Annex 3

Code of Practice on Asbestos Work Using Glove Bag Method - Issued Pursuant to Section 37 of the Air Pollution Control Ordinance (CAP 311)

This Code of Practice is issued by the Secretary for Planning, Environment and Lands under Section 37 of the Air Pollution Control Ordinance (Chapter 311) after consultation with the Advisory Council on the Environment. It sets out the procedures to be adopted in asbestos work using the glove bag method. This Code is intended to give guidance and advice to Registered Asbestos Consultants preparing asbestos abatement plans as well as to Registered Asbestos Contractors, Registered Asbestos Supervisors and Registered Asbestos Laboratories carrying out the work.

Although this Code is not legally binding, compliance with the advice given could be used as evidence of good practice in the course of legal proceedings.

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Introduction

1. This Code of Practice provides guidance and advice to Registered Asbestos Consultants, Contractors, Supervisors and Laboratories on asbestos work using glove bag method.

2. The glove bag method for removing asbestos pipe insulation is widely accepted within the asbestos industry as an abatement technique for small projects of short duration. It has the advantage of allowing workers to remain totally segregated from the asbestos containing material being removed. It is ideal for handling small sections of piping, valves, joints, elbows, flanges, and other non-planar surfaces allowing asbestos containing insulation and lagging to be removed whilst minimizing the chance of asbestos fibres becoming airborne.

3. The measures and procedures described in this Code are considered to be the minimum requirements necessary for safeguarding the environment and the health of occupants of areas where asbestos work has been carried out. Additional precautions may be necessary for certain operations and this Code should not be interpreted as precluding the adoption of such measures. The requirements of the Factories and Industrial Undertakings Ordinance for worker safety are particularly relevant in this regard.

4. The need for the worker to be properly trained in the use of glove bag before commencement of work is of great importance. It is the duty of the Registered Asbestos Contractor to ensure that formal training is given to the worker and that knowledgeable and close supervision is provided to monitor quality of work.

Materials and Equipment

5. The materials and equipment used during abatement activities should conform to the following.

   a) Only commercial grade **glove bags** of proven design shall be used. Glove bags are available in different sizes and designs (e.g. for use on vertical pipes) but they normally consist of the following features:

      - 0.15 to 0.30mm thickness transparent PVC or polythene bag open at the top with shoulders
      - heat sealed seams attaching to bag two inward-projecting long-sleeve gloves, one inward-projecting water sprayer access sleeve and an internal tool pouch
      - zippers to seal top flaps of bag
      - nylon straps to seal both shoulders of bag to pipe or insulation
      - 'zip-lock' feature to seal lower part of bag from top portion.

   b) Tools used inside a glove bag should be non-powered and so designed that the likelihood of puncturing or cutting the bag is minimized. For example, a knife used inside a glove bag should have a retractable blade; a saw used inside should be the flexible wire type; and a brush should not have metal bristles.

Clean rags for final clean-up of the pipe surface should be protected in a sealable bag to curb cross-contamination inside the glove bag.

c) For construction of temporary partitions, transparent **plastic sheeting** of 0.15mm thickness manufactured from extruded low-density polythene to B.S. 4932:1973 or equivalent, should be employed.

d) Duct tape, foam agent and spray adhesive should be capable of sealing joints of adjacent sheets of polythene, facilitating attachment of polythene sheets to finished and unfinished surfaces, and of adhering under both wet and dry conditions, including during the use of amended water.

e) Wetting agent for preparing **amended water** to enhance penetration should be 50% polyoxyethylene ester and 50% polyoxyethylene ether or equivalent, diluted to a specific concentration in accordance with the manufacturer's instructions. 10- to 20-litre capacity water pump sprayers should be used to apply amended water in a fine mist during abatement work.

f) **HEPA**-filtered appliances which include air movers, vacuum cleaners and respirators, should be fitted with high efficiency particulate air filters capable of trapping and retaining 99.97% of particles (asbestos fibres) greater than 0.3 micron mass median aerodynamic equivalent diameter.

g) Polythene sheeting, transparent or colour-coded bags and containers used for packing of asbestos waste should meet the specifications given in the Code of Practice on the Handling, Transportation and Disposal of Asbestos Waste issued by the Secretary for Planning, Environment and Lands.

h) Respiratory protective equipment and protective clothing used for asbestos abatement should comply with the requirements of the Factories and Industrial Undertakings (Asbestos) Special Regulations enforced by the Labour Department.

Documentary proof on the safety and specifications of the above materials and equipment may be required for submission to the Environmental Protection Department for endorsement.

Limitations of Glove Bag Method

6. Glove bags should not be used where the surface temperature of pipes exceeds 65 degree Celsius or when pipe insulation is in such a poor condition that a glove bag cannot be fixed to the surface in a secure manner.

