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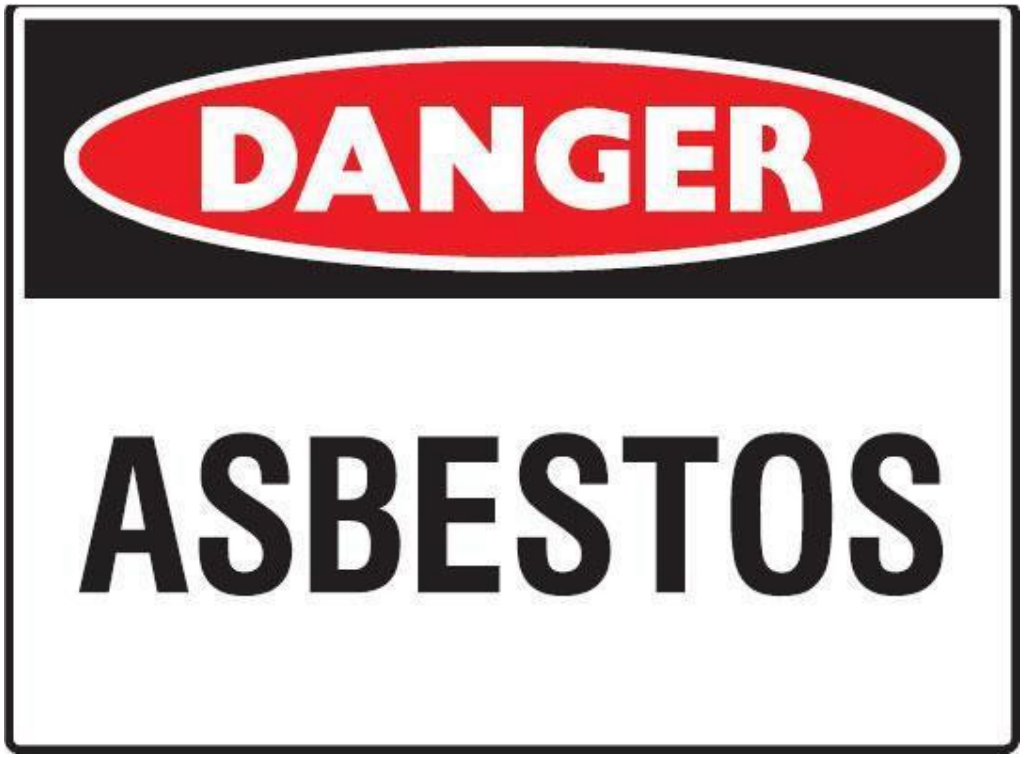
Asbestos Awareness

Participant Workbook

Participant Name: _____



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WorkSafe Consulting Services - Asbestos Awareness.

WorkSafe Consulting Services is committed to helping Employers and Employees to take a pro-active approach to loss prevention in the workplace.

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Asbestos Safety Type 1 & 2

Course Outline – We will discuss and review the following:

1. The Legislation
   Designated Substance Asbestos on Construction Projects and in Buildings and Repair Operations O. Reg 278/05

   -Legal Definitions

   -Type 1 and Type 2 Operations

   -Measures and Procedures Type 1 & 2

   Operations

   -Additional Measures Type 2

   -WHMIS Regulations,

2. The Hazards of Asbestos Exposure

3. Hazard Recognition – Identification of potential asbestos containing material.

4. Assessments- Legislated Standards, Guideline, checklists/policy procedure programs.

5. Controls- Personal Hygiene and Work Practices, Personal Protective Equipment- Clothing, Respirators

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Asbestos Awareness

Asbestos Awareness Training | Module 01 - YouTube

This video is a well-rounded video giving you a great introduction to the types of asbestos, health effects and types of products Asbestos may be found in. This was developed in the UK, please disregard the mention of UK in the video. We will cover the Canadian Legislation and the Canadian Enforcement branch that enforces compliance with the Act and its regulations.

Buildings Prior to 1990 and building products prior to 1990 may be asbestos containing. She references the year 2000. Here in Canada, we use 1990 and prior for the year that ACM were used.

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Asbestos is a generic term describing a number of naturally occurring fibrous minerals that have been used in a wide range of products because of their insulating, acoustical, fire protective and chemical resistant properties. There are different types of asbestos which include:

1. Chrysotile

Natural rock mineral serpentinite is the raw material, from which chrysotile asbestos with its unique properties is obtained. Another old and not less romantic name is "fossil flax", all because asbestos readily separates into long thin flexible fibres of down to 0.5 micrometer in diameter.

Testing revealed a fiberboard roof liner with a 100% chrysotile (white) asbestos paper backing.

The new 2006 asbestos regulations contain an important change. They now state that not only do you have to know where asbestos might be contained, but you also need to identify what type of asbestos it might be.

As there is no way to tell what type of asbestos is present in most materials by looking at them, this now means that more testing is required than previously and therefore, a type one and a half is now the best option for most premises.

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2. Amosite

Amosite asbestos is more commonly referred to as "brown" asbestos and sometimes "gray" asbestos. This form of asbestos was found and is mined in South Africa and is considered to be one of the more hazardous forms of the material, second only to "blue" asbestos. In fact, a large portion of South Africans who worked in the many asbestos mines there have been sickened with some sort of asbestos-related disease. Countless numbers have died.

From the amphibole group - which is naturally more hazardous than serpentine asbestos - amosite asbestos was, at one time, the second most prevalent type of asbestos found in building materials, accounting for about 5% of all asbestos used in factories and other commercial buildings. Its color comes from the natural presence of iron and magnesium found in this form of asbestos.

The amosite variety of asbestos was used primarily as a fire retardant in thermal insulation products, like ceiling tiles. Brown asbestos is now banned in most countries and has been for a number of years, but it can still be found in older products and structures, therefore still posing potential dangers, especially because this form of asbestos is highly friable. That means it crumbles easily when damaged, therefore releasing airborne fibers which can then be inhaled by those in the vicinity of the material.

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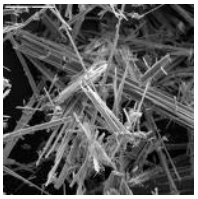
3. Anthophyllite, Tremolite, Actinolite



The other three types (Anthophyllite, Tremolite, Actinolite) are rare and found mainly as contaminants in other minerals.

The three most common types of asbestos that were mainly used in a wide range of products are chrysotile (white asbestos) Crocidolite (blue asbestos) and Amosite (brown or grey asbestos.

Until the late 1960's, industry used both serpentine (75%) and amphibole (25%) asbestos. Subsequently, the use the chrysotile increased to approximately 95% while blue and grey asbestos declined to 5%. Asbestos is one of the most useful and versatile minerals known to man mainly because of its unique properties, flexibility, tensile strength, insulation (from heat and electricity) and chemical inertness. It is the only natural mineral that can be spun and woven like cotton or wool into useful fibers and fabrics.

More than 3000 asbestos products and their uses have been identified. Most homes/commercial buildings prior to 1990 may contain asbestos products in one form or another. Asbestos products have been used in thousands of commercial and private buildings. Some other uses of asbestos include fencing, asbestos pipes, thermal insulation, fire proofing, as an additive in paints and sealants, in textiles such as felts and theatre curtains, in gaskets, and in friction products like brake linings and clutches. During the peak building years i.e. 1950's, 1960's and 1970's, asbestos found its way into most public buildings, for example hospitals, schools, libraries, office blocks and factories. Workplaces such as ships' engine rooms and power station were heavily insulated with sprayed limpet asbestos.

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Determining the Risk Asbestos Learning Series: Levels of Risk | WorkSafeBC - YouTube

In this video they describe the work as Low, Medium and High Risk.

Here in Ontario

Low Risk type of work would be defined as Type 1 Work -where there is not going to be any airborne asbestos present in the work area or surrounding area.

Medium Risk type of work would be defined as Type 2 Work – where there is potential exposure to airborne asbestos present in the work area or surrounding area.

High Risk type of work would be defined as Type 3 Work- where here in Ontario you have to be licensed to conduct type 3 work and properly trained. This type of work requires significant controls and protection for the worker where there is zero chance of exposure to the worker or other workers.

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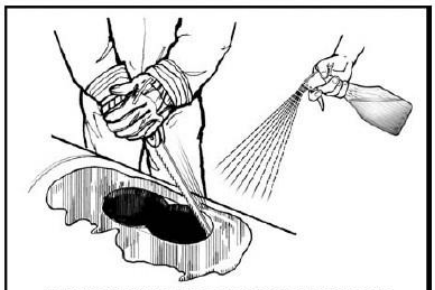
Type 1 Operations

9 TYPE 1 ASBESTOS OPERATIONS

9.1 What are Type 1 operations?

Type 1 operations include the following:

1. Installing or removing less than 7.5 square metres of ceiling tile containing asbestos (81 square feet, or ten 4-foot x 2-foot ceiling tiles) without it being broken, cut, drilled, abraded, ground, sanded, or vibrated.
2. Installing or removing non-friable asbestos-containing material, other than ceiling tiles, without it being broken, cut, drilled, abraded, ground, sanded, or vibrated.
3. Breaking, cutting, drilling, abrading, grinding, sanding, or vibrating non-friable asbestos-containing material if a) you wet the material, **and** b) you use only non-powered hand-held tools.



HAND SAWING ASBESTOS CEMENT PIPE

4. Removing less than one square metre of drywall where asbestos joint-filling compound was used.

DRYWALL JOINT-FILLING COMPOUND

Early drywall joint-filling compounds contained significant amounts of asbestos fibre. This particular use was specifically prohibited in 1980. Still, it may be found in buildings constructed several years afterwards.

If these operations are done properly, it is unlikely that exposure will exceed acceptable limits. This is why the use of respirators is optional for Type 1 work.

9.2 Controls for Type 1 operations

1. Eating, drinking, smoking, and chewing gum are prohibited.
2. If a worker requests a respirator and protective clothing for Type 1 operations, the employer must provide them. The respirators must be the proper type (see respirator chart, Appendix A) with filters suitable for asbestos. Once workers request respirators, they must wear them. Protective clothing must be impervious to asbestos fibres. Once workers request protective clothing, they must wear it.

   Refer to section 11.3 of this manual for more information on the use, care, and disposal of respirators and protective equipment.

   Protective clothing is used for two reasons:

   - to prevent transfer of dust and waste into clean areas
   - to guard unprotected workers, their families, and the public from secondary exposures to asbestos.

   Members of asbestos workers' families have developed illnesses from the dust brought home in work clothes. (See article on the next page.)
3. Before beginning work, visible dust must be removed by wiping with a damp cloth or by vacuuming with a special HEPA*-filtered vacuum.

   * HEPA (High Efficiency Particulate Aerosol) vacuums are specially designed to trap very small particles. They catch at least 99.97% of all particles 0.3 microns or larger. See "HEPA Filters," Appendix I.

Continued after the article on the next page.

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Vacuum with HEPA filter

4. Never use compressed air to clean asbestos dust off surfaces. This just blows the fibres into the air.

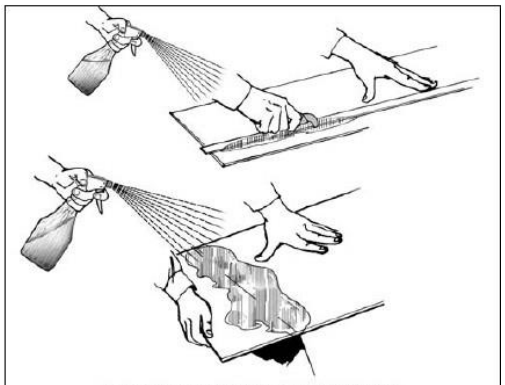
5. When you wish to cut, shape, or drill the non-friable materials as mentioned in Section 9.1 #3 (above), you must wet the work (water plus wetting agent—see box below) and use only hand tools such as nibblers, rasps, files, shears, knives, hand drills, or hand saws. Using hand tools may create some dust, but wetting the material will prevent the dust particles from becoming airborne.

WETTING AGENT

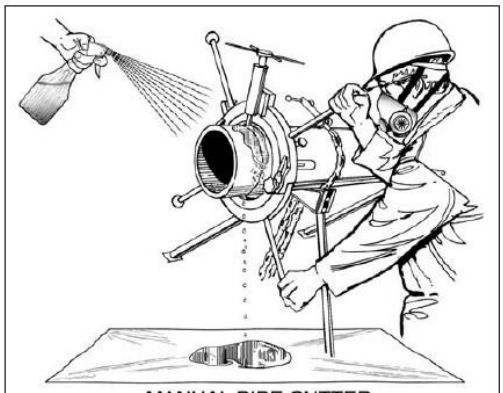
Water alone is not sufficient to control dust and fibres. You must add a "wetting agent" to reduce the water's surface tension. This increases the water's ability to penetrate material and get into nooks and crannies. To make this "amended water," you can use ordinary dishwashing detergent: 1 cup detergent for every 20 litres of water.

The US Environmental Protection Agency (EPA), in its *Guidance for Controlling Asbestos-Containing Materials in Buildings*, EPA-560/5-85-024 (Purple Book), recommends the use of a 50:50 mixture of polyoxyethylene ester and polyoxyethylene ether.

6. You must use a dropsheet (typically 6-mil polyethylene) below the work area to help control dust.



SCRIBING and BREAKING ASBESTOS CEMENT



MANUAL PIPE CUTTER

7. All asbestos dust and waste must be cleaned up regularly and frequently (before it dries out) using a HEPA vacuum or by damp-mopping or wet-sweeping.

8. Before leaving the work area, workers must damp-wipe or HEPA-vacuum their protective clothing to remove any surface contamination. Workers must damp-wipe their respirators before taking them off.

9. Asbestos waste and disposable coveralls must be placed in dust-tight containers and labeled with warning signs (see sections 11.7, 11.12, and 12 for more information on clean-up and disposal).

10. You must never reuse dropsheets. After the work is done, dropsheets must be

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Asbestos Awareness

Type 2 Operations

wetted or damp-wiped and then folded so that any residual dust or scrap is contained inside the folds. Dispose of dropsheets as asbestos waste.

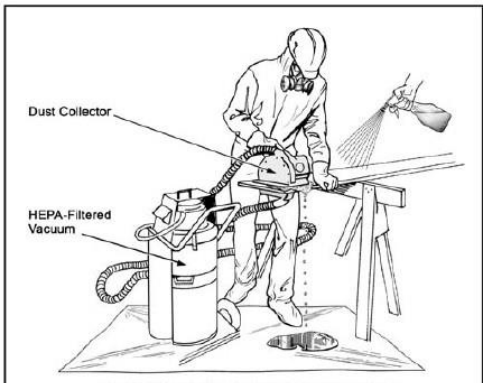
11. Barriers and portable enclosures that are rigid and will be reused must be cleaned by damp-wiping or HEPA-vacuuming. Barriers and enclosures that are not rigid or cannot be cleaned must not be reused.
12. Containers must be cleaned by damp wiping or HEPA-vacuuming before being removed from the work area.
13. You must dispose of waste at a landfill site that will accept asbestos (see sections 11.12 and 12).
14. A washbasin, soap, water, and towels—or a similarly-equipped clean-up facility—must be provided for workers so that they can wash their hands and faces upon leaving the work area. Workers must also wash before eating, drinking, smoking, or any such activities. This will help reduce secondary exposure to asbestos.

10 TYPE 2 OPERATIONS

10.1 What are Type 2 operations?

Exposure to asbestos is likely in Type 2 operations. You need controls to protect workers and others nearby. Type 2 operations include the following:

1. Removing all or part of a false ceiling in buildings containing sprayed asbestos fireproofing if it is likely that asbestos fibres are resting on top of the ceiling. This is likely when fireproofing is deteriorating or damaged.
2. Removing or disturbing less than 1 square metre of friable asbestos materials—for example, repairing an insulated pipe joint or removing some fireproofing to fasten a new pipe hanger.
3. Enclosing friable asbestos insulation to prevent further damage or deterioration.
4. Applying tape, sealant, or other covering (by means other than spraying) to pipe or boiler insulation.
5. Installing or removing more than 7.5 square metres of ceiling tile containing asbestos, without it being broken, cut, drilled, abraded, ground, sanded, or vibrated.
6. Breaking, cutting, drilling, abrading, grinding, sanding, or vibrating non-friable asbestos-containing material if the material is not wetted and the work is done only with non-powered hand-held tools.
7. Removing one square metre or more of drywall where the joint-filling compound contains asbestos.
8. Working on non-friable asbestos with power tools that are attached to dust collecting devices equipped with HEPA filters. If you need to power-grind or machine the asbestos product and your tools are not equipped with HEPA-filtered dust collectors, refer to Section 11.15.



POWER SAW EQUIPPED WITH DUST COLLECTOR AND HEPA-FILTERED VACUUM

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Type 2 Controls

To prevent electric shock, any power tools used around water must be equipped with a ground fault circuit interrupter (GFCI) and be maintained properly. GFCIs constantly monitor for any current leaking to ground. If leaking current is detected, the GFCI immediately switches off power to that circuit to prevent a lethal dose of electricity.

