

# ASBESTOS

- Controls for**
- construction
  - renovation
  - demolition

**UPDATED**



**CONSTRUCTION  
SAFETY**

This data sheet has been reviewed and endorsed by the Provincial and Regional Labour-Management Health and Safety Committees and is fully a document of accord between labour and management authorities.

In the past, members of the public have used printed information that was outdated by subsequent improvements in knowledge and technology. We therefore make the following statement for their protection in future.

The information presented here is, to the best of our knowledge, current at time of printing and is intended for general application. This publication is not a definitive guide to Ontario Regulation 278/05 (*Designated Substance—Asbestos on Construction Projects and in Buildings and Repair Operations*) or to practices and procedures wholly applicable under every circumstance. Consult Ontario Regulation 278/05. Although the Construction Safety Association of Ontario cannot guarantee the accuracy of, nor assume liability for, the information presented here, we are pleased to answer individual requests for counselling and advice.

The Construction Safety Association of Ontario thanks Inscan Contractors (Ontario) Incorporated and Pinchin Environmental Limited for their contributions to this data sheet.

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# **ASBESTOS CONTROLS FOR CONSTRUCTION, RENOVATION, DEMOLITION**

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This data sheet describes good practice when working with asbestos, and complies with Ontario Regulation 278/05 (*Designated Substance – Asbestos on Construction Projects and in Buildings and Repair Operations*). Refer to the regulation for the full description of your legal duties. Contact the Ministry of Labour (1-800-268-8013, [www.labour.gov.on.ca](http://www.labour.gov.on.ca)) to get a copy.

**1. WHAT IS ASBESTOS?**

"Asbestos" refers to a group of naturally occurring minerals once used widely in the construction industry. Its strength, ability to withstand high temperatures, and resistance to many chemicals made asbestos useful in hundreds of applications.

**Types of asbestos**

There are two general categories of asbestos: *serpentine* (long and flexible fibres) and *amphibole* (brittle and sharp fibres). There are six types of asbestos generally recognized:

- chrysotile (*serpentine*)
  - crocidolite
  - amosite
  - actinolite
  - anthophyllite
  - tremolite
- } *amphibole*

Chrysotile and amosite are the most common forms of asbestos in Canada.

Some studies show that amphibole fibres stay in the lungs longer than chrysotile fibres. This tendency may account for the greater toxicity (harmfulness) of amphibole fibres.

**History**

Major use of asbestos products in construction began in the 1930s and escalated during the post-war building boom. During the 1950s and 1960s approximately 40 to 50 thousand tons were used annually in Ontario.

In the early 1970s the use of such products declined sharply because of increasing concern over the health effects of asbestos. In the mid-1970s specific prohibition and the availability of safer substitutes put an end to the use of many asbestos products. But the early

widespread use of asbestos has left a potentially dangerous legacy. The thousands of tons of asbestos installed over the past eighty years can pose serious risk to workers in the renovation, maintenance, repair, and demolition sectors of the construction industry.

From 1994 to 2004, Ontario’s Workplace Safety and Insurance Board (WSIB) approved 249 occupational disease fatality claims. Of these, 216 were judged to be caused by asbestos exposure. Trades at particular risk include plumber/pipe fitters, insulators, labourers, and electricians.

**2. WHAT ARE THE HEALTH EFFECTS?**

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

- asbestosis
- lung cancer
- mesothelioma (cancer of the lining of the chest and/or abdomen).

A person exposed to asbestos may feel no ill effects at the time of exposure. The effects may appear many years later.

The asbestos-related diseases people get today are the result of exposures during the 1960s, 1970s, and 1980s.

**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.

**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 to develop, 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 exposure 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.

**Mesothelioma** is a relatively rare 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.

**Other illnesses** – There is also 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.

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 lining of the lung (pleura). Pleural plaques are an indicator of previous exposure to asbestos and can make breathing difficult. Some researchers believe that there's 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.

### 3. WHERE IS IT?

Because of the wide variety of asbestos materials and applications in construction over the years, there is considerable risk that work such as renovation and maintenance can disturb these materials and cause significant exposures to workers and others.

#### Client's Report

For such projects the client must complete a report indicating whether asbestos-containing material (ACM) is or is not present. (ACM is defined as containing 0.5% or more asbestos.) If it is present, the report must describe the type of asbestos and its condition. This report must then be provided to all contractors bidding on the job and must be reviewed before contract arrangements are finalized.

