FILTER TYPES</th>
<th>USE FOR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organic-Vapour Cartridge/Canister</td>
<td>Vapours of Organic-solvents such as Trichloroethylene (TCE), Perchloroethylene/Tetrachloroethylene (PCE), Toluene, Xylene, Hexane, etc.</td>
</tr>
<tr>
<td>Acid-Gas Cartridge/Canister</td>
<td>Chlorine, Hydrogen chloride, and Sulfur dioxide.</td>
</tr>
<tr>
<td>Organic-Vapour/Acid-Gas Cartridge/Canister</td>
<td>For Organic-vapours and Acid-gases.</td>
</tr>
<tr>
<td>Ammonia/Methylamine Cartridge/Canister</td>
<td>Ammonia and Methylamine gases.</td>
</tr>
<tr>
<td>Formaldehyde Cartridge/Canister</td>
<td>Formaldehyde vapour.</td>
</tr>
<tr>
<td>Mercury Vapour/Chlorine Cartridge/Canister</td>
<td>Metallic Mercury-vapour and Chlorine-gas.</td>
</tr>
<tr>
<td>Multi-Gas-and-Vapour Cartridge</td>
<td>Organic-vapours, Acid-gases, Ammonia, Methylamine, Formaldehyde and Chlorine. Recommended for use in atmospheres where various types of gases and vapours are present. <strong>NOT for mercury vapour.</strong></td>
</tr>
<tr>
<td>N95, R95 and P95 Particulate Prefilter</td>
<td>Provide 95% filtering efficiency against dusts, mists and fumes of inert and harmful substances.</td>
</tr>
<tr>
<td>N97, R97 and P97 Particulate Prefilter</td>
<td>Provide 99% filtering efficiency against dusts, mists and fumes of inert and harmful substances</td>
</tr>
<tr>
<td>N100, R100 and P100 Particulate Prefilter/Cartridge</td>
<td>Provide 99.97% filtering efficiency against:- (1) Dusts, mists, and fumes of toxic and very toxic substances. (2) Radionuclides, Radon daughters and Asbestos-containing dusts and mists.</td>
</tr>
<tr>
<td>Paint-Spray Prefilter</td>
<td>Use together with Organic-Vapours cartridge for <strong>SPRAY-PAINTING</strong>.</td>
</tr>
<tr>
<td>Pesticide Filter/Prefilter</td>
<td>Use alone for <strong>dry-powdered PESTICIDES</strong> or together with Organic-Vapour cartridge for protection against <strong>solvent-based PESTICIDES</strong>. <strong>NOT for use against FUMIGANTS.</strong></td>
</tr>
</tbody>
</table>
Note: 'R' and 'P' series particulate filters are used in environments with oil particles present in the air.
WARNING

Do not use :-

(i) Particulate filters to protect against Gases/Vapours; or

(ii) Vapour/Gas filters to protect against dusts/particulates; or

(iii) Vapour filters to protect against Gases; or

(iv) Gas filters to protect against Vapours.

※ For protection against particulates, gases and vapours, use combination filters.
**FIT CHECK FOR RESPIRATORS**

This should be done **every time** a respirator is used.

**NEGATIVE PRESSURE FIT CHECK**

1. Close off the inlet openings of the cartridges or filters by covering with the palms, so that air cannot pass.

2. Breathe **in** gently so that the face piece collapses slightly, and hold the breath for 10 seconds.

3. If the face piece remains slightly collapsed and no inward leakage is detected, the fit is good.

**POSITIVE PRESSURE FIT CHECK**

1. Close off the exhalation valve by covering with the palms, so that air cannot pass.

2. Breathe **out** gently so that slight positive pressure can be built up inside the face piece.

3. If there is no outward leakages from the edges of the face piece, the fit is good.

**NOTE:**

If leakage is present, re-adjust the strap and facepiece and repeat the test.
**LIST OF RESPIRATOR SUPPLIERS**  
(WITH FIT-TEST & TRAINING )

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 Ministry of Manpower of their services. The Ministry expressly disclaims all responsibilities and liabilities of every kind and nature.

The supplier will issue a Certificate to the respirator-wearer who has undergone the fit-test and training

| 1. | 3M Singapore Pte Ltd | Tel: 64548611 | 9 Tagore Lane | Fax: 64568953 |
| 2. | Draeger Services South East Asia | Tel: 68729288 | 67 Ayer Rajah Crescent #06-03 | Fax: 67732033 |
| 3. | Gas & Safety Technology | Tel: 62240862 | 315 Outram Road #06-01 | Fax: 62224436 |
| 4. | Lee Seng Heng | Tel: 62653172 | 1 Penjuru Close | Fax: 62658080 |
| 5. | Lee Hung Scientific Pte. Ltd | Tel: 65606900 | 50 Bt. Batok St. 23 | Fax: 65676909 |
| 6. | MSA S.E. Asia Pte Ltd | Tel: 67761633 | 51 Ayer Rajah Crescent #02-03 | Fax: 67782529 |
| 7. | Noah Agencies 'N' Marine Services Pte Ltd | Tel: 62660788 | 43 Kian Tech Drive | Fax: 62661042 |
| 8. | PDS International Pte Ltd | Tel: 62767366 | 10 Pandan Crescent #05-03/04 | Fax: 62765080 |
| 9. | Pacific Royce (S) Pte Ltd | Tel: 67496998 | 61 Kaki Bukit Ave 1 #03-06 | Fax: 67496289 |
| 10. | QMT Industrial & Safety Pte Ltd | Tel: 62956896 | 8A Ruby Lane | Fax: 62956297 |
| 11. | QSS Safety Products | Tel: 67452966 | 239 Ubi Avenue 4 | Fax: 68412966 |
| 12. | Ray Scientific | Tel: 67641526 | 151 Ubi Avenue 4 | Fax: 67669481 |
| 13. | Ready Oilfield Safety & Services Pte Ltd | Tel: 67648477 | 60 Hillview Terrace | Fax: 67648227 |
**REGISTER OF PERSONS EMPLOYED IN WORK INVOLVING EXPOSURE TO ASBESTOS**