9. Using a glove bag to remove asbestos-containing insulation.
10. Cleaning or removing filters used in air-handling equipment in a building with sprayed asbestos fireproofing.
11. Any other operation that is not Type 1 or Type 3, but one that may cause exposure to asbestos.

10.2 Controls for Type 2 operations

1. Workers involved in Type 2 operations must wear a NIOSH-approved respirator as identified in the respirator chart, Appendix A. The employer must provide workers with training on the individual respirators they will be using. The training must cover
   - selection of respirator
   - fitting
   - inspection
   - use
   - care and maintenance
   - cleaning and disinfecting
   - limitations of the respirator.

   The equipment must be maintained according to the employer's written procedures and must be consistent with the manufacturer's instructions. The manufacturer can provide cleaning and disinfecting products which will not damage the respirators. Any damaged or worn parts must be replaced before a worker uses the equipment.

   Wherever possible, the respirators should be assigned to individual workers for their exclusive use. Otherwise, the respirators must be properly cleaned and disinfected before being used by someone else.

   Refer to section 11.3 of this manual for more information on the use, care, and disposal of respirators and protective equipment.

2. Workers must wear protective clothing impervious to asbestos with tight-fitting cuffs at the wrists, ankles, and neck, as well as a hood or head cover. This usually means one-piece disposable coveralls—ones which are easy to clean of surface contamination before you throw them

Protective clothing

Laceless, pull-on rubber boots

away. Torn or damaged clothing must be repaired or replaced. We recommend you use laceless, pull-on rubber boots. They can be washed off later or disposed of as contaminated waste.

Refer to section 11.3 of this manual for more information on the use, care, and disposal of protective equipment.

Protective clothing is required for two reasons:

a) to prevent transfer of dust and waste into clean areas

b) to guard unprotected workers, their families, and the public from secondary

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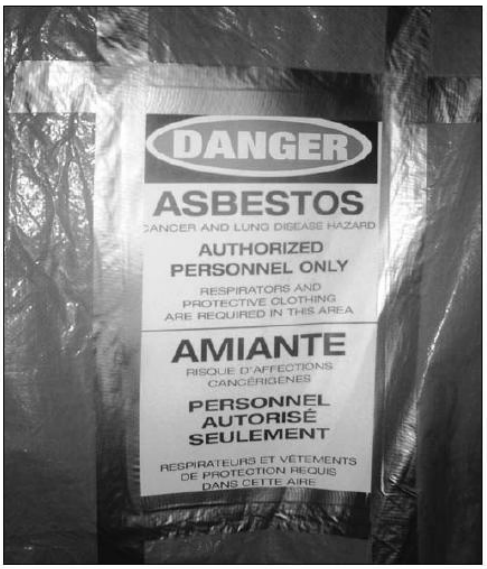
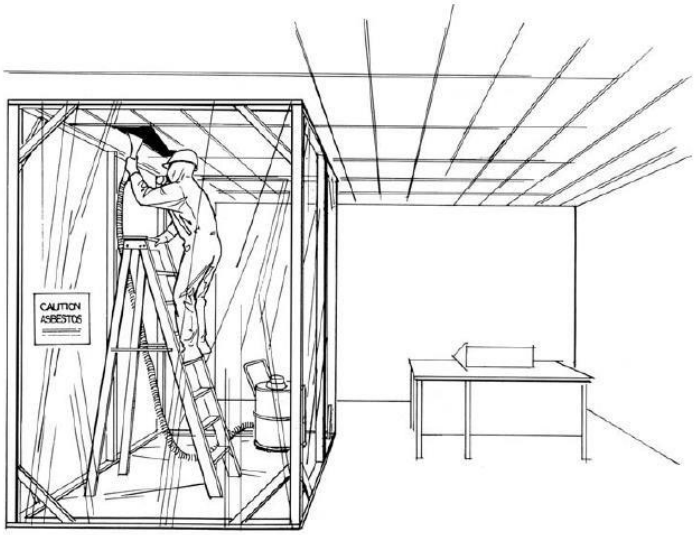
exposures to asbestos. Members of asbestos workers' families have developed illnesses from the dust brought home in work clothes. (See article in section 9.2.)

3. Only those workers wearing the required respirators and protective clothing are permitted in the work area.
4. You must never eat, drink, smoke, or chew gum in the work area.
5. Never use compressed air to remove asbestos dust from a surface.
6. You must wet asbestos-containing material before you remove it to lessen the chance of creating dust—unless wetting would cause a hazard or damage.
7. You must add a wetting agent to the water. See section 9.2 number 5.
8. Any dust on exposed surfaces must be cleaned by damp-wiping or HEPA vacuuming before starting work which may disturb the dust.



Warning sign

9. Warning signs are required for all Type 2 activities.
10. For ceiling removal (to gain access to a work area) and for removal of less than



TYPE 2 ENCLOSURE FOR CEILING WORK

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TYPE 2 OPERATIONS: GLOVE BAGS

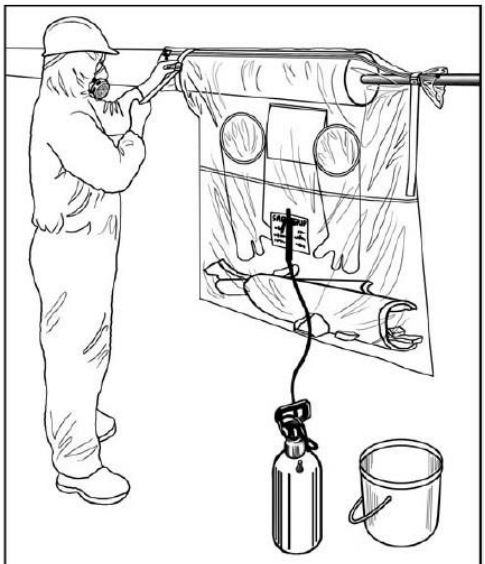
1 square metre of friable asbestos-containing material indoors, an enclosure must be erected around the area to prevent the spread of asbestos dust. If your enclosure is opaque, it must have a transparent window to allow observation of the work. The ventilation system must be disabled and sealed off if the inlets or exhausts are within the enclosed area. For other Type 2 operations, 6-mil polyethylene dropsheets should be adequate.

11. You must put waste asbestos, disposable clothing, the enclosure and barrier materials (such as polyethylene sheeting), and any other contaminated items into dust-tight containers labeled with warning signs. The containers must be damp-wiped or HEPA-vacuumed to remove any surface contamination before you take the containers out of the work area. Refer to Sections 11.7, 11.12, and 12 in this manual for information on clean-up and waste disposal.
12. Any dust or waste must be cleaned up by damp-wiping or HEPA-vacuuming before it can dry out and pose a hazard. You must never reuse dropsheets. Dropsheets and enclosures must be decontaminated and wetted before disposal.
13. After the work is completed, barriers and portable enclosures that are rigid and that will be reused must be cleaned by damp wiping or HEPA-vacuuming. Barriers and portable enclosures must not be reused unless they are rigid and can be cleaned.
14. Before leaving the work area, workers must damp-wipe or HEPA-vacuum their protective clothing to remove any surface contamination. Workers must damp-wipe their respirators before taking them off.
15. A washbasin, water, soap, and towels must be provided for workers to wash their hands and faces before leaving the work area. Workers must also wash before eating, drinking, smoking, or any such activities.

10.3 Glove Bag Operations

All the procedures that apply to Type 2 operations also apply to glove bag operations. In addition, you must do the following.

1. Separate the work area from the rest of the workplace by walls, barricades, fencing, or other suitable means.
2. Disable the mechanical ventilation system serving the work area and seal all openings or voids, including ventilation ducts and windows to and from the work area.
3. Place polyethylene dropsheets below the work area.
4. The glove bag must be strong and large enough to hold the material you're removing.



Asbestos GLOVE BAG

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Describe in your own words what a Type 1 operation is and what is a Type 2 Operation
Reference the previous pages. You can summarize your answers.

1. Type 1 Operation:

2. Type 2 Operation:

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Asbestos Awareness

Understanding the Legislation
Using Pages 14 to 16

What is the definition for ACM

_____
_____
_____
_____
_____
_____

What is a Competent Worker

_____
_____
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_____

What is the definition for Friable Material:

_____
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What is a Homogeneous Material: Hint – in solid form and non friable

_____
_____
_____
_____
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5 OVERVIEW OF THE NON-ASBESTOS LEGISLATION AND POLICIES THAT APPLY TO ASBESTOS WORK IN ONTARIO

5.1 Occupational Health and Safety Act (OHSA)

The *Occupational Health and Safety Act*

1. sets out the rights and duties of all parties in the workplace. Its main purpose is to protect workers against health and safety hazards on the job.
2. establishes procedures for dealing with workplace hazards, and it provides for enforcement of the law where compliance has not been achieved voluntarily through the internal responsibility system.

5.1.1 Specific non-asbestos regulations made under the OHSA

5.1.1.1 Construction Regulation (Ontario Regulation 213/91)

Asbestos removal falls under the Construction Regulation which regulates health and safety issues such as:

- housekeeping
- electrical hazards
- fire safety
- ladders
- scaffolds and work platforms
- elevating work platforms
- confined spaces
- demolition.

5.1.1.2 WHMIS (Workplace Hazardous Materials Information System)

WHMIS applies to all work sites where controlled products are used. Under the WHMIS regulation, employers must

- provide material safety data sheets (MSDSs) for the products,
- ensure that controlled products have WHMIS labels applied to the containers,
- ensure that workers receive WHMIS training.

5.1.1.3 Critical Injury Definition Regulation (Regulation 834)

For the purposes of the *Occupational Health and Safety Act* and the regulations, "critically injured" means an injury of a serious nature that,

- places life in jeopardy;
- produces unconsciousness;
- results in substantial loss of blood;
- involves the fracture of a leg or arm but not a finger or toe;
- involves the amputation of a leg, arm, hand or foot but not a finger or toe;
- consists of burns to a major portion of the body; or
- causes the loss of sight in an eye.

All critical injuries must be reported to the Ministry of Labour (MOL) for further investigation.

5.2 Workplace Safety and Insurance Act

Through the *Workplace Safety and Insurance Act*, the Workplace Safety and Insurance Board (WSIB) oversees the compensation of those injured or made ill due to work-related causes. The WSIB provides disability benefits, monitors the quality of health care, and assists in early, safe return to work for workers who were injured on the job or who developed an occupational disease.

The *Workplace Safety and Insurance Act* also outlines first aid requirements for companies.

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5.3 Environmental Protection Act

The disposal of asbestos is strictly regulated by the *Environmental Protection Act*. Asbestos waste must be disposed of at a landfill specifically approved and equipped to handle asbestos waste.

5.4 Transportation of Dangerous Goods Act

The transportation of asbestos-containing waste from the site of the asbestos abatement project to the landfill is regulated by the Transport of Dangerous Goods (TDG) Regulation and requires that

- any person transporting or handling dangerous goods has a TDG certificate
- the contractor transporting asbestos waste must have correct
  - TDG placarding on vehicles
  - manifest
- friable asbestos waste is transported only in vehicles equipped with emergency spill clean-up equipment.

5.5 Company policies

Companies may establish additional safe work practices and procedures (policies) that go beyond the requirement set out in the OHSA and its regulations. Company supervisors are responsible for ensuring compliance and enforcement of these work practices and procedures.

6 OVERVIEW OF THE ASBESTOS LEGISLATION THAT APPLIES TO ASBESTOS WORK IN ONTARIO

Ontario Regulation 278/05 (*Designated Substance—Asbestos on Construction Projects and in Buildings and Repair Operations*) under the *Occupational Health and Safety Act* (OHSA) outlines safe work measures and procedures and respiratory protection for workers who may encounter asbestos-containing material (ACM) in the course of their work.

ACM (asbestos-containing material) is defined as material containing 0.5% or more asbestos.

6.1 Application

The regulation applies to all work on ACM, or work which is likely to disturb ACM, with the major exception being residential buildings containing four dwelling units or less, where one of the units is occupied by the owner or the owner's family. However, Section 30 of the *Occupational Health and Safety Act* states that homeowners are required to inform contractors about the presence of asbestos in their homes so that they can protect workers.

6.2 Restriction of sprayed material and thermal insulation

Spraying material containing more than 0.1% asbestos or the use of thermal insulation containing more than 0.1% asbestos is prohibited.

6.3 Classification of Type 1, Type 2, and Type 3 operations

The Ministry of Labour uses the following five factors to categorize the asbestos-related activity into one of three types: Type 1, Type 2, or Type 3. Think of Types 1, 2, and 3 as describing low-, medium-, and high-risk work.

1) Nature of material

FRIABLE versus NON-FRIABLE

Friable means easy-to-crumble with hand pressure into dust.

Non-friable means difficult-to-crumble with hand pressure into dust.

- Friable products such as fireproofing and thermal insulation can release fibres very easily, whereas non-friable products will generally release fibres only when they are
  - cut

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- shaped
- otherwise worked with power tools
- deliberately crumbled or pulverized.

- Compared to chrysotile, amphiboles such as amosite are not as easily controlled by water and thus tend to generate more dust during removal.
- Some studies show that amphibole fibres (crocidolite, amosite, tremolite) stay in the lungs longer than serpentine (chrysotile) fibres. This tendency may account for the greater toxicity (harmfulness) of amphibole fibres.

2) Nature of activity

This can greatly affect the degree of hazard. For example, cutting asbestos cement products with a power tool creates much more dust than scribing and breaking.

3) Application of water

Using water to prevent the creation and spread of dust is a practical control in many cases. It is not practical, however, in areas where wetting would create a hazard or cause damage. In such circumstances, dry removal is allowed.

4) Size of the project or duration of exposure

Asbestos diseases are dose-related: the greater the exposure in duration and/or intensity, the greater the risk. Short exposures to any given amount of asbestos will usually be less significant than longer exposures.

5) Risk to bystanders

The hazards of exposure must be considered for both workers and other people not directly involved in the asbestos project. For instance, handling asbestos outdoors or pre-demolition does not pose the same risk to bystanders as handling it in an occupied building where the dust may recirculate.

The classification and control procedures for carrying out Type 1, 2, and 3 operations are outlined in sections 9, 10, and 11 of this manual.

6.4 Demolition, alteration, and repair–Owner's report

For any demolition, alteration, or repair projects the owner must complete a **report** indicating whether any material *that is likely to be handled, dealt with, disturbed, or removed* is

- friable or non-friable asbestos-containing material (ACM), or
- to be treated as ACM, and, in the case of sprayed-on friable material, treated as though it contained a type of asbestos other than chrysotile.

The report (including drawings, plans, and specifications as appropriate) must show the location of the ACM and must be provided to all contractors bidding on the job and must be reviewed before contract arrangements are finalized.

6.5 Training and certification requirements

6.5.1 General asbestos awareness training requirement

Anybody who works in a Type 1, Type 2, or Type 3 asbestos operation must be trained by a competent person on the following:

- the hazards of asbestos exposure
- the purpose, inspection, maintenance, use, fitting, cleaning, disinfecting, and limitations of respirators
- personal hygiene and correct procedures for work with asbestos
- how to use, clean, and dispose of protective clothing.

This requirement includes workers such as electricians, plumbers and pipe fitters, gas fitters,

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painters, drywallers, demolition workers, heating and ventilation workers, and computer installers performing work in the area of a Type 1, Type 2, or Type 3 operation, but not involved in an actual removal operation.

Workers performing Type 3 operations and supervisors in these operations must also be certified to do so, as described below.

6.5.2 Certification requirements for Type 3 operations

As of November 1, 2007, **workers** and **supervisors** must be certified before they can do Type-3 asbestos work or supervise Type-3 work. Certification is not required for

- workers in Type 1 or Type 2 operations
- workers entering Type 1, 2, or 3 work areas to perform work not related to the asbestos removal operation.

The workers that do not require certification are, however, required to have asbestos awareness training.

There are two asbestos abatement certification programs: one for workers (*Asbestos Abatement Worker*) and one for supervisors (*Asbestos Abatement Supervisor*). Before becoming a certified asbestos abatement supervisor you must

- be certified as an asbestos abatement worker
- have taken a 16-hour training course on being a supervisor in construction
- take the *Asbestos Abatement Supervisor* program and pass the test.

Workers and supervisors must have their original certification cards available at the work site when they are working. Ministry of Labour Inspectors may ask a worker to produce their original card plus appropriate identification.

6.5.2.1 Steps to get certified

1. One of the following groups must register you for an in-school training program approved by the Ministry of Training, Colleges, and Universities (MTCU):
   - employers engaged in Type 3 asbestos work
   - joint local union/employer training committees.

   Note: The employer must apply to the MTCU for "signing authority" before it can enroll you in an approved training program.
2. Take the training that you need.
3. Once you have completed the in-school part, you are eligible to write the asbestos abatement worker or supervisor test. Each test is administered by the MTCU (not the training provider) and consists of 40 multiple-choice questions.
4. If you pass the test, the "signing authority" (the employer) sends the required paperwork to the MTCU. This confirms that you have successfully completed the in-school training program and have passed the test. The MTCU will then issue you a Certificate of Completion.