If the composition of the material is unknown, the client may have the material tested to determine its asbestos content. Otherwise, work must proceed as if the material contains asbestos—and a type of asbestos other than chrysotile if the material is sprayed-on.

This requirement does not apply to owners of residential buildings containing four dwelling units or less, where one of the units is occupied by the owner or the owner's family. 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.

#### Friable and non-friable

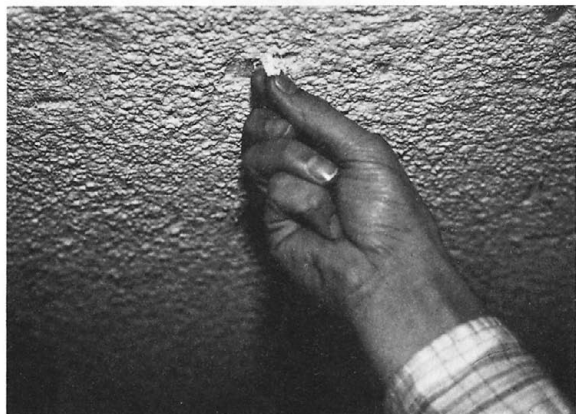
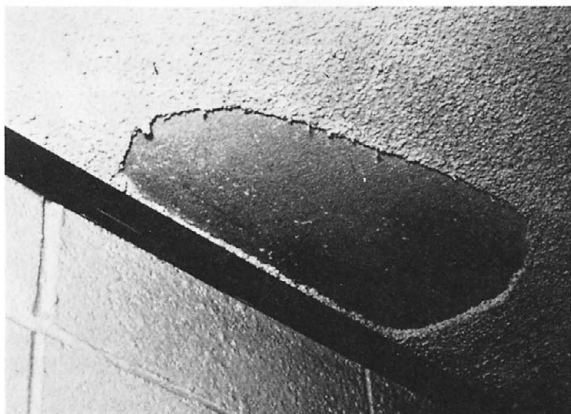
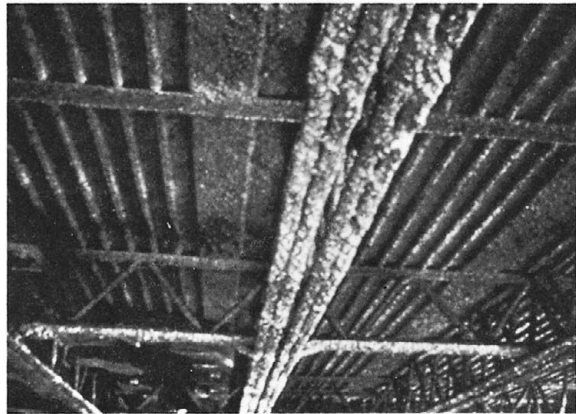
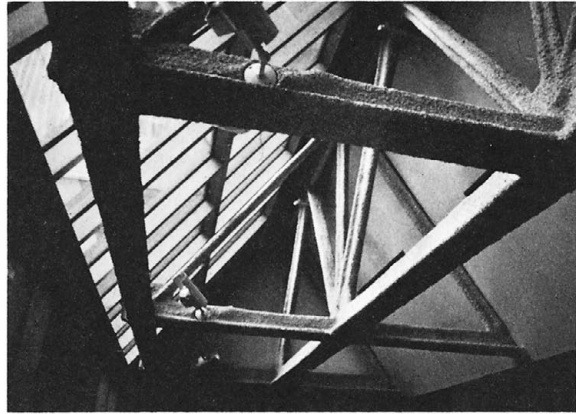
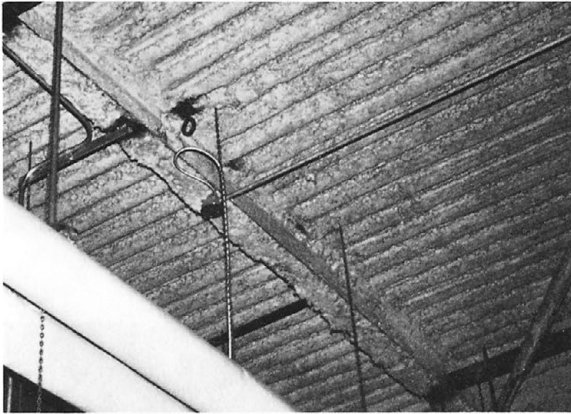
Two classes of asbestos products were widely used. The first includes materials easily crumbled or loose in composition. These are referred to as "friable." The second type includes materials much more durable because they are held together by a binder such as cement, vinyl, or asphalt. These products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