<table>
<thead>
<tr>
<th>Name</th>
<th>NRIC/FIN No.</th>
<th>Sex</th>
<th>Date of Birth</th>
<th>Address</th>
<th>Department / Section</th>
<th>Work involving Exposure to asbestos</th>
<th>Involved in Previous Renovation or other work* with asbestos</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Date Started</td>
</tr>
</tbody>
</table>

*Whether in same company or other companies.*
THE FACTORIES ACT, (CHAPTER 104)
THE FACTORIES (MEDICAL EXAMINATIONS) REGULATIONS
Regulation 8(2)
SUMMARY REPORT FORM

Factory : _________________________________________________________ Tel: __________________
Address of factory : ________________________________________________ Fax: _________________
Hazard :  ______________________________    Total no. of exposed workers : _____________________
No. of workers examined : ______________________________________
No. with normal results : ______________________________________
No. with abnormal results : ______________________________________
  a. Occupational : ______________________________________
  b. Not Occupational : ______________________________________
No. of workers recommended for suspension: ______________________________________

FOR NOISE HAZARD ONLY:
1. Person(s) performing the audiometric tests is/are as follows:-
   Name                        NRIC

2. Number of workers examined who are using hearing protectors during noise exposure: _________

FOR LEAD, CADMIUM, MERCURY, MANGANESE, ARSENIC, TRICHLOROETHYLENE AND
PERCHLOROETHYLENE ONLY:

The laboratory conducting the analysis *does/does not participate in the following proficiency testing scheme
for the relevant chemical: *DSS/NEQAS/Robens Institute/Danish EQAS/NIOSH/
Others: (Specify)_____________________________________________________

I certify that the information given above is correct. Further, I confirm that the medical examinations were
conducted in accordance with the Guidelines for Designated Factory Doctors. In the case of audiometric tests, these
were done in a proper booth or test environment and conducted by persons who have undergone a course of training
in audiometric screening approved by Chief Inspector of Factories. All workers were counselled on the importance
of wearing hearing protectors when exposed to excessive noise.

Details of the workers with abnormal results are attached.

Name of Designated Factory Doctor:__________________________  DFD Reg. No:_____________
Name & Address of Practice: __________________________________________________________
________________________________________________________________________
Tel No: ____________   Fax No:______________

Date                                   Signature
*Delete as appropriate   Please ensure all items in the form are completed. Incomplete forms will be returned.
Checklist for Removal of Asbestos
Occupational Safety and Health Division
Ministry of Manpower

1. Before starting work
- Read the Guidelines on the Removal of Asbestos Materials in Buildings, issued by
  the Ministry of Manpower (MOM).
- Notify MOM at least 28 days before commencement of work by submitting the
  Notification Form provided in Appendix 1 of the Guidelines.
- Send workers for a large-size chest X-ray & medical examinations to be
  conducted by a Designated Factory Doctor (DFD). Please refer to the list of DFD
  attached.
- Submit a copy of summary report on the X-ray examinations to MOM.
- Submit to MOM the receipts and descriptions of the personal protective alliances
  such as respirators, gloves, protective clothing etc, used.
- Apply for written permission to the National Environment Agency (NEA) for asbestos
  disposal using Appendix V.
- Consult ENV for proper disposal of asbestos materials. A list of disposal
  companies is given in Appendix VI.

2. Preparatory work
- Erect barriers or barricades to prevent unauthorised persons entering the
  asbestos work area.
- Display warning signs at the work area.
- Remove all movable objects from the work area.
- Cover immovable objects with impermeable polyethylene sheeting.
- Disable ventilation system serving the work area.
- Use polyethylene sheeting to isolate work area.
- Provide suitable respirators for workers and test for correct size and fit.
- Provide changing and shower rooms for workers to remove the contaminated
  clothing and wash themselves after the removal work.

3. During work and on completion of work
- If possible, wet the asbestos materials before removal to suppress the release of
  asbestos fibres.
- Ensure the asbestos materials are removed with minimal breakage.
- Wet and wrap/cover the asbestos sheets before they are hoisted down from the
  roof by crane. (For roof removal only)
- Collect asbestos waste and debris in sealed, impermeable bags or containers
  immediately after removal.
• Affix warning labels on all bags or containers containing asbestos materials.
• Vacuum or damp-wipe the polyethylene sheeting before removal.
• Use industrial vacuum cleaners (a list of suppliers is provided in Appendix III) or wet cleaning methods to remove the remaining asbestos dust.
• Dispose asbestos materials in accordance with ENV’s procedures.

4. Post removal work

• Vacuum or damp-wipe the work clothing before removal.
• Dispose or wash on-site the contaminated work clothing.
• Transport contaminated work clothing out of the changing rooms or work area in sealed impermeable and labelled bags.
• Inform the laundries engaged in cleaning of the precautions needed to protect against exposure to asbestos dust.