6.5.2.2 Exemption from exams

Until November 1, 2008, experienced Type 3 workers and supervisors can take the tests without having to take the in-school training programs. If you fail the test, however, you will be required to take an in-school training program approved by the MTCU.

Experienced workers and supervisors from outside Ontario can take the tests without having to take the in-school training. If they fail the test, however, they will be required to take an in-school training program approved by the MTCU.

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You are considered experienced if you have at least 1,000 hours of experience performing Type 3 work before November 1, 2007. You must prove this with an Asbestos Work Report Form 1 (or equivalent document for those from outside Ontario) or a letter on official company letterhead.

6.6 Notifying the Ministry of Labour (MOL)

6.6.1 Informing the Ministry of Labour of Type 3 operations and Type 2 glove-bag operations

You must notify the Ministry of Labour (MOL), orally and in writing, before beginning a Type 3 operation, or before beginning a Type 2 operation in which one square metre or more of insulation is to be removed using a glove bag. The written notice must include

- the name and address of the person giving the notice
- the name and address of the owner of the place where the work will be done
- the exact address and location where the work will be done
- a description of the work that will be done
- the starting date and expected duration of the work
- the name and address of the supervisor in charge of the work.

TORONTO-BASED ENERGY COMPANY FINED FOR HEALTH AND SAFETY VIOLATIONS

SARNIA, Ont. - A Toronto-based energy company that operates an ethanol refinery in Sarnia, was fined $125,000 for two violations of the *Occupational Health and Safety Act*, and a London, Ont.-based insulation contractor, was fined $50,000 for one violation, both on May 14, 2007, in connection with asbestos infractions.

Between March 9 and 12, 2005, workers removed insulation and other materials from heat exchangers and from a "stripper change drum" (large chemical vessel). On the morning of March 11, 2005, a concern was raised that material on the stripper change drum contained asbestos. The constructor of the insulation-removal project sent the materials for testing to a facility in London and received confirmation at 4 p.m. from that facility that the materials contained asbestos. The energy company failed to notify the Ministry of Labour of the asbestos, both orally and by submitting a required written report in a timely fashion. Both the energy company and the insulation contractor, which employed the workers who were removing the materials, also failed to ensure workers wore appropriate personal protective equipment when removing the materials both after the suspected asbestos was discovered and after it was confirmed.

The energy company pleaded guilty, as a constructor, to:

1. failing to ensure friable material discovered during the work, that was not referred to in a previously-prepared asbestos report, was reported to the Ministry of Labour, both orally and in a written report, as required by Section 7(6) of the Regulations for Asbestos on Construction Projects and in Buildings and Repair Operations. This was contrary to Section 23(1) of the act; and

2. failing to ensure workers were provided with protective equipment that included a supplied-air, positive-pressure full-face-piece respirator for a Type 3 asbestos removal, as required by Section 14(5)(viii) of the Regulations for Asbestos on Construction Projects and in Buildings and Repair Operations. This was contrary to Section 23(1)(b) of the act.

The Justice of the Peace fined the company $25,000 on the first count and $100,000 on the second count.

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6.12.1 Powers of the Ministry of Labour Inspectors.

An inspector can visit a site at any time and exercise fairly broad powers to inspect, test, look at documents/records, take photographs, ask questions, and give orders. If the inspector approaches a worker or supervisor directly, the worker must answer questions and cooperate. The supervisor must be informed of any orders given or recommendations made.

7 NON-ASBESTOS HAZARDS ASSOCIATED WITH ASBESTOS OPERATIONS

7.1 Electrical hazards

Due to the presence of water used in asbestos abatement procedures, one of the most dangerous hazards is contact with electricity. The employer must develop and implement specific safety procedures for preventing electric shock and burn.

Sometimes, work on energized equipment is unavoidable, such as when transformers or control boxes must remain energized during the abatement project. In such circumstances, dry removal is allowed provided that the appropriated precautions are taken.

7.1.1 Electrical power distribution

- Ensure all electrical panels, exposed electrical conductors, or equipment (such as transformers, switches, capacitors) are locked out and tagged before any work begins. All wiring should be treated as energized unless tested and proven to be de-energized.
- If power cannot be disconnected, all exposed electrical equipment must be covered to prevent moisture from entering into the equipment.
- Electrical power connections to permanent fixtures must be disconnected but temporary connections may be made for lighting purposes or the operation of tools or equipment.
- Every precaution must be taken to avoid electrical shock. Use ground fault circuit protection.
- Ensure that all permanent circuits are provided with a grounding system. This can be determined with a portable ground tester.
- Ensure that electrical outlets are tightly sealed and taped to avoid water spray.
- Determine what equipment must remain energized during the abatement process.
- Insulate or guard energized equipment and wiring from employee contact and other conductive objects.
- Avoid damaging permanent building wiring during the work.

7.1.2 Temporary power distribution systems

- All temporary circuits provided by the abatement contractor must be provided with a grounding system and protected by ground fault circuit interrupters (GFCIs).
- Avoid stringing temporary wiring across floors and through door openings.
- Elevated wiring should not be fastened with staples, nails, or wire.
- Use care not to damage the wiring insulation during installation or abatement work.
- Temporary lights are to be installed according to the Ontario Electrical Code. You must use inline or circuit breaker/ receptacle type GFCIs at all times.

GFCI – A Ground Fault Circuit Interrupter provides additional protection from shocks by shutting off the current to equipment when the GFCI senses an electrical fault.

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Asbestos Awareness

Review and Discuss the Regulations:

List which regulations will apply to the work you do (Review previous pages)

Notes:

_____

_____

_____

_____

_____

_____

What is WHMIS:

_____

_____

_____

How often are you to be WHMIS Trained:

_____

_____

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What should you be trained on?

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The Impact of Asbestos - YouTube

Health Effects of Asbestos

The most dangerous asbestos fibers are too small to be visible. After they are inhaled, they can remain and accumulate in the lungs. Asbestos can cause lung cancer, mesothelioma (a cancer of the chest and abdominal linings), and asbestosis (irreversible lung scarring that can be fatal). Symptoms of these diseases do not show up until many years after exposure began. Most people with asbestos-related diseases were exposed to elevated concentrations on the job; some developed disease from exposure to clothing and equipment brought home from job sites.

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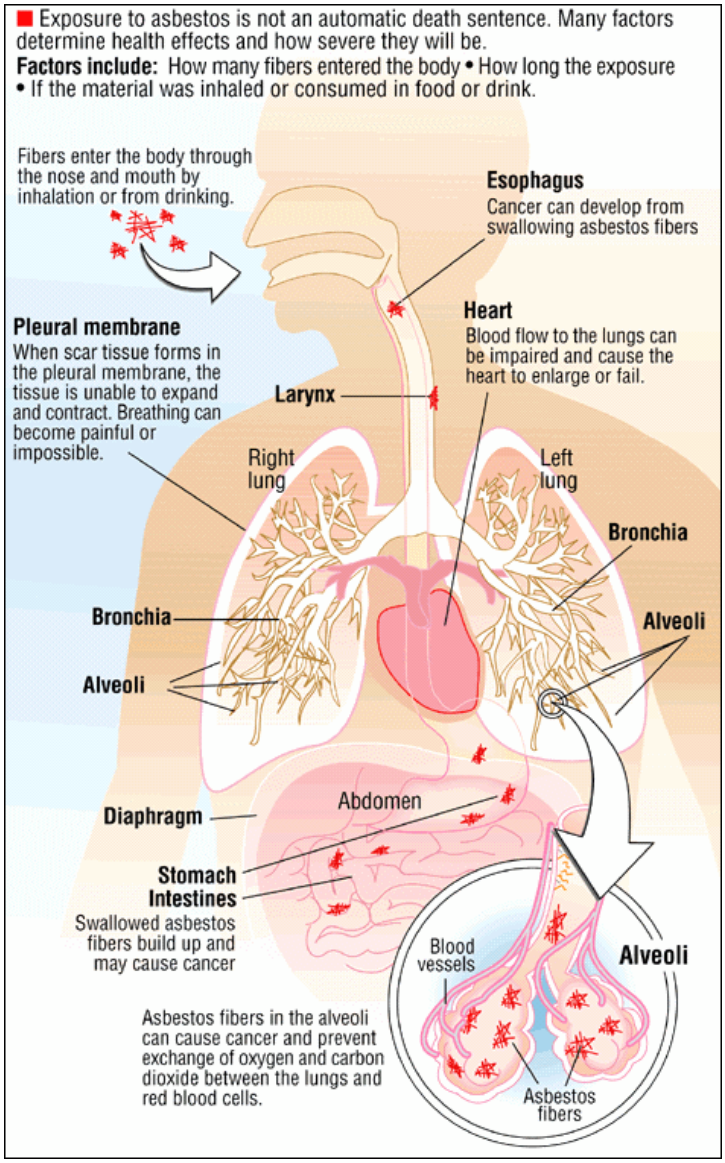
Asbestos and Lung Cancer



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Asbestos fibres usually need to be less than 3 micrometres in diameter before they can be inhaled deep into the lungs. (A micrometre is one millionth of a metre, which is one thousandth of a millimetre, and its abbreviation is µm.) The fibres can remain in the lungs for many years—even decades.

The average diameter of an airborne asbestos fibre ranges from 0.11 to 0.24 µm, depending on the type of asbestos and are invisible to the eye. You can see fibres that are greater than 100 µm in diameter. Human hair is approximately 100 µm in diameter—more than 300 times thicker than asbestos fibre.

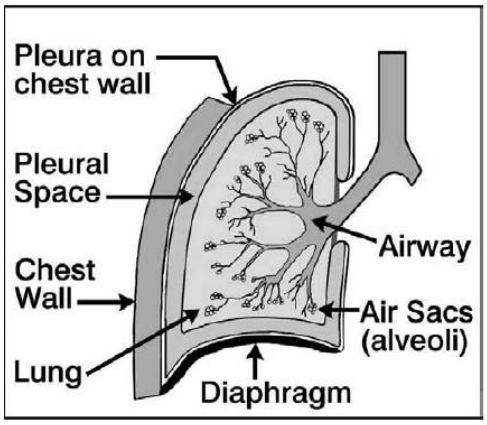
Inhalation of the airborne asbestos fibres that you cannot see is what causes asbestos-related diseases.

Inhaling asbestos fibres has been shown to cause the following diseases:

- Mesothelioma
- Lung cancer
- Asbestosis
- Other illnesses.

A person exposed to asbestos may feel no ill effects at the time of exposure. The time period between exposure to asbestos fibres and the development of disease can range from 15 to 55 years. This is known as the **latency period**. The asbestos-related diseases workers get today are the result of exposures during the 1960s, 1970s, and 1980s.

Normal Lung Anatomy



Mesothelioma is a rare and fatal cancer of the lining of the chest and/or abdomen. While this disease is seldom observed in the general population, it appears frequently in workers exposed to asbestos.

> Because of past exposures, mesothelioma is the #1 cause of occupation-related death in construction.

Lung cancer appears quite frequently in people exposed to asbestos dust. While science and medicine have not yet been able to explain precisely why or how asbestos causes lung cancer, it is clear that exposure to asbestos dust can increase the risk of this disease. Studies have shown that the risk to asbestos workers is roughly five times greater than for people who are not exposed to asbestos.

Cigarette smoking, another cause of lung cancer, multiplies the risk. Cigarette smoking and asbestos combine to produce a synergistic effect. Research has shown that the risk of developing lung cancer was fifty times higher for asbestos workers who smoked than for workers who neither smoked nor worked with asbestos.

Asbestosis is a disease of the lungs caused by scar tissue forming around very small asbestos fibres deposited deep in the lungs. As the amount of scar tissue increases, the ability of lungs to expand and contract decreases, causing shortness of breath and a heavier workload on the heart. Ultimately, asbestosis can be fatal.

Other illnesses – There is some evidence of an increased risk of cancers of the gastrointestinal tract and larynx. However, the link between asbestos exposure and the development of these illnesses is not as clear as with lung cancer or mesothelioma.

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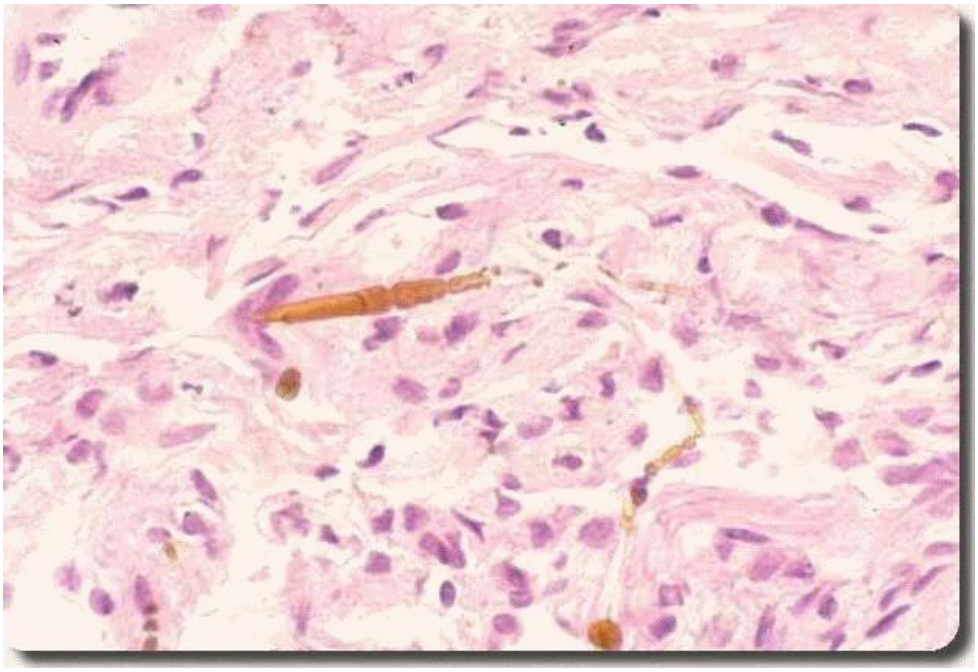
Asbestos in the Lungs



The asbestos body in this photograph was found in the lung tissue of a worker exposed to asbestos. Scarred lung tissue surrounds the asbestos body. Sadly, this person has asbestosis.

Note:
The chronic effects of asbestos exposure can take from 10 years or longer to show up as symptoms, or illness and disease in the body.

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Location of Asbestos

The diseases described above do not respond well to current medical treatment and, as a result, are often fatal.

Asbestos may cause skin irritation and a wart-like condition which can be prevented by wearing normal clothing. Asbestos does not cause skin cancer.

Significant exposure to asbestos puts you at risk for developing pleural plaques (scarring of the pleura—the lining of the lung). Pleural plaques are an indicator of previous exposure to asbestos and can make breathing difficult. Some researchers believe that there is evidence that workers with pleural plaques are at risk of developing other asbestos-related diseases such as lung cancer or mesothelioma. If you develop pleural plaques you should inform your physician about your exposure to asbestos.

2.1 Disease statistics

From 1997 to 2006, Ontario's Workplace Safety and Insurance Board (WSIB) approved 300 occupational disease fatality claims – the vast majority of them (approximately 85%) due to asbestos exposure. Trades at particular risk include plumbers/pipe fitters, insulators, labourers, and electricians.

2.2 Pre-employment medical examination

Before starting as an asbestos worker, it is recommended that the prospective worker go through a pre-employment medical examination. The examination is to see if the worker has a pre-existing respiratory disease (such as asthma or evidence of impaired lung function) that may prevent the worker from using respiratory protection.

3 LOCATIONS OF ASBESTOS

Two classes of asbestos products were widely used. The first includes materials easily crumbled or loose in composition such as spray-fireproofing. These are referred to as "friable." The second type includes materials that are much more durable because they are held together by a binder such as cement, vinyl, or asphalt. These products are termed "non-friable."

FRIABLE means easily crumbled into dust

NON-FRIABLE means difficult to crumble into dust.

3.1 Typical locations – friable materials

3.1.1 Sprayed-on fireproofing

This material was widely used to fireproof steel structures. It can be found on beams, columns, trusses, joists, and steel pan floors. Sprayed material was also used as a decorative finish and as acoustical insulation on ceilings. The material can be loose, fluffy, and lumpy in texture or, if more gypsum or cement was used, it may be quite hard and durable.

Sprayed-on fireproofing

3.1.2 Pipe and boiler insulation

Much of the insulation on older heating systems and industrial processes was asbestos. Some types were pre-formed blocks or sections while others (commonly called "air cell" insulation) were corrugated and resemble cardboard. Often these materials are covered by painted canvas or sheet material.

Site-mixed asbestos cement was often used to insulate valves and elbows on piping and on the rounded ends of boilers and pressure vessels.

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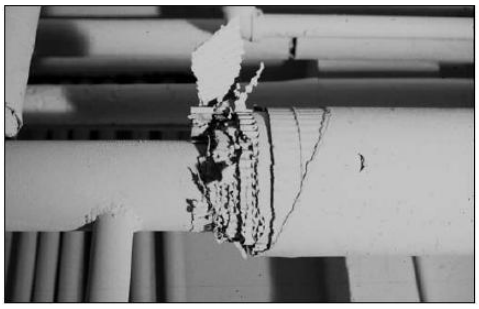
Boiler

Pipe and boiler insulation



Air cell insulation

3.1.3 Loose fill insulation

This application was relatively rare and usually limited to tank insulation where the asbestos is held in place by light gauge wire mesh and then covered with sheet metal.