<p><b>FRIABLE</b> means easily crumbled into dust</p> <p><b>NON-FRIABLE</b> means difficult to crumble into dust</p>
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**TYPICAL LOCATIONS****FRIABLE MATERIALS****1) Sprayed-on fireproofing**

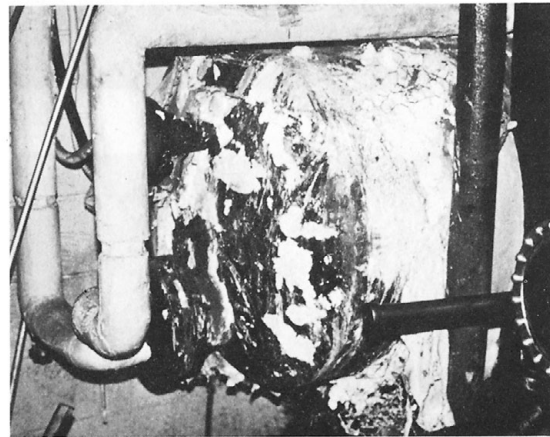
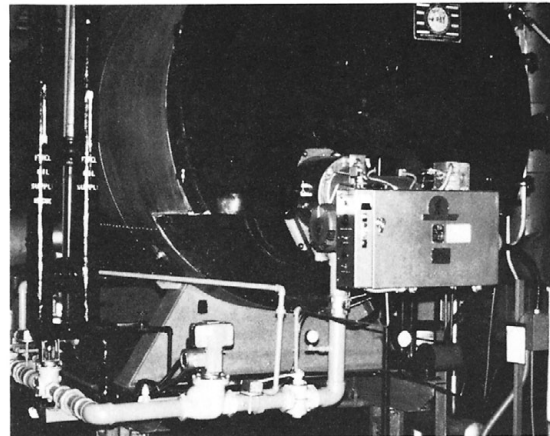
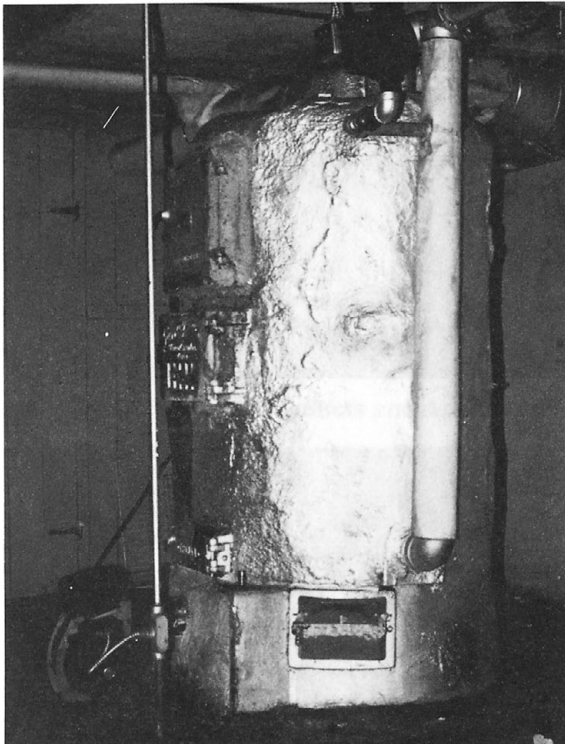
This material was widely used to fireproof steel structures. It can be found on beams, columns, trusses, joists, and steel pan floors. Sprayed

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.