7. Glove bags should not be used to remove pipe insulation which has an aluminium cladding of thickness exceeding 0.51mm (24 gauge) or a steel cladding. For aluminium cladding of 0.51mm or less, the following must be satisfied to ensure that the choice of glove bag method is acceptable:

a) The length of each section of the cladding does not exceed the length of the

glove bag.

b) The cladding should be removed only after the glove bag has been attached to the pipe and sealed.

c) Any jagged or sharp edges which have been produced during the removal of the cladding should be handled in such a way so as to minimize the possibility of ripping or puncturing the glove bag.

8. Glove bags should never be shifted, moved, re-installed or re-used once contaminated with asbestos for the abatement work. Repetitive use of the glove bag method on long pipe insulation for which full containment method would have been used is not permitted. As a general rule, one glove bag (of standard size) per room per day is the maximum acceptable for small-scale, short duration work.

Site Preparation and Preliminary Decontamination

9. The proposed **work area** (area containing asbestos containing material to be abated or worked on) should be vacated prior to any site preparation work. Warning notices in English and Chinese (see appendix 1) should be displayed conspicuously outside the work site on the first day of site possession and should remain posted until reassurance air testing is satisfactorily concluded.

10. If work is performed indoors, the work area should be isolated from the rest of the premises by walls or by erection of temporary partitions. Partitions should be constructed of wood stud framing or equivalent material of sufficient strength (maximum spacing 400mm centre-to-centre) to support one layer of plastic barrier sheeting on the side facing the abatement activity, and taped at the floor, ceiling, walls, joints and fixtures to form an airtight seal. A curtained doorway to give access to the work area should also be provided, consisting of a polythene sheet with an I-shaped slit opening covered by a plastic flap weighted at the bottom to maintain a good seal. All heating, ventilation and air-conditioning (HVAC) systems affecting the work area should be shut down and locked out. All HVAC openings in the area should be covered and tape sealed with polythene sheeting.

11. Shower facilities (either portable or existing in premises) should be arranged for possible use by workers in the case of accidental contamination. Where necessary, a secure place outside the work area should be identified solely for temporary storage of bagged asbestos wastes. The place should bear adequate warning notices and particular attention should be given to maintain good fire safety measures.

12. Debris of asbestos containing material should be removed by HEPA-vacuuming or wet wiping. Workers should wear appropriate respirators and depending on the extent of contamination, full-body protective clothing and a negative air pressure environment including a 3-chamber **decontamination unit** may be required (for construction details of containment and decontamination unit, please refer to the Code of Practice on Asbestos Work Using Full Containment or Mini Containment Method issued by the Secretary for Planning, Environment and Lands). The Registered Asbestos Consultant will decide on the extent of provisions to be made and verify that preliminary decontamination has been satisfactorily completed.

13. The floor of up to 1.5m from the abatement activity should be lined with 2 layers of polythene sheeting to collect debris in the event of a spill due to rupture of a bag. If the pipe insulation adjacent to the section to be worked on is damaged, the adjacent section should be misted with amended water and then wrapped in 2 layers of polythene sheeting and sealed airtight with duct tape.

Air Monitoring

14. A **Registered Asbestos Laboratory** should be engaged to conduct background and reassurance (similar to final clearance) air tests in accordance with the Code of Practice on Asbestos Work Using Full Containment or Mini Containment Method. Air samples which show fibre counts in excess of 0.01 fibre/ml will not be acceptable and the area will have to be re-cleaned again until the specified fibre level is attained.

Asbestos Removal

15. Glove bag method for asbestos abatement must be conducted by workers who are specifically trained in glove bag procedures. Personal protection equipment should include appropriate respirators and full-body protective clothing worn throughout the entire course of work. The pipework to be worked on should be checked to ensure the temperature is low enough and that services to the pipework in question have been shut down for worker safety. Friable asbestos containing material which would be disturbed or removed during the work should be thoroughly wetted with amended water before the glove bag is attached.

16. The procedures specified by the manufacturer for attaching the glove bag should be followed. As a rule, the diameter of the pipe insulation should not exceed one half the bag's working length above the gloves. The shoulders of the bag should be attached over duct tape (minimum 75mm wide) which has been placed securely around the insulation forming a smooth seal. For glove bags without zippers to seal the top flaps, doubled-sided tape (minimum 50mm wide) can be used to hold the top two flaps together, smoothly and without wrinkles or air pockets, and then the entire length of the tape should be stapled at intervals of approximately 100mm to ensure good seal across the top. The stapled top should then be folded back and taped down with a strip of duct tape. The shoulders of the bag should be strapped around the pipe to make an airtight seal, using duct tape or the nylon straps provided. Enough slack to the top of the bag should exist to allow working fully around the pipe without stretching the bag or the seals. The nozzle of a water pump sprayer should be inserted through the access sleeve of the bag and tape sealed.