Loose fill insulation

3.1.4 Vermiculite

Vermiculite is a mineral. It has been used in insulation and many commercial and consumer products for well over 50 years. Vermiculite itself is not asbestos and has not been shown to pose a health problem. Vermiculite, however, can be contaminated with asbestos since mineral deposits of the two substances can occur together underground. For example, vermiculite ore from the Libby Mine in Montana from the 1920s to 1990 was contaminated with asbestos. Insulation made from this vermiculite was sold in Canada during that time under various trade names such as "Zonolite."

Vermiculite

Not all vermiculite contains asbestos fibres. It is recommended that buildings with vermiculite-based insulation be tested to determine if asbestos is present. If you don't test the material, assume that it contains some asbestos.

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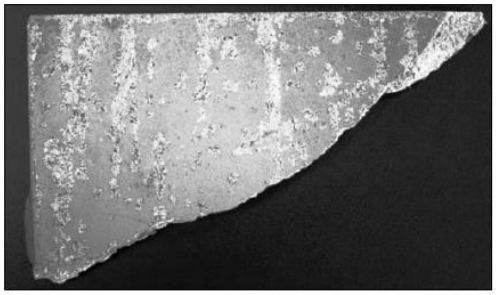
3.2 Typical locations – non-friable materials

Note: Certain conditions (such as chemical exposure, thermal degradation, and water damage) may cause non-friable asbestos-containing material to deteriorate and become friable.

3.2.1 Asbestos cement products

This type of material contains cement to bind the asbestos fibres together and was used in pipe form for sewers and water supply. In sheet form it was used for roofing and siding, as well as some types of firewall construction—for example, behind stoves and fireplaces and in high-rise construction.



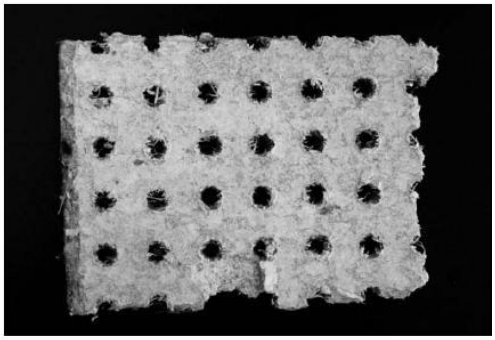
Asbestos concrete

3.2.2 Acoustical plaster

Acoustical plaster may be friable – it depends on the exact mixture. This material was mixed on site and applied like conventional plaster. It was used in schools, auditoriums, hospitals, and commercial buildings where acoustical properties were required.

3.2.3 Acoustical tiles

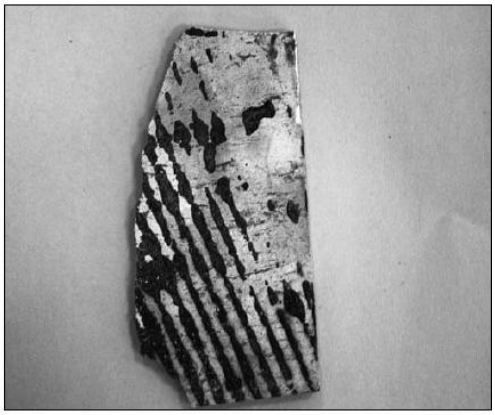
Some of the older acoustical tiles may contain significant amounts of asbestos. Some tiles were stapled or glued in place whereas others were suspended on T-bar. Some tiles can be considered friable because they can be crumbled by hand pressure. They are generally considered to be non-friable, however, since they are usually intact when they're handled.



Acoustical tile

3.2.4 Vinyl asbestos products

These products were widely used in flooring as both tiles and sheets. The vinyl served to lock in the asbestos fibres.



Vinyl asbestos flooring

3.2.5 Roofing felts/shingles

Some roofing felts used in built-up asphalt or pitch roofing contained asbestos. Asphalt or pitch was used to saturate the felts and bind the fibres in place.

3.2.6 Asphalt/asbestos limpet spray

This black tarry mixture was sprayed onto tanks and other equipment primarily in petrochemical plants and heavy industry. The application was very similar to sprayed-on fireproofing except

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that asphalt was used as the binder. In some applications a surface coat of asphalt was used to cover asbestos insulation on tanks, hoppers, and other storage or process equipment.

Asbestos was added to asphalt and used for road construction.

3.2.7 Drywall joint-filling compound

Early drywall joint-filling compounds contained significant amounts of asbestos fibre. This particular use was specifically prohibited in 1980 by the *Hazardous Products Act.* Still, it may be found in buildings constructed several years afterwards.

Drywall joint-filling compound

3.2.8 Coatings and mastics

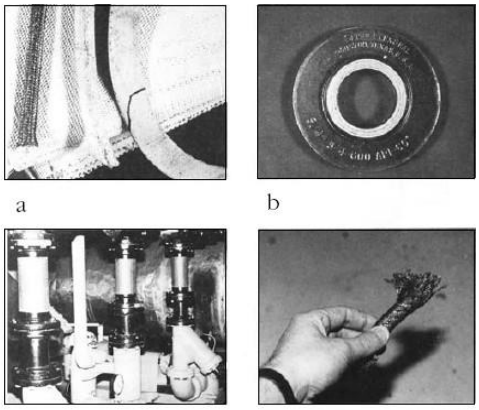
Since asbestos was relatively inexpensive and withstood weathering, it was widely used as a filler in many coatings and mastic products such as roofing cement, caulking materials, and flooring adhesives.

3.2.9 Gaskets and packings

Several different types of gasket material contained asbestos. One common type was a rubber/vinyl/asbestos mixture which could be cut to size or came in standard sizes and patterns. Woven or pressed asbestos material was also widely used on doors and other openings on boilers, furnaces, and kilns (see image a). A third type consisted of a metal outer ring and an asbestos inner ring (see image b) and was used on high pressure steam lines and similar processes (see image c). A fourth type was often used as packing for pumps and valves (see image d).

3.2.10 Refractory brick

High temperature refractory brick and mortar containing asbestos material were previously used in the construction of structures required to withstand high temperatures such as in boiler rooms and furnace rooms.



a b c d

Gaskets and packings

3.3 Summary: Typical locations

Table 1 summarizes where asbestos products have been generally used. The images on the following pages indicate typical locations of asbestos materials in various types of construction.

TABLE 1 — ASBESTOS PRODUCTS IN CONSTRUCTION

Product	Residential	Commercial/ Institutional	Industrial
Sprayed-On Fireproofing		XX*	
Pipe and Boiler Insulation	X	X	XX
Loose Fill Insulation	X		X
Vermiculite Insulation	X		
Asbestos Cement Products	X	X	X
Acoustical Plaster	X	X	
Acoustical Tiles	X	XX	
Vinyl Asbestos Tiles	X	X	
Gaskets		X	XX
Roofing Felts	X	X	X
Asphalt/Asbestos Limpet Spray			X
Drywall Joint-Filling Compound	X	X	
Coatings and Mastics	X	X	X

*Extensive use

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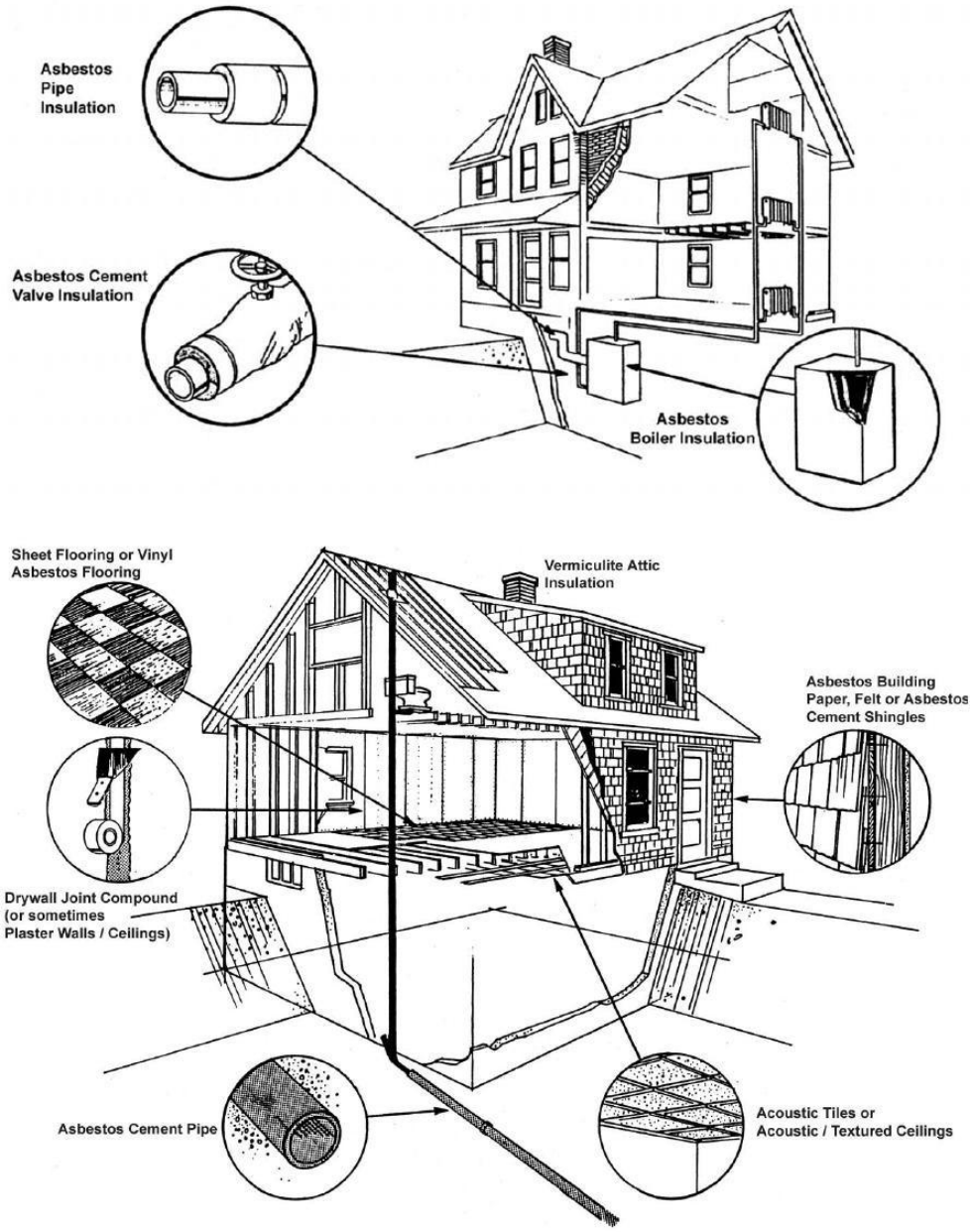

Asbestos Products in Residential Buildings

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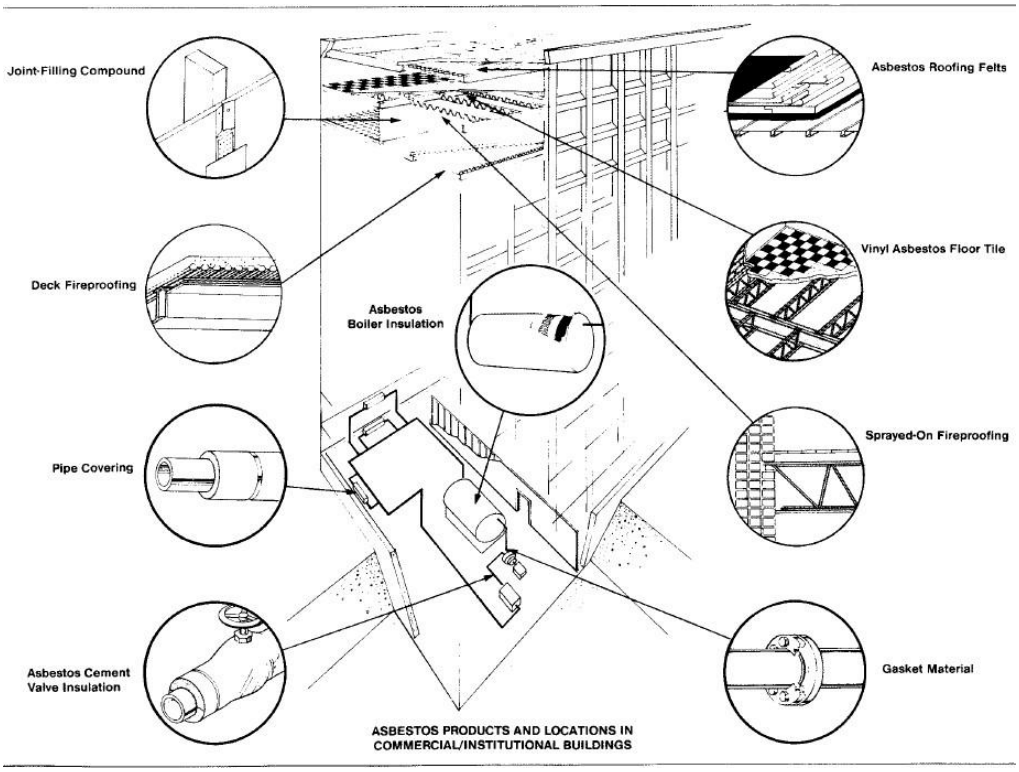

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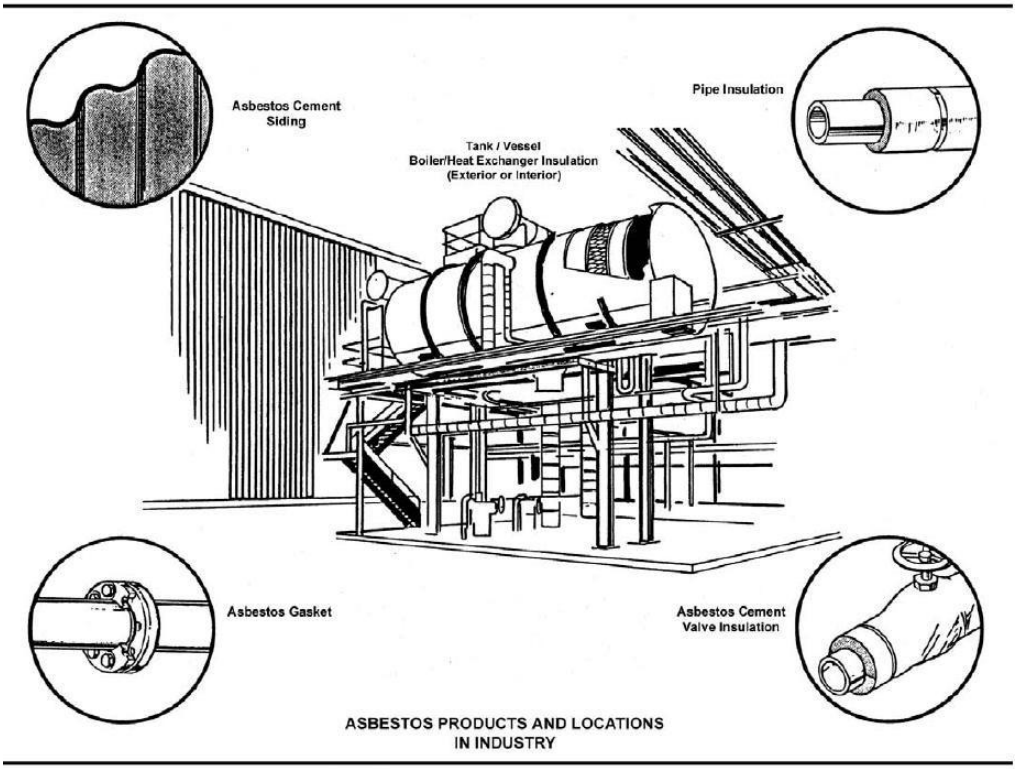

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Where Can I Find Asbestos And When Can It Be A Problem?

Most products made today do not contain asbestos. Those few products made which still contain asbestos that could be inhaled are required to be labeled as such. However, until the 1970s, many types of building products and insulation materials used in homes contained asbestos. Common products that might have contained asbestos in the past, and conditions which may release fibers, include:

- Steam pipes, boilers, and furnace ducts insulated with an asbestos blanket or asbestos paper tape. These materials may release asbestos fibers if damaged, repaired, or removed improperly.
- Resilient floor tiles (vinyl asbestos, asphalt, and rubber), the backing on Vinyl sheet flooring, and adhesives used for installing floor tile. Sanding tiles can release fibers. So may scraping or sanding the backing of sheet flooring during removal.
- Cement sheet, millboard, and paper used as insulation around furnaces and wood burning stoves. Repairing or removing appliances may release asbestos fibers. So may cutting, tearing, sanding, drilling, or sawing insulation.
- Door gaskets in furnaces, wood stoves, and coal stoves. Worn seals can release asbestos fibers during use.
- Soundproofing or decorative material sprayed on walls and ceilings. Loose, crumbly, or water-damaged material may release fibers. So will sanding, drilling, or scraping the material.
- Patching and joint compounds for walls and ceilings, and textured paints. Sanding, scraping, or drilling these surfaces may release asbestos.
- Asbestos cement roofing, shingles, and siding. These products are not likely to release asbestos fibers unless sawed, drilled, or cut.
- Artificial ashes and embers sold for use in gas-fired fireplaces. Also, other older household products such as fireproof gloves, stove-top pads, ironing board covers, and certain hairdryers.
- Automobile brake pads and linings, clutch facings, and gaskets.