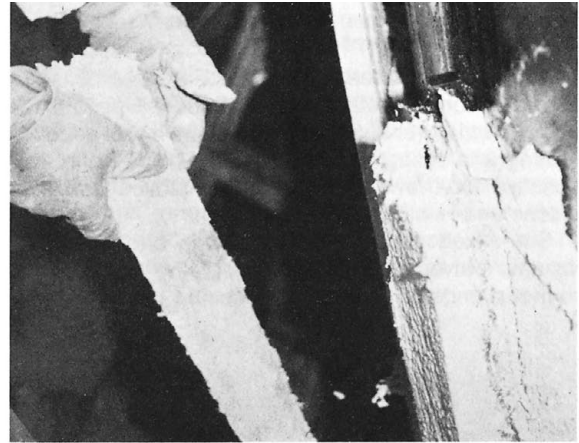
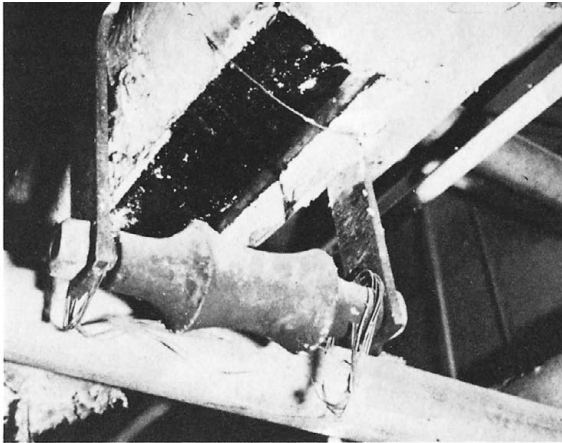
## 2) Pipe and boiler insulation

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.

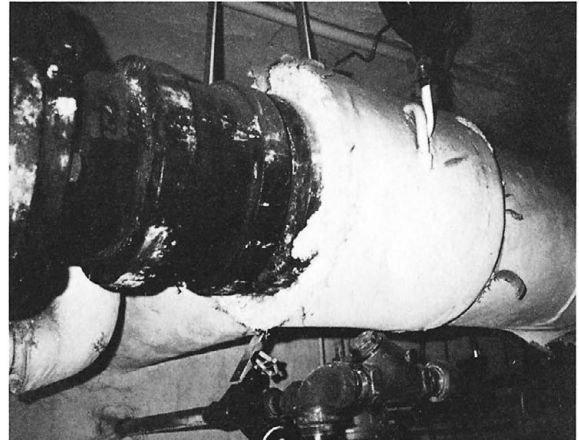
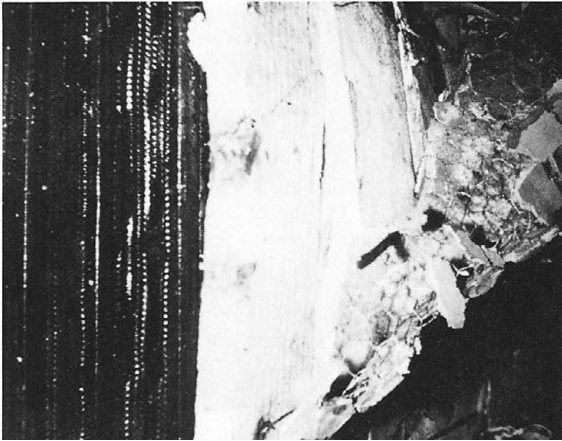


*Below: Two examples of air cell insulation*



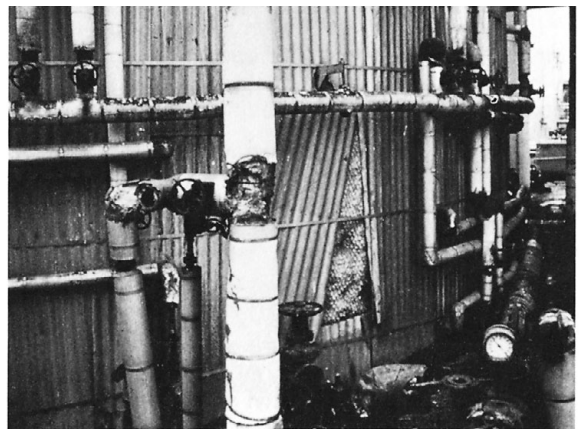


*Four examples of block-type pipe and boiler insulation*



**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.





#### 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.”

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.



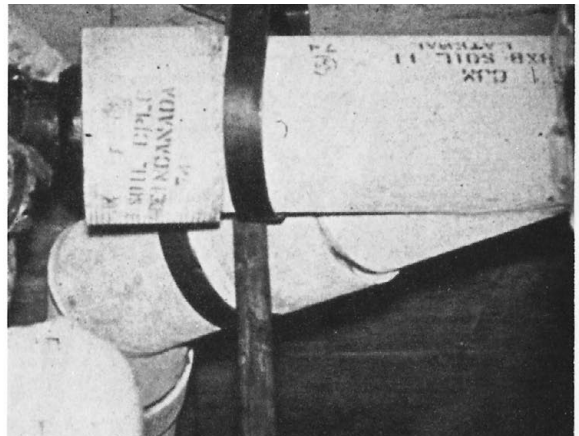