17. The integrity of the glove bag should be tested by a simple 'squeeze' test, that is, gently squeeze the bag and if the bag does not collapse, it is properly sealed. In case there is leakage and the leakage points cannot be located, a test using smoke tubes (e.g. Draeger) will be required. The nozzle of the water sprayer would be retrieved to allow contents of the smoke tubes to be injected into the bag. After replacing the spray nozzle in the access sleeve and proper sealing, the bag should again be squeezed gently to check for the leakage points which are then taped airtight.

18. The bottom of the glove bag should be supported to take the weight of any dislodged

metal cladding and soaked insulation which can strain even a well constructed seal at the top. The asbestos containing material within the glove bag should be made thoroughly wet with amended water prior to stripping. Workers should work in pairs with one to accomplish removal while the other wets the asbestos containing material simultaneously at regular intervals. Care must be taken in handling any chicken-wire holding the asbestos containing material to the pipe to avoid puncturing the bag.

19. After the insulation has been removed, the exposed pipework, etc. should be sprayed with amended water and brushed to remove all visible asbestos containing material. All reusable tools including the nozzle of the water sprayer should be wet cleaned and the interior of the bag washed down to collect all visible debris at the bottom. The enclosed volume of the bag should then be misted and sufficient time should be allowed for the mist to settle out. Any pipe insulation ends created by these procedures should be sealed with suitable encapsulant and end caps prior to bag removal.

20. To recover the tools, the worker should grasp the items and pull through with one (or both) glove insert, thus turning the glove inside out to form a new pouch with the tools in it. The glove is then twist sealed, taped and severed at mid-seal forming a separate bag to be immersed in a bucket of water for further cleaning.

21. The cleaned nozzle of the water sprayer should be retrieved and the opening of the access sleeve should be immediately covered with the nozzle of the HEPA vacuum to suck air out and collapse the bag (but be careful not to suck water into the vacuum). With the glove bag collapsed and the access sleeve twist sealed, the bottom part of the bag should be 'zip-locked' to contain the asbestos containing material collected there. Alternatively, the bag should be twisted several times and the 'neck' taped to seal the bottom part.

22. A colour-coded disposal bag should be slipped around the glove bag while it is still attached to the pipe. The glove bag should then be detached from the pipe by cutting across the top with blunt scissors and received in the disposal bag for further packaging in accordance with the Code of Practice on the Handling, Transportation and Disposal of Asbestos Waste. All exposed surfaces of pipe, flange and valve should be wet wiped one final time and the work area thoroughly HEPA-vacuumed. All used protective clothing, polythene sheeting and soiled clean-up materials should be disposed of properly as asbestos waste. Facilities for washing the hands and arms should be used by every worker leaving the work area and any soiled water should be disposed of as asbestos waste in sealable drums.

Acceptance of Work

23. The Registered Asbestos Consultant should carry out a visual inspection to certify the absence of any visible asbestos debris and proper decontamination of hand tools and equipment. Upon approval by the Registered Asbestos Consultant, all surfaces stripped of asbestos containing material should be encapsulated with a suitable sealing material. A reassurance air test should then proceed to confirm an air quality of no more than 0.01 fibre/ml is attained or else the work area should be re-cleaned and a further reassurance air test be carried out. Upon a satisfactory test result, all

remaining plastic sheeting and temporary partitions may be dismantled.

Emergency Procedures

24. Emergency procedures are site specific and prior assessment of the work area is important in developing suitable procedures to cater for emergencies such as bag rupture and accidents due to working at height. If during the course of abatement, a worker collapses or some other accident occurs, the victim(s) should follow normal decontamination procedures with assistance from fellow workers before exiting the work area. For life-threatening situations, however, decontamination should take a lower priority and every effort should be made to ensure the victim(s) receives immediate medical treatment. Any area contaminated during the emergency should be thoroughly cleaned by wet wiping and HEPA vacuuming at the earliest opportunity, and verified by the Registered Asbestos Supervisor and approved by the Registered Asbestos Consultant before work is allowed to continue.

Warning Notice for Posting outside the Work Site

Specification

The Warning Notice should comprise both warning signs and explanatory labels.

1. Material : Durable, weather-resistant and rigid on a vertical plane outside the work site.
2. Colour : (a) For 'Danger' sign
   Sign : Black lines on yellow background
   Label : Black letters and characters on yellow background
   (b) For 'No unauthorised entry' sign
   Sign : Red lines on white background with the figure in black
   Label : White letters and characters on red background
3. Size : Height of Sign - Not less than 120mm
   Height of Capital Letters - Not less than 25mm
   Height of Chinese Characters - Not less than 35mm