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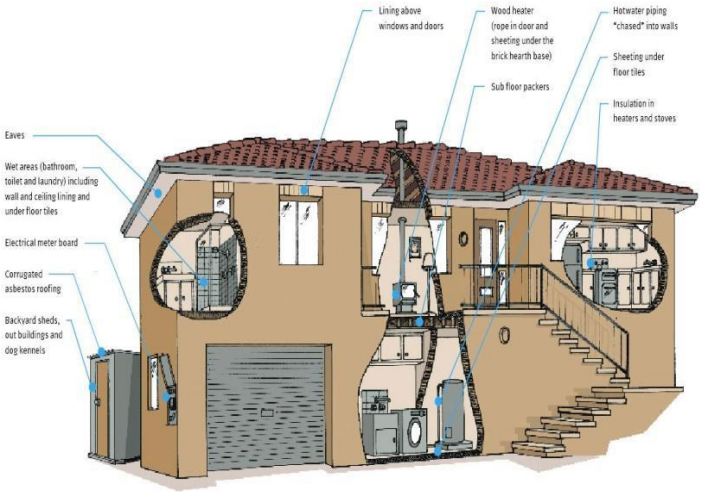
Where Asbestos Hazards May Be Found In The Home?

- Some roofing and siding shingles are made of asbestos cement.
- Houses built between 1930 and 1950 may have asbestos as insulation.
- Asbestos may be present in textured paint and in patching compounds used on wall and ceiling joints. Their use was banned in 1977.
- Artificial ashes and embers sold for use in gas-fired fireplaces may contain asbestos.
- Older products such as stove-top pads may have some asbestos compounds.
- Walls and floors around wood burning stoves may be protected with asbestos paper, millboard, or cement sheets.
- Asbestos is found in some vinyl floor tiles and the backing on vinyl sheet flooring and adhesives.
- Hot water and steam pipes in older houses may be coated with an asbestos material or covered with an asbestos blanket or tape.
- Oil and coal furnaces and door gaskets may have asbestos insulation.



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Asbestos Learning Series: Respirators | WorkSafeBC (youtube.com)

Respirators- Choosing and selecting the correct Respirator for the work being performed.

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Controlling the Hazard!

Respirators

Workers cannot be assigned to an asbestos work operation unless they are physically able to perform the operation while wearing the respirator (See Appendix E — "Health Surveillance Guidelines" — of CSA Standard CSA-Z94.4-02.)

The employer must provide workers with training on the individual respirators they will be using. The training must cover

- proper fit
- inspection and maintenance
- cleaning and disinfecting
- limitations of the respirator.

11.3.3 Types of respirators

There are two main categories of respirators used to protect workers in an asbestos Type-3 environment:

- air- (atmosphere-) supplying respirators (respirators that are attached to a supply of new, clean air)
- air-purifying respirators (respirators that clean the air around you before you breathe it in).

11.3.3.1 Air-supplying respirators

Air-supplying respirators provide clean air through a hose called an airline, which is attached to a freestanding tank of compressed air, an air compressor, or an ambient air blower.

11.3.3.1.1 Modes of operation

Air-supplying respirators can operate in the following modes:

- "negative pressure" or "demand"
- "continuous-flow"
- "positive pressure" or "pressure-demand."

11.3.3.1.1.1 Negative-pressure (demand) mode

Air is delivered only when the wearer inhales. Because contaminated air may leak inward around the facepiece if the breather inhales strongly, these devices have limited use in high-exposure conditions.

11.3.3.1.1.2 Continuous-flow mode

As the name implies, these devices deliver a constant flow of air to the wearer. Inward leakage of contaminated air is still possible if the breather inhales more air than the device can supply. Minimum flow rates must be maintained to minimize inward leakage. Continuous-flow mode offers better protection than the negative pressure (demand) mode.

Air-supplying respirator

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11.3.3.1.1.3 Positive-pressure or pressure-demand mode

Since the previous modes may permit inward leakage, a system was developed which maintains a positive pressure inside the facepiece at all times, and also supplies more air as demanded. This class of device is used for high-exposure conditions and offers the best protection of the three modes.

11.3.3.2 Air-purifying respirators

Air-purifying respirators used for protection during a Type-3 asbestos operation must be equipped with N-100, R-100, or P-100 (HEPA) filters.

The "100" (actually 99.97%) refers to the efficiency of the filters.

Oil has been found to ruin the filtering ability of some filter material. Therefore, to ensure that a suitable filter is being used, particulate filters have an N, R, or P designation:

N – Not resistant to oil – must not be used at all in an environment where solvent or oil is present.

R – Resistant to oil - can be used for a single shift in an environment where solvent or oil is present.

P – Oil-**P**roof – can be used for an extended period of time in an environment where solvent or oil is present.

Air-purifying respirators can be powered or non-powered.

11.3.3.2.1 Non-powered air-purifying respirators

Air is drawn through the filter by the wearer breathing in. Non-powered respirators depend entirely on the wearer breathing in (inhaling) and breathing out (exhaling) to deliver an adequate supply of purified breathing air.

For asbestos Type 3 removals, **only full-facepiece** respirators are allowed when using a non-powered air-purifying respirator.

Full-facepiece non-powered air-purifying respirator

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11.3.3.2.2 Powered air-purifying respirators (PAPR)

These respirators use a battery-powered blower to continuously draw air through HEPA filters and into the tight-fitting facepiece (full or half facepiece)

Powered air-purifying respirator

11.3.4 Proper fit

The performance of a respirator with a tight-fitting facepiece depends on good contact between the wearer's skin and the respirator. A good face seal can only be achieved if the wearer is clean-shaven in the region of the seal and the facepiece is of the correct size and shape to fit the wearer's face. Eyeglasses cannot be worn with a full-facepiece respirator as the side arms will break the seal. An alternative such as eyeglass inserts in the respirator facepiece or contact lenses (check with your employer to see if the use of contact lenses is allowed) should be considered for those who require prescription glasses.

Employers should ensure that the selected facepiece is the right size (small, medium, large) and can correctly fit each wearer.

11.3.4.1 Fit testing

For a tight-fitting facepiece the ***initial selection*** should include fit-testing to ensure the wearer has the correct device. The test will assess the fit by determining the degree of face-seal leakage using a test agent while the user is wearing the respirator (see Appendix G for more details).

You need to fit test again when

- changing to a different model of respirator
- changing to a different-sized facepiece
- there have been significant changes to the facial characteristics of the individual wearer (e.g., as a result of significant weight gain or weight loss, or a dental procedure).

Fit testing and seal checking are different.

Fit testing (described above) detects if the respirator fits the wearer correctly in the first place. A user **seal check** (described below) is when the user makes sure the straps are correctly adjusted and the respirator is properly seated on the face *before each use.*

11.3.4.2 Seal checking

Before each use, the wearer should conduct a seal check. The manufacturer's instructions will give information on simple seal checks, such as those involving blocking the filters and inhaling to create suction inside the mask (negative seal

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check), or blocking the exhalation valve and exhaling (positive seal check) so that any leakage can be detected. (See the following images and Appendix F for more details.)

Negative seal check

Positive seal check

11.3.5 Inspection and maintenance

The equipment must be maintained and inspected according to the employer's written procedures which must be consistent with the manufacturer's instructions.

Clean your respirator with a neutral detergent

A respirator should be checked by the wearer before and after it is used to make sure that it is in good working order (see Appendix D for more details). Any damaged or worn parts must be replaced before a worker uses the equipment.

11.3.6 Cleaning and sanitizing

Respirators must be cleaned *after* each use according to the manufacturer's instructions. If shared by different workers, respirators must be properly sanitized before they can be used by another person.

The manufacturer can provide cleaning and sanitizing products which will not damage the respirators.

Strong detergents, hot water, or household cleaners or solvents must not be used because they may cause the rubber parts to deteriorate. Use a neutral detergent.

The respirator should be thoroughly cleaned and rinsed with warm water to avoid skin irritation (for more details see Appendix E). After rinsing, respirators should be hung up to dry.

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[Asbestos Learning Series: Protective Clothing | WorkSafeBC (youtube.com)]

Protective Clothing

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Resources and requirements for Type 3 Operations Controls – Site Preparation

11.4 Site preparation—indoor projects

Indoor Type-3 operations require strict controls to prevent asbestos dust from contaminating other areas. The work area must be completely enclosed and isolated from the rest of the location in order to

- prevent and contain the spread of asbestos dust
- prevent other people in the rest of the building from being exposed to asbestos
- restrict access of unauthorized personnel.

Requirements for site preparation:

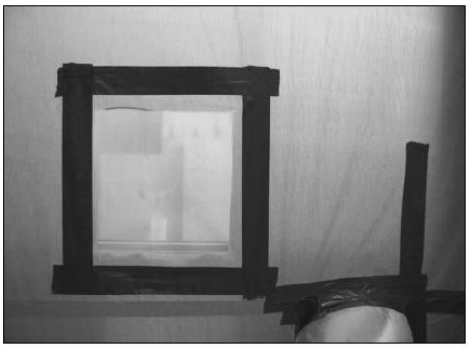
1. Polyethylene sheeting or other suitable material that is impervious to asbestos, held in place with appropriate tape and adhesive, is normally used to build the enclosure. Typically, 6-mil polyethylene is used on the walls and heavier polyethylene is used on the floor (it must withstand foot traffic).

   When existing walls aren't appropriate for the enclosure, it may be necessary to erect temporary walls to which the plastic barrier can be attached.

   All joints must overlap and be taped to ensure the area is completely sealed off. Regulation 278/05 requires you to have

Polyethylene sheeting

Temporary walls



Transparent observation window

one or more transparent observational windows when you're using opaque, Type-3 enclosures for operations where non-friable asbestos is disturbed in any way with power tools not attached to dust collectors equipped with HEPA vacuums. However, CSAO recommends that all Type 3 enclosures have a transparent window if the enclosure is opaque. Collectively, the windows should allow as much of the work area as possible to be viewed from outside the enclosure. Keep the windows clean and unobstructed.

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2. During the construction of the enclosure, asbestos materials should not be disturbed until the enclosure is complete and negative air is in place. In situations where asbestos debris or dust is lying on any surface of the work area and will be disturbed during the construction of the enclosure then the area must be precleaned using a damp cloth, or by using a vacuum equipped with a HEPA filter, before the enclosure is built. Suitable personal protective equipment, including respirators, should be worn during precleaning and during all work which disturbs or could disturb asbestos during the building of enclosures.

Wet wiping procedures

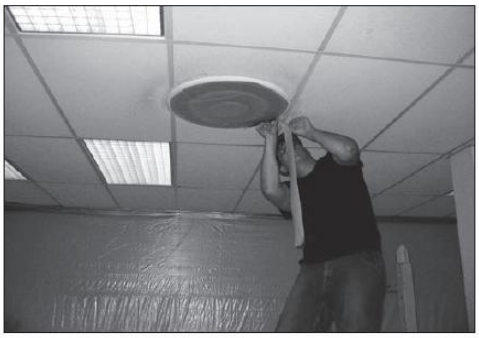
- Wet wipe with clean water and paper towels to remove any residue.
- Dispose of paper towels as asbestos waste.

HEPA vacuum procedures

- vacuum the contaminated area in parallel passes with each pass overlapping the previous one.
- Vacuum the area a second time, in the same manner, in passes at right angles to the first passes.

Never use compressed air to clean asbestos dust off surfaces – it is prohibited. It just blows the fibres into the air.

3. The ventilation system serving the work area must be shut down and sealed off.
4. Any furnishings that can be removed must be damp-wiped or HEPA-vacuumed if dusty and taken out of the enclosure before other work begins. Items which cannot be moved must be cleaned and sealed with polyethylene sheeting.



Sealing the ventilation system

Covered and sealed furniture

Sealed pipe

5. If scaffolding is used during the asbestos removal operation the open ends of the scaffold tubing must be sealed.
6. Any openings such as stairways, doors (including elevator doors), windows, and

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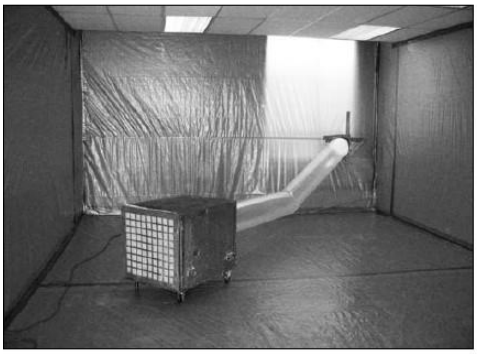
pipe/conduit penetrations must also be sealed off.

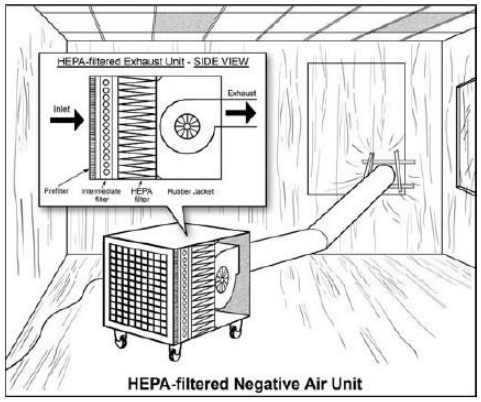
7. If asbestos is being removed from an entire floor, the elevators must be prevented from stopping at that floor.
8. With two exceptions (see box below), all Type 3 operations require a negative pressure of 0.02 inches of water inside the enclosure relative to the area outside the enclosure. You can do this by
   - running negative air units equipped with HEPA filters inside the enclosure and venting them outside, **and**
   - making sure that the enclosure is sealed from the surrounding area. The better the area is sealed, the easier it will be to maintain negative air pressure.

> Type 3 operations require a negative pressure of 0.02 inches of water inside the enclosure relative to the area outside the enclosure, *unless*
>
> - the building will be entirely demolished following the asbestos removal work
> - the asbestos removal is done outdoors.

Air always moves from positive pressure to negative pressure. By maintaining negative air pressure, air will always move from the



HEPA-filtered negative air unit



non-contaminated or "clean" area into the enclosure, instead of the other way. Without negative air pressure, dust could get out of the enclosure through cracks, tears, ducting, or even through the door to the enclosure.

A competent worker must measure the pressure difference between the inside and outside of the enclosure at regular intervals. A digital pressure monometer will measure the differential pressure. Because air pressure can vary within a large enclosure it is recommended that the differential pressure be measured in a variety of locations.

Here are some clues that there is negative air pressure inside the enclosure:

Monometer

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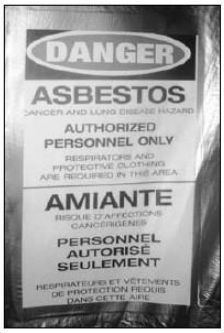
- Plastic barriers and sheeting will move inwards toward the work area.
- There will be noticeable air movement through the decontamination units. You can use smoke tubes to see if air moves from the clean room through the shower room and equipment room to the work area. This must be done with the negative air units on.

A competent worker must inspect and maintain the negative air units before each use to make sure that air isn't leaking and that the HEPA filter isn't damaged or defective (See Appendix I and Appendix J for more details on negative air units and HEPA filters). The negative air units must be in proper working order before you can use them. Clean replacement air must be taken from outside the enclosure to replace air being exhausted.

9. Warning signs must be posted outside and at every entrance to the work area.



Warning sign

10. If you plan to use wet removal methods, the electrical power supply in the area should be shut down, isolated, locked, and tagged to prevent electric shock.
11. Any temporary power supply for tools or equipment should have a ground fault circuit interrupter (GFCI).
12. A competent worker must inspect the work area for defects in the enclosure at the beginning and end of each shift. Any defect must be repaired immediately – No work is allowed until the defect is repaired.

Isolated electrical panel

11.5 Entry/decontamination facility

1. You must set up an entry/decontamination facility that keeps airborne asbestos within the "dirty" area and provides a place for workers to decontaminate themselves as well as their tools, materials, and equipment. A typical entry/decontamination facility is shown on the next page.

   The facilities will need to have a separate "dirty" changing room for contaminated work clothing, and a separate "clean" changing room for clean or personal clothing. The showers should be located between the two changing rooms so that it is necessary to pass through them when going from one changing facility to the other. The 'clean' and 'dirty' ends should be fitted with adequate seating and be of sufficient size for changing purposes.

2. The doorways should be fitted with overlapping polyethylene curtains on each side so that they will close behind workers passing through. This "airlock" will help prevent the spread of dust.
3. There must be a temporary shower with hot and cold running water so workers can wash off residual asbestos before they leave the contaminated area.
4. A competent worker must inspect the work area for defects in the

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decontamination facility at the beginning and end of each shift. Any defect must be repaired immediately – No work is allowed until the defect is repaired.

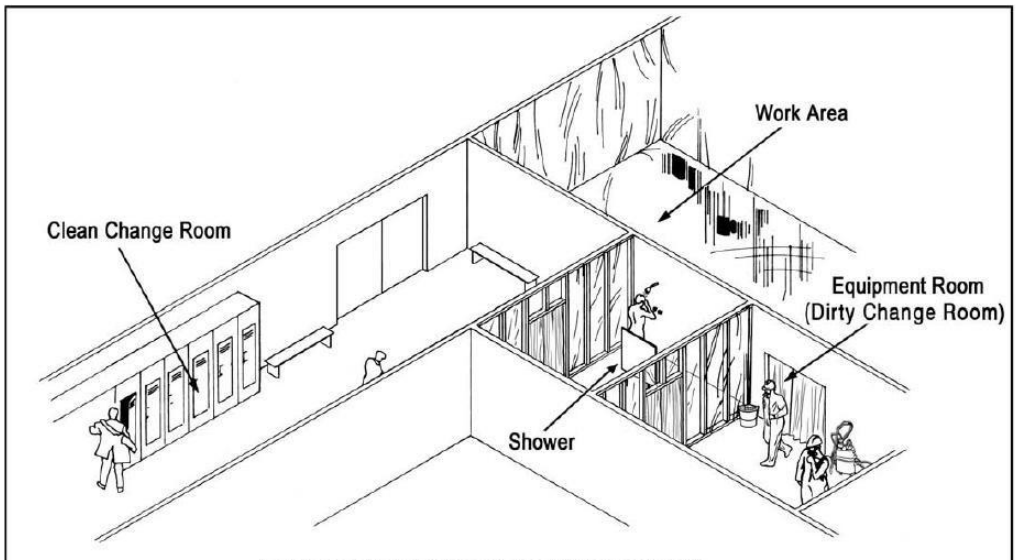
11.5.1 Procedures for entry and decontamination

These entry and decontamination procedures must be followed every time workers enter or exit the work area.

11.5.1.1 Entry

1. Workers enter the clean change room and
   - remove street clothes
   - put on disposable coveralls
   - inspect their respirators
   - replace filters and perform other maintenance (e.g., change power packs on powered air-purifying respirators)
   - put on and seal-check respirators
   - go to the curtained doorway.

2. They enter the shower room and go (without showering) into the equipment room.
3. Here, they put on their boots, hardhats, and other equipment from the previous shift.
4. They enter the dirty work area through the last curtained doorway.



TYPICAL ENTRY / DECONTAMINATION LAYOUT

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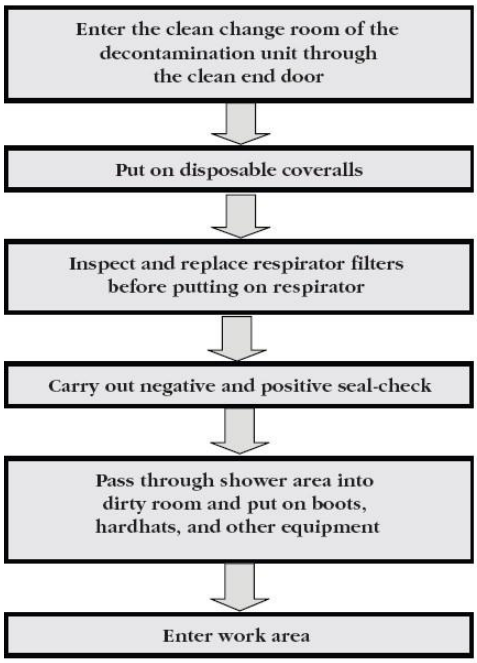
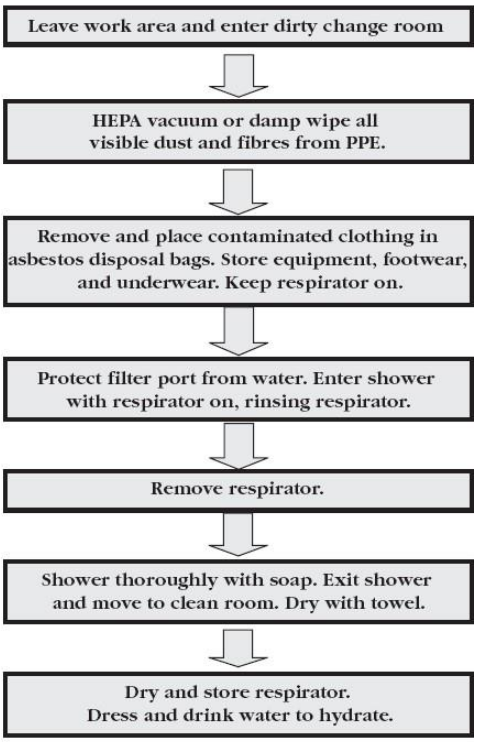
Entering Enclosure



Leaving Enclosure



11.5.1.2 Decontamination

1. Workers enter the dirty change room and remove any visible dust from their protective clothing by damp-wiping or HEPA vacuuming.
2. Workers remove and discard disposable coveralls (see Section 11.7 for disposal information) and store any other personal protective equipment (PPE), tools, and equipment to be reused. They continue to wear their respirators.
3. Workers enter the shower area via the curtained doorway and shower with their respirator on, rinsing off the respirator. They then remove the respirator and continue showering. With most respirators, the filters, blowers, and battery pack must be kept out of the shower water to prevent damage. Damp-wipe them before taking them off.
4. Workers exit to the clean side, and enter the change room via the curtained doorway, and change into their street clothes.

Used towels should be treated as asbestos waste and put into a sealable container.

Any tools or equipment used in the work area should be decontaminated by damp-wiping or HEPA-vacuuming before being taken out of the area.

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If necessary, arrangements must be made so that female workers can decontaminate themselves separately from male workers.

11.6 Removal

1. Wherever possible, asbestos-containing material (ACM) should be wetted before removal starts. Unless wetting creates a hazard, it is not recommended to remove ACM when the material is dry. To improve penetration of the water and reduce runoff and dry patches, a "wetting agent" must be added to the water (see section 9.2). You may need to spray this "amended water" repeatedly to penetrate the ACM and to keep it wet. A portable pressurized vessel such as a pump-up garden sprayer can be used to apply the amended water. Constant water pressure is desirable. High pressure water spray should not be used.
2. Any electric tools and equipment used in wet removal operations must be equipped with ground fault circuit interrupters (GFCIs) to prevent electric shock.

11.7 Clean-up and storage

1. Asbestos waste must be cleaned up frequently and regularly by HEPA-vacuuming, damp-mopping, or wet-sweeping before it dries out. It might be necessary to spray down asbestos debris with amended water to keep it damp after it is removed.
2. Asbestos waste and protective clothing that will not be reused must be placed in a suitable container for disposal. Dropsheets, polyethylene sheets, and enclosure materials must be wetted before they are placed in a suitable container for disposal.
3. A suitable container is

- dust-tight
- suitable for the type of waste (e.g., if the waste is sharp, such as floor tiles, the container must be rigid and puncture-proof)
- impervious to asbestos
- properly marked that it contains asbestos waste (see label below).

Examples of suitable containers are 6-mil polyethylene bags (always double-bag them) or polyethylene drums.

Double-bagged

4. You must always damp-wipe or HEPA vacuum the surface of the container to remove asbestos dust before taking it out of the work area. Containers must be removed from the workplace frequently and at regular intervals.
5. Before sealing the first 6-mil polyethylene bag, use a HEPA vacuum to suck any excess air out of it. Seal the bag by twisting the top tightly, folding it over, and sealing it with duct tape. Damp-wipe or HEPA-vacuum the outside of the bag before it is moved from the work area to the decontamination area. Once in the decontamination area, place the bag into a second 6-mil polyethylene bag and seal it.

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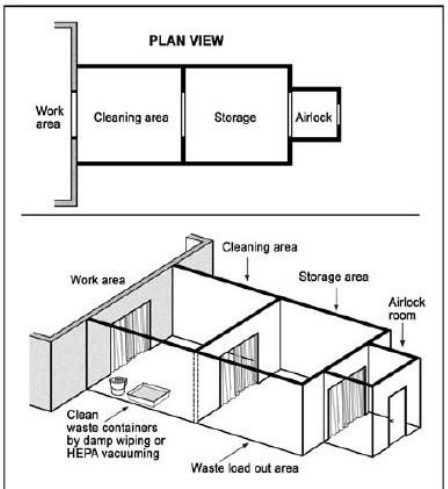
Although not required by regulation it is good practice to remove waste bags from the enclosure via a separate "bag lock," which is a separate passageway for the waste bags. The bags should be vacuumed all over before being passed into the next compartment of the bag lock where the bags are put into second, outer bags. The bags are then passed to the outside or to an additional storage compartment before being passed to the outside.



Waste Storage Area

6. Don't place waste materials with sharp edges—such as floor, wall, or ceiling tiles—into a bag. These items should be neatly stacked together. Wrap each stack in 2 layers of 6-mil or thicker polyethylene. Then place in a suitable container for asbestos waste.
7. After cleaning up and removing the asbestos waste, the work area must be thoroughly washed down with amended water if it's possible to do so.
8. Once all the asbestos has been removed, tools and equipment—including scaffolding, ladders, etc.—must be thoroughly cleaned by damp-wiping or HEPA-vacuuming to remove any settled asbestos dust. The negative air units must keep operating during this time.

11.8 Visual inspection

1. A competent worker must conduct a visual inspection to ensure that the enclosure and the work area inside the enclosure are free from visible asbestos-containing material (ACM). A thorough visual inspection consists of verifying that there is no debris or residue from removed ACM and that all visible dust or debris in the work area has been cleaned up. If visible residue, dust, or debris remain, it must be cleaned up using wet wiping and/or HEPA vacuuming before lockdown (gluedown) is applied and clearance sampling is started.
2. The visual inspection should be performed using procedures outlined in the American Society for Testing and Materials (ASTM)'s *Standard Practice for Visual Inspection of Asbestos Abatement Projects* (ASTM E 1368).

11.9 Lockdown/gluedown

Although it is not a regulated requirement, it is a standard industry practice to apply a lock-down sealant throughout the containment area to seal down any invisible dust and fibres undetected during the visual inspection after the removal activities.

- The lockdown sealant needs to be compatible with any materials that will be installed over the sealant such as fireproofing material. (The supervisor must verify this with the manufacturer.)
- The sealant should be applied in accordance with the manufacturer's recommendations.
- There are a variety of lockdown sealants available and the one you choose must be appropriate for the intended use. For

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Lockdown

example, if the area requires a certain fire protection rating, the sealant must have that rating.

- Lockdown sealants are available in clear and colour mixtures. They will require different drying times, depending on the manufacturer. Follow the manufacturer's instructions.
- Take care to avoid getting sealant on or in HVAC units, HEPA vacuums, and negative-pressure machines.
- After the first coat, an inspection should be conducted to see if a second coat might be necessary
- If applying two coats, consider using a different colour to ensure complete coverage. You will be able to see the areas where only one coat has been applied.
- Certain lockdown sealants can pose a health risk if used in an enclosed space.
- Review the MSDS for hazards, required personal protective equipment (e.g., respiratory protection requirements), and control measures to use when applying the sealant.
- Follow the manufacturer's instructions.

11.10 Clearance air testing

1. Clearance air testing must be performed upon completion of Type 3 removal or repair operations **except** under any of the following conditions:
   - the operation involves work only on non-friable ACM using a power tool not equipped with a HEPA-filtered vacuum
   - the work is done outdoors
   - the work is done in a building that will be demolished and only the asbestos removal and demolition workers will enter the building.
2. Only a competent worker can conduct clearance air testing after an acceptable visual inspection and after the work area inside the enclosure is dry. For more information, see "Clearance Air Testing," Appendix C. You must keep the barriers, enclosure, decontamination facility, and negative air pressure units operating until the work area inside the enclosure passes the clearance air test (less than 0.01 fibres/cubic centimetre). If the work area does not pass the test, cleaning, decontamination, inspection and lock-down measures inside the enclosure must be repeated before retesting.
3. Within 24 hours after receiving the clearance air testing results, the owner and the employer must post a copy of the results and provide a copy to the joint health and safety committee or the health and safety representative.

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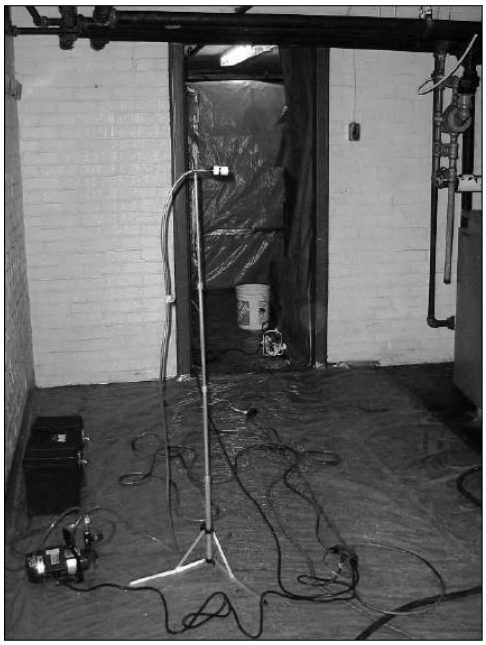

Air sampling

11.11 Teardown

1. All polyethylene used for lining and in enclosures must be wetted, disposed of as asbestos waste, and not be reused. Dropsheets must be wetted and then folded so that any residual dust or scrap is contained inside the folds. Dispose of dropsheets as asbestos waste.
2. After the work is completed, barriers and portable enclosures that are rigid and that will be reused must be cleaned by damp-wiping or HEPA-vacuuming. Barriers and portable enclosures must not be reused unless they are rigid and can be cleaned.
3. After the work area has passed both the visual inspection and air-clearance test, you can shut down the negative air filtration units. The negative-air system must be completely decontaminated. All pre-filters must be removed and disposed of as asbestos waste. Seal the inlet and outlet with 2 layers of 6-mil polyethylene.
4. Teardown should be done as a Type 2 operation and workers must be adequately protected.

11.12 Disposal of asbestos-containing material

Regulation 347 under Ontario's *Environmental Protection Act* covers the off-site handling and disposal of asbestos waste. The regulation describes types of containers, labelling, and disposal procedures. There are also regulations concerning the transportation of dangerous goods, enforced by either the Ontario Ministry of Transportation or Transport Canada.

Some municipalities may not accept asbestos waste at their landfills. Check with your local authorities or the Ministry of Environment to find the nearest disposal site.

11.13 Outdoor operations

Outdoor operations can be simpler than indoor operations. You can often use large quantities of water to thoroughly soak the material and reduce the amount of airborne dust. There's less risk to bystanders because of this increased wetting and the natural dispersion of asbestos dust in the air.

For these reasons, there are some different requirements for outdoor Type-3 operations:

- No final visual inspection or clearance air test is required after removal.
- An enclosure is required only when removing non-friable asbestos-containing material using power tools without HEPA-filtered vacuums. A transparent window area to allow observation of the entire work area is required if the enclosure material is opaque.
- Full decontamination facilities are required for outdoor Type-3 operations except for

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Demolition

outdoor operations on non-friable asbestos-containing material involving power tools without dust-collecting devices equipped with HEPA filters (only wash-up facilities are required for this exception).

- Dust and waste must not be allowed to fall freely from one work level to another.
- All the other requirements as for indoor Type-3 operations apply.

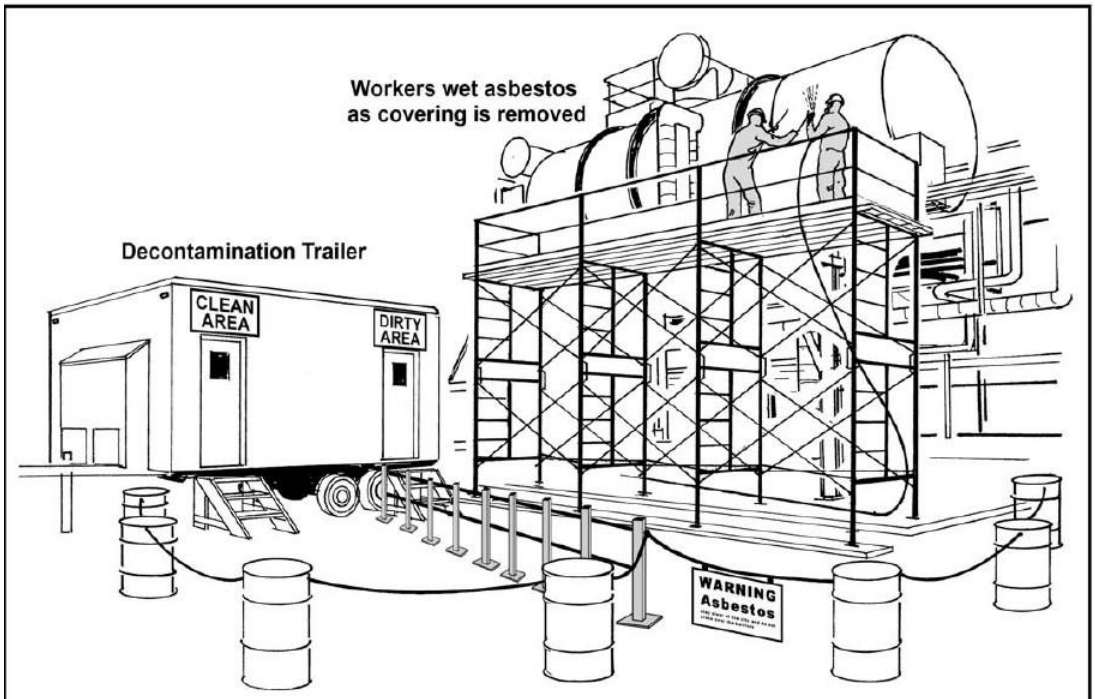
Weather conditions may influence the performance of work. Heat, cold, or high winds can make working unsafe. Exposure to the cold can be an important consideration for workers if work must be done outdoors in the winter or indoors if a building's heating system must be shut down.

For outdoor operations it will generally not be possible to connect a decontamination facility directly to the work area. In such situations, portable decontamination units will have to be provided. When leaving the work area, workers should thoroughly vacuum their personal protective equipment and respirators, and wash their footwear, but DO NOT REMOVE RESPIRATORS. Workers should immediately put on another set of disposable coveralls (transit coveralls having a different colour from those worn inside the work area) before making their way to the portable decontamination unit. All transit routes should be clearly marked to keep out other workers and members of the public.

11.14 Demolition

Before any building is demolished, all asbestos-containing material (ACM) that may be disturbed during the work has to be removed if possible, including material that is hidden:

- Asbestos can be hidden in shafts, between walls, or above false ceilings.



ASBESTOS REMOVAL - Typical Outdoor Job

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Waste Management

12 ASBESTOS WASTE MANAGEMENT

Ontario's *Environmental Protection Act* covers the disposal of asbestos waste and is enforced by the Ministry of Environment.

There are also regulations concerning the transportation of dangerous goods, enforced by Transport Canada.

Some municipalities may not accept asbestos waste at their landfills so check with your local authority or the Ministry of Environment to find the nearest disposal site.

INDIVIDUAL FINED $45,000 FOR ILLEGAL TRANSPORT OF ASBESTOS WASTE

SARNIA – A person was fined $45,000 for operating a waste management system without Ministry of the Environment (MOE) approval under the Environmental Protection Act (EPA). In the fall of 2002, the person was awarded a demolition contract requiring the removal and disposal of asbestos waste at a long-term care facility for senior citizens.

The contract clearly set out the requirements for the disposal of the waste in accordance with Ontario Regulation 347 made under the EPA. At the time, the individual bagged some of the asbestos waste and transported it to asbestos waste bins owned by a disposal company in London without notifying that company. In July 2003, the ministry was advised that some asbestos waste from the senior citizen's home had not been handled in accordance with the regulations. An investigation by the ministry's Investigation and Enforcement Branch confirmed that a quantity of asbestos waste was transported without a Certificate of Approval for a waste management system. The individual was charged accordingly.

On June 21, 2005, the individual was convicted on one count under the EPA. For transporting waste without a Certificate of Approval contrary to Section 27(1) (a) of the act, the person received a $45,000 fine plus victim fine surcharge.

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Resources for Type1, Type2 and Type 3 Operations:

RESPIRATOR CHART FOR ASBESTOS WORK

"ACM" means asbestos-containing material.

Description of work		Required respirator
Type 1 operations		
All Type 1 operations		If worker asks employer to provide a respirator: **A**
Type 2 operations		
Removing all or part of a false ceiling to obtain access to a work area, if ACM is likely to be lying on the surface of the false ceiling.		**B**
Breaking, cutting, drilling, abrading, grinding, sanding, or vibrating non-friable ACM if the work is done by means of power tools that are attached to dust-collecting devices equipped with HEPA filters.	Material is not wetted	**B**
	Material is wetted to control fibres	**A**
All other Type 2 operations*		**A**
Type 3 operations		
Breaking, cutting, drilling, abrading, grinding, sanding, or vibrating non-friable ACM using power tools, if the tool is not attached to a dust-collecting device equipped with a HEPA filter.	Material is not wetted	**C**
	Material is wetted to control fibres	**B**
➤ Removing or disturbing more than one square metre of friable ACM during the repair, alteration, maintenance, or demolition of all or part of a building, aircraft, ship, locomotive, railway car or vehicle, or any machinery or equipment. ➤ Spraying sealant on friable ACM. ➤ Cleaning or removing air-handling equipment, including rigid ducting but not including filters, in a building where sprayed fireproofing is ACM. ➤ Repairing, altering, or demolishing all or part of a kiln, metallurgical furnace, or similar structure that is made in part of refractory ACM. ➤ Repairing, altering, or demolishing all or part of any building in which asbestos is or was used in the manufacture of products, unless the asbestos was cleaned up and removed before 16 March 1986.	Material is not wetted	**D**
	Friable ACM other than chrysotile was applied or installed by spraying, and is wetted to control fibres	**C**
	Friable chrysotile ACM was applied or installed by spraying, and is wetted to control fibres	**B**
	Friable ACM was not applied or installed by spraying, and is wetted to control fibres	**B**

* **Warning:** For any **Type 2** operation in which wetting is required but would cause a greater hazard or damage, then dry work is permitted. Dry work, however, usually results in more airborne fibres. CSAO recommends that you select a category B respirator (see below).

KEY TO RESPIRATOR CHART

A	B	C	D
Air-purifying half-mask respirator with N-100, R-100, or P-100 particulate filter. If the worker requests the respirator from the employer, then the worker must wear it.	Choose any of the following: ➤ Air-purifying full-facepiece respirator with N-100, R-100, or P-100 particulate filter. ➤ Powered air-purifying respirator with a tight-fitting facepiece (either full or half facepiece) and a high-efficiency filter. ➤ Negative-pressure (demand) supplied-air respirator with a full facepiece. ➤ Continuous-flow supplied-air respirator with a tight-fitting facepiece (full or half facepiece).	Pressure-demand supplied-air respirator with a half facepiece.	Pressure-demand supplied-air respirator with a full facepiece.

Disposable respirators or dust masks are not recommended for avoiding exposure to asbestos fibres because it's difficult to perform negative-pressure and positive-pressure seal checks.

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CHART FOR ASBESTOS OPERATIONS

Use this chart to determine the "Type" of asbestos procedure and required respirator.

How to use the chart

LEGEND

ACM means asbestos-containing material.

HEPA or **No HEPA** refers to whether your tool is attached to a dust-collecting device equipped with a High-Efficiency Particulate Aerosol (HEPA) filter.

Wetted or **not wetted** refers to the practice of wetting the asbestos-containing material with "amended water," (such as a mixture of 1 cup dishwashing detergent for every 20 litres of water).

- Use this chart with CSAO's data sheet *Asbestos: Controls for Construction, Renovation, and Demolition* (DS037). It will clarify any details. You can order the data sheet from CSAO or download it free from www.csao.org. (You can also download a colour version of this chart).
- Start in the middle of the chart and work outwards.
- Your goal is to reach the boxes that will tell you the "Type" of removal (Type 1, 2, or 3) and the respirator you require.
- The outside circle of the chart tells you what kind of respirator you need. We've used A, B, C, and D to represent different kinds of respirators. The respirator table below explains what each of the letters means.
- For two categories of operations, the chart asks you to determine the size of the material you're working with. Once you choose the size (area in m²), you have to stay within the colour (shading) of the size until you get to the "Type" ring. For example, if you're removing ceiling tiles, and the area is greater than 7.5 m², you have to stay within the area of the chart that is coloured the same dark grey as the "Greater than 7.5 m²" cell (**this includes the striped area**) until you get to the "Type" ring. You must not move into to the light-grey areas which are for operations of less than 7.5 m².

  See the third page of this chart for another example of how to use the chart.
- **When you know the "Type" of removal, you need to implement the required controls**. The controls for each type of operation are listed in the asbestos regulation (Ontario Regulation 278/05, *Designated Substance—Asbestos on Construction Projects and in Buildings and Repair Operations*). To help you understand the regulation's requirements, CSAO has produced a guide called *Asbestos: Controls for Construction, Renovation, and Demolition* (DS037). You can order both of these publications from CSAO or download them free from www.csao.org.

RESPIRATORS

A*	B	C	D
Air-purifying half-mask respirator with N-100, R-100, or P-100 particulate filter. The worker must wear the respirator if they request it from the employer.	Choose any of the following: ➤ Air-purifying full-facepiece respirator with N-100, R-100, or P-100 particulate filter. ➤ Powered air-purifying respirator with a tight-fitting facepiece (either full or half facepiece) and a high-efficiency filter. ➤ Negative-pressure (demand) supplied-air respirator with a full facepiece. ➤ Continuous-flow supplied-air respirator with a tight-fitting facepiece (full or half facepiece).	Pressure-demand supplied-air respirator with a half facepiece.	Pressure-demand supplied-air respirator with a full facepiece.

Disposable respirators or dust masks are not recommended for avoiding exposure to asbestos fibres because it's difficult to perform negative-pressure and positive-pressure seal checks. For more information on seal checks, see Appendix F of CSAO's *Asbestos: Controls for Construction, Renovation, and Demolition* (DS037), available on www.csao.org

* For any Type 2 operation in which you will **not** wet the asbestos-containing material, CSAO recommends that you use a category **B** respirator.

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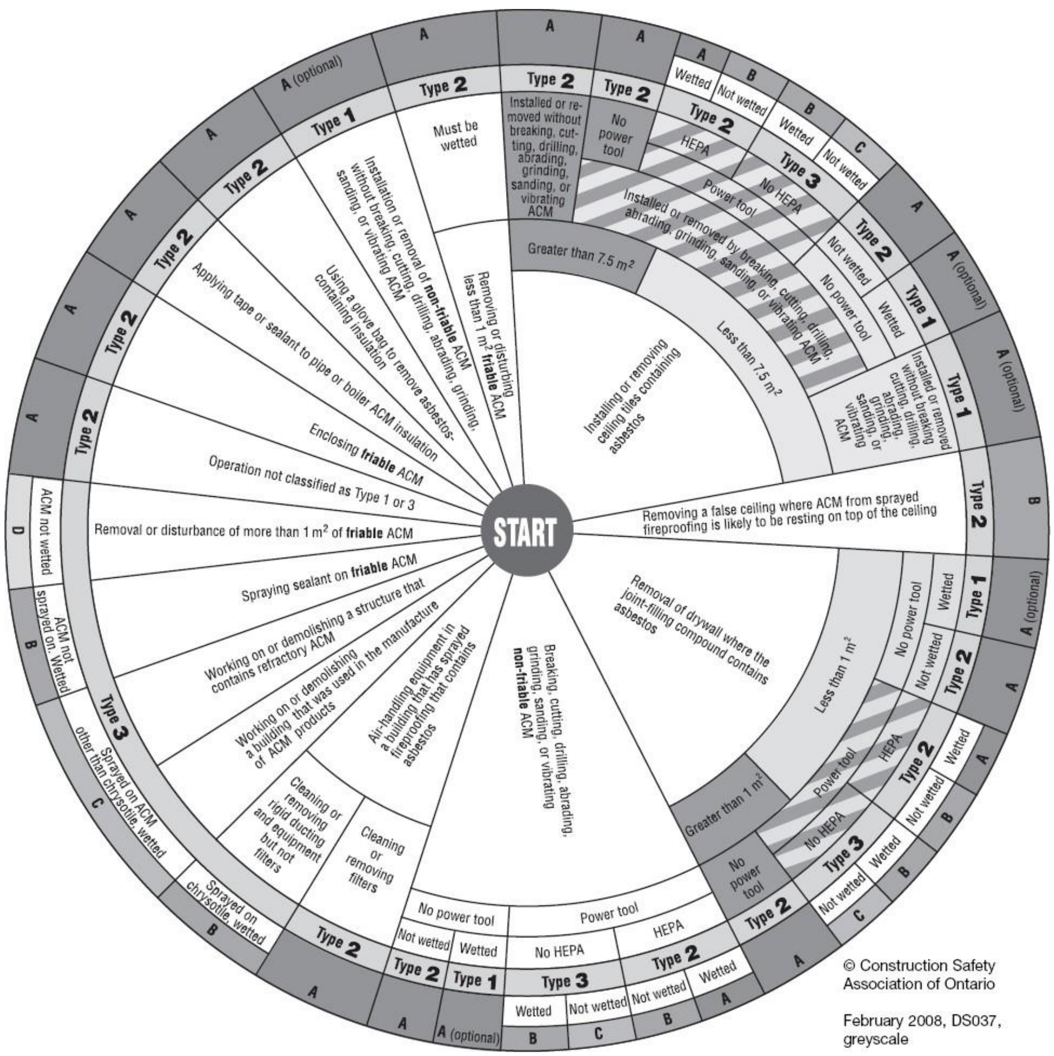

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February 2008, DS037, greyscale

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Example of how to use the chart

1. Let's say you want to remove drywall where the joint-filling compound contains asbestos. The first thing you do is find the slice of the pie that says this. (To the right and a bit below "START".)

2. You then move outward and see what decision you need to make. In this case, you need to decide how much drywall you will be removing (greater than 1 m² or less than 1 m²). Let's say that you will be removing less than 1 m².

   Notice that the "colour" of the box is light grey.

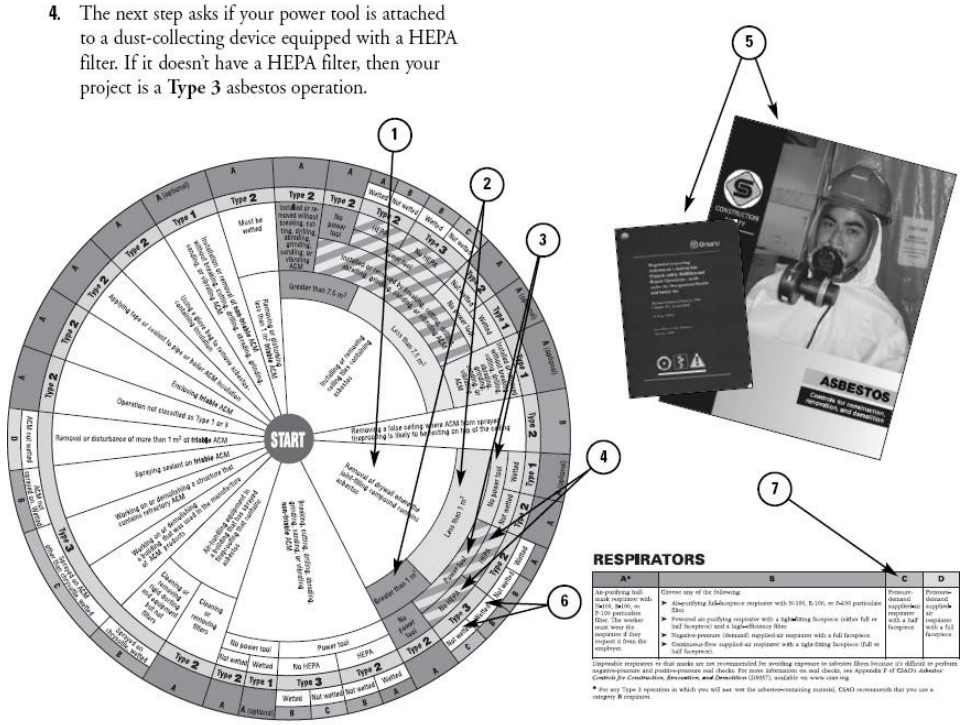
3. Staying within the light grey colour, move outward and see what decision you need to make. You need to decide if you will use a power tool or not. ("Power tool" is an option despite the dark stripes because the area still contains some light grey.) Let's say you will be using a power tool for the removal.

4. The next step asks if your power tool is attached to a dust-collecting device equipped with a HEPA filter. If it doesn't have a HEPA filter, then your project is a **Type 3** asbestos operation.

5. Now that you know the "Type" of your operation, you need to learn your legal requirements and the controls you must use. Refer to the documents listed on the page opposite the chart (under "**When you know the "Type" of removal**").

6. To determine what respirator you require, move one step further in the circular chart, and decide whether you will wet the material with "amended water" (see the page opposite the chart). If you're performing a dry removal, the **respirator type will be C.**

7. Look at the respirator table on the page opposite the circular chart, and see what respirator "C" represents. It is a **pressure-demand supplied-air respirator equipped with a half facepiece**. This is the kind of respirator you need.



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APPENDIX C

CLEARANCE AIR TESTING

The asbestos regulation for construction (Ontario Reg. 278/05) requires clearance air testing upon completion of Type-3 removal or repair operations. (There are some exceptions to this rule. See the regulation for details.)

Clearance air testing involves collecting air samples from inside the work area and analyzing them. This will determine if the clean-up and decontamination measures have eliminated the asbestos dust hazard. Clearance air testing is done only after the work area has passed the visual inspection, the area inside enclosure is dry, and "lockdown/gluedown" has been applied.

Clearance air testing reference: M.1.5, Appendix M of *Guidance for Controlling Asbestos-Containing Materials in Buildings*, publication number EPA 560/5-85-024, 1995, by the U.S. Environmental Protection Agency.

Barriers, enclosures, decontamination facilities, and negative air units **must be maintained** until the work area inside the enclosure passes the clearance air test.

Only a competent worker can perform clearance sampling.

Before and during sampling, "forced" air using leaf blowers or similar equipment is used to disturb settled dust from all surfaces in the work area, including enclosure surfaces. This disturbance displaces any settled dust to ensure "worst case" air concentrations of asbestos dust. Airborne dust is then sampled using an air pump which draws air through a filter. Samples are sent to an accredited laboratory for analysis. Laboratory turn-around times are anywhere from 24 to 72 hours.

There are two methods of analysis:

- Phase Contrast Microscopy (PCM). A technician uses an optical microscope.
- Transmission Electron Microscopy (TEM). A technician uses an electron microscope.

Phase Contrast Microscopy generally costs less, but it can be less accurate than Transmission Electron Microscopy. In Phase Contrast Microscopy, all fibres including non-asbestos fibres are counted, while in Transmission Electron Microscopy, only asbestos fibres are counted. Also, the number of samples required for analysis is different.

There are 3 clearance test analysis options:

1. Clearance test using PCM analysis alone
2. Clearance test using TEM analysis after the clearance test fails using PCM analysis.
3. Clearance test using TEM alone.

The clearance test passes if

- using PCM alone; all samples are less than 0.01 fibres per cubic centimeter in concentration
- using TEM after the clearance test using PCM analysis fails, all samples are less than 0.01 fibres per cubic centimeter in concentration. (The 0.01 refers to **all fibres** for PCM, and **asbestos fibres** for TEM.)
- using TEM alone, the average asbestos fibre concentration level inside the enclosure is statistically the same or less than the average asbestos fibre concentration outside the enclosure.

Consequences of failure of clearance test: If the work area does not pass the test, cleaning, decontamination, inspection, and lock-down measures inside the enclosure must be repeated before retesting. This adds to the cost and duration of project. It's crucial that the

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project owner or general contractor ensures that the asbestos work is done properly and that the clearance sampling is done only by a competent worker.

Clearance air testing is not required for

- Type 1 operations
- Type 2 operations
- Type 3 operations when
  - the operation involves work only on non-friable ACM using a power tool not equipped with a HEPA-filtered vacuum
  - the work is done outdoors, or
  - the work is done in a building that will be demolished and only the asbestos-removal and demolition workers will enter the building.

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APPENDIX D

INSPECTING RESPIRATORS

Before each use, respirators must be inspected to make sure that they are in good working order. The pre-use inspection should include checking

1. the facepiece and face-seal area for cracks, tears, dirt, or warping
2. the inhalation valves for warping, cracking, or tearing
3. the head straps for cracks — ensure that they have good elasticity
4. all plastic parts for signs of cracking — ensure that filter gaskets or seal areas are in good condition
5. the exhalation valve and valve seat for signs of dirt, warping, cracking, or tearing
6. the viewing area of the full facepiece for any damage that might restrict vision
7. the type and condition of the filter
8. the battery charge/condition and the airflow rate for powered air-purifying respirators (PAPR).
9. the regulators, alarms, and other warning systems.

A respirator with any damaged or deteriorated components must be repaired or discarded.

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APPENDIX E

CLEANING AND STORAGE OF RESPIRATORS

Respiratory protective equipment should be cleaned after each use. It must be disinfected whenever the equipment is transferred from one person to another. Maintenance and cleaning procedures need to be appropriate for the type of respiratory protective equipment being used. Follow the manufacturer's instructions.

The following is based on Appendix F (Guidelines for cleaning, disinfecting and storing of respirators) of CSA Z94.4-02:

1. Remove cartridges and filters.
2. Rinse respirator in warm water.
3. Immerse facepiece (excluding filters and cartridges) in warm water (50° C) with a mild detergent.
4. Clean with soft brush or sponge. Do not use cleaners containing solvents, because they will damage the respirator components.
5. Rinse in fresh, warm water.
6. If the respirator is shared, disinfect the facepiece by soaking in a solution of quaternary ammonia disinfectant or sodium hypochlorite (30 ml of household bleach in 7.5 litres of water).
7. Rinse in fresh, warm water, and air dry.
8. The cleaned respirator must be stored in a clean area away from dust, chemicals, sunlight, heat, extreme cold, and excessive moisture.

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APPENDIX F

PUTTING ON AND SEAL CHECKING RESPIRATORS

Putting on the respirator

1. Fully loosen all head straps. Pull hair back with one hand. Bring facepiece up to face with other hand.
2. While holding the facepiece in place, pull the straps over your head.
3. Tighten the straps starting from the bottom and going to the top.

Seal checking

Respirators must be seal checked (negative **and** positive) before each use.

Negative pressure test

- Wearer puts on respirator and adjusts it appropriately.
- Inlets to the filters are blocked with hands or covers.
- Wearer inhales gently and holds for 5 seconds.
- Mask should collapse slightly and not permit air into the facepiece.

Negative-pressure seal check

- If a leak is detected, readjust the mask and repeat the test.

Positive pressure test

- Perform only once wearer is satisfied with negative pressure test.
- Cover or block exhaust port of respirator.
- Wearer exhales gently for 5-10 seconds.
- Mask should expand outward slightly
- If a leak is detected, inspect and/or readjust mask and repeat the test.

Positive-pressure seal check

If you cannot achieve a proper seal, do not enter the work area. See your supervisor.

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APPENDIX H

RESPIRATOR POLICY

Each company is required to have a written respirator policy and a program for implementing that policy.

The CSA Z94.4-02 standard outlines the content requirements for a respiratory program which includes:

- Roles and responsibilities
- Hazard assessment
- Selection of the appropriate respirator
- Respirator fit testing
- Training
- Use of respirators
- Cleaning, inspection, maintenance, and storage of respirators
- Health surveillance of respirator users
- Program evaluation
- Record-keeping.

A qualified person should administer and oversee the respiratory protection program.

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APPENDIX I

HEPA FILTERS

HEPA stands for High-Efficiency Particulate Aerosol, and refers to filters used in a variety of industries and workplaces.

In construction, there are two main uses for HEPA filters:

1. industrial HEPA vacuum cleaners
2. negative air filtration units.

Vacuum cleaners with HEPA filters trap toxic particles such as asbestos and keep them from returning to the air where people can inhale them.

Negative air filtration maintains air pressure inside an enclosure at a lower level than outside. The filtration unit draws contaminated air from within the enclosure through a HEPA filter and blows the air outside.

To qualify as a HEPA filter, the filter must be certified by the Institute of Environmental Sciences and Technology to ensure that it can capture 99.97% of particles greater than or equal to 0.3 microns in diameter. A filter passing the certification test is given a number and the test results are recorded on the label. So read the label carefully.

Efficiency

By definition, a HEPA filter is able to remove a minimum 99.97% of all particles 0.3 microns in diameter or larger. A human hair, by comparison, is about 100 microns in diameter.

Ordinary filters cannot trap such microscopic particles. Instead, the particles are blown back into the air where workers can inhale them. HEPA filters prevent this from happening.

HEPA vacuums and negative air units have pre-filters to remove large particles before they can reach the HEPA filter itself. Without pre-filters, costly HEPA filters would have to be replaced much more often.

Guidelines

To ensure that HEPA filters are working efficiently, take the following steps.

- Read and follow the manufacturer's instruction manual.
- Filters are contaminated with toxic substances. When inspecting or replacing filters, do it in a safe, well-controlled place and wear personal protective clothing and equipment. Personal protective equipment will vary according to the hazard but may include an N-100, R-100, or P-100 NIOSH-approved air-purifying respirator, dust-resistant safety goggles, disposable coveralls, and impervious gloves.
- When renting HEPA vacuums or negative air units with HEPA filters, make sure the filters are real HEPA filters and not "HEPA-like" filters.
- Test HEPA filters by means of a Dispersed Oil Particulate (DOP) test when the filters are first installed to see if they're mounted correctly. The purpose is to ensure that air flows through the filter and doesn't leak around the seals of the filter housing.

  We recommend that after the test is complete, you put a sticker on the unit stating when the test was completed and the result. After the work is finished and before the next use, perform a new test and place a new sticker on the unit.
- Make sure the filter is not installed backwards, is properly seated in its housing, and is tightly secured.
- Inspect the filter housing for signs of dust indicating that dust is bypassing the filter. A HEPA filter is useless if the housing leaks.
- Dust in the exhaust airflow means the HEPA filter has ruptured or failed and must be replaced.
- If the fan is not drawing the amount of air required to keep the area under negative

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As the HEPA filter becomes coated with more and more particles, the air flow through the vacuum or negative air unit will decrease. Change the filter.

pressure, the unit filters may have become loaded or clogged with dust. This can be confirmed by measuring the pressure change across the filters (most units have either a differential pressure gauge or a "change filter" indicator). If the filter is clogged, the pre-filter should be changed first. If the pressure change does not decrease, the intermediate filter should be changed. If changing both the pre-filter and the intermediate filter does not solve the problem, the HEPA filter may need to be changed.

- When changing the HEPA filter, make sure the fan is off. Always use the manufacturer's recommended replacement filter. Other filters may not fit and therefore they may leak.
- After the filter has been replaced, arrange for a Dispersed Oil Particulate (DOP) test to ensure that

  - the new filter's integrity is good

  - air flows through the filter

  - air doesn't leak around the seals of the filter housing.

  A new test certificate sticker should be placed on the unit.
- All used filters must be placed in sealable plastic bags, labeled, and disposed of as asbestos waste.
- Pre-filters and HEPA filters cannot be cleaned. They must be replaced with new filters approved by the manufacturer.
- Don't use compressed air to clean old filters or bang old filters to remove accumulated dust.
- Don't punch holes in HEPA filters or pre-filters when they get clogged.
- Follow the manufacturer's instructions on when and how to change the filter.
- To replace old filters, use only new filters approved by the manufacturer.
- Don't use another manufacturer's filter or alter it to fit your vacuum or air filtration unit.
- Dispose of old filters as contaminated waste.

See Appendix J for information on "Negative Air Units and HEPA Filters: Troubleshooting."

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APPENDIX J

NEGATIVE AIR UNITS AND HEPA FILTERS: TROUBLESHOOTING

How do I know if the HEPA filter is leaking dust?

- There are two specific purposes for testing the HEPA filters:
  1. to check the filter, and
  2. to ensure that air flows through the filter and doesn't leak around the seals or the filter housing.
- Before each use it is the supervisor's responsibility to have the negative air unit's HEPA filter tested.
- Testing must be done by means of a DOP (Dispersed Oil Particulate) test. During a DOP test, a competent worker will introduce small amounts of aerosol or "smoke" upstream of the HEPA filter. While the aerosol or "smoke" is being pulled through the unit, the competent worker doing the testing will then use a meter to check for particles downstream of the HEPA filter to determine if any aerosol or "smoke" has passed through or around the filter.
- After the test is complete, the tester will place a sticker on the unit stating when the test was completed, the serial number of the unit, and whether the result was a pass or fail.
- The test certificate is only valid for that specific "job" or "setup." Once the work has been completed and before the next use, your supervisor must arrange for a new test.

Take extra care when handling a negative air unit.

- Any jarring movement to the unit or even the slightest damage to the unit can cause the seal to fail or even the HEPA filter to break.
- If you notice any damage to the unit, or if you know that the unit has been hit or jarred, you should notify your supervisor immediately.

How do I know when there is a problem and what do I check for?

- It is a requirement to maintain the enclosure pressure at 0.02 inches of water negative to the surrounding area. If the air pressure in the enclosure goes below 0.02 inches of water, immediate action is required.
  - The first thing you need to do is check if the negative air unit is still running.
  - If the unit is running then there could be an opening in the enclosure somewhere. Even a small opening can cause a substantial drop in the negative air pressure.
  - If you have checked the enclosure and everything is okay then the problem

HEPA test sticker

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could be that the negative air unit's filters have become clogged with dust which restricts the air flow through the unit. If this is the case the first thing you can do is vacuum some of the dust off of the pre-filter. You may be able to remove enough dust to substantially increase the air flow through the unit. If this doesn't work, the negative air unit's filters need to be changed.

How do I change the filters?

- When the fan is not drawing the amount of air required to keep the containment area under negative pressure, the unit filters may have become loaded or clogged with dust.
- This can be confirmed by measuring the pressure difference across the filters. Most units have either a differential pressure gauge or a "change filter" indicator as part of the unit.
- If the filters have become clogged, the pre-filter should be changed first.
- All filters must be changed within the Type-3 enclosure and in accordance with the manufacturer's instructions.
- If changing the pre-filter does not increase the air flow then the intermediate filter should be changed as well.
- If changing both the pre-filter and intermediate filter does not solve the problem, the HEPA filter may require changing.
  - When changing the HEPA filter, make sure the fan is off.
  - Always use the manufacturer's recommended replacement HEPA filter. Other filters may not fit and therefore they may leak.
  - After the filter has been replaced, arrange for a DOP (Dispersed Oil Particulate) test to ensure the new filter integrity is good and that air flows through the filter and doesn't leak around the seals or the filter housing.
  - All used filters must be placed in sealable plastic bags, labeled, and disposed of as asbestos waste.

Where do I position the negative air unit and the exhaust?

- When preparing for a Type 3 removal the location of the negative air unit and the location of the unit's exhaust duct are important.
- Try to position the negative air unit away from the demolition or in a location that will have the least amount of airborne dust.
- Lower dust levels will minimize the likelihood of having to replace the filters which means
  - the unit will operate for longer durations
  - the unit will operate more efficiently
  - there will be less change in pressure within the enclosure
- Whenever possible, the exhaust or discharge duct should be placed so that it discharges outside.
- Never have the exhaust duct discharge to the building's return air system. If the unit's HEPA filter fails, asbestos fibers could be spread throughout the building.
- Negative air pressure within the enclosure must be established before any work is performed.
- Negative air pressure must be maintained at all times during Type-3 removal.

What will happen if there is a power failure?

- In the event of a power failure, the negative air unit will stop running. This

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means that the enclosure will no longer be under negative air pressure.

- If this happens, do the following:
  - Stop working immediately.
  - Leave the work area through the designated exit.
  - After you leave the enclosure seal the entrance way, exits or any other opening in the enclosure with plastic and tape.
  - Do not open the door to the enclosure. Remember, without negative air pressure, dust could get out of the enclosure and contaminate adjacent areas with asbestos.

Leave the negative air unit in the on position even though it is not running. When the power is reestablished, the enclosure will again be under negative pressure without anyone having to open a door.

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Quiz
You can use the workbook if necessary to find the answers.

1. **If you think something might contain asbestos, you should _____.**
   A. closely inspect the material....
   B. Wait until it can be properly discovered by a certified asbestos inspector
   C. Assume that it does contain asbestos and inform your supervisor
   D. call 911
2. **All of the following products commonly contain asbestos**
   A. Sprayed-on ceiling insulation
   B. House Paint
   C. Cement Products
   D. Floor Tiles
   E. ALL the above

3. **Which of the following is NOT true about asbestos?**
   A) Asbestos fibers are heavy and do not travel with air currents
   B) Asbestos fibers can cause health effects
   C) Asbestos fibers can easily get into your lungs
   D) Exposure to asbestos fibers can lead to lung disease years later

4. **Asbestos is often found in which of the following items?**
   A) Pipe, duct, and boiler insulation
   B) House paint
   C) Upholstered furniture
   D) Sprayed-on ceiling insulation
   E) Fire Fighting Protective Suits
   F) Floor and Ceiling tiles
   G) ALL the above

5. **Which of the following items may contain asbestos? Check all that apply.**
   A) Theater Curtains
   B) Upholstery
   C) Hot Pads
   D) Fireproof clothing for fire fighters

6. **Which of the following types of asbestos is most commonly found in buildings?**
   A) Amosite
   B) Chrysotile
   C) Crocidolite
   D) Tremolite

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7. **Asbestos fibers can**
   A) Lodge in you digestive system
   B) Lodge in your lungs or the lining of your lungs
   C) enter your blood systems
   D) All of the above

8. **After an asbestos worker has left his job, how long must his employer keep his medical records?**
   A) 30 years
   B) 10 years
   C) 6 months
   D) 20 years

9. **The time period between exposure and the development of asbestosis is usually __**
   A) a year
   B) three years
   C) five years
   D) more than ten years

10. **Asbestos medical exams must include all of the following EXCEPT:**
    A) a Pulmonary Function Test
    B) a chest exam
    C) completion of a standardized respiratory disease questionnaire
    D) a cat scan

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Answers:

1. **C**
2. **E**
3. **A**
4. **G**
5. **A, C, D**
6. **B**
7. **D**
8. **A**
9. **D**
10. **D**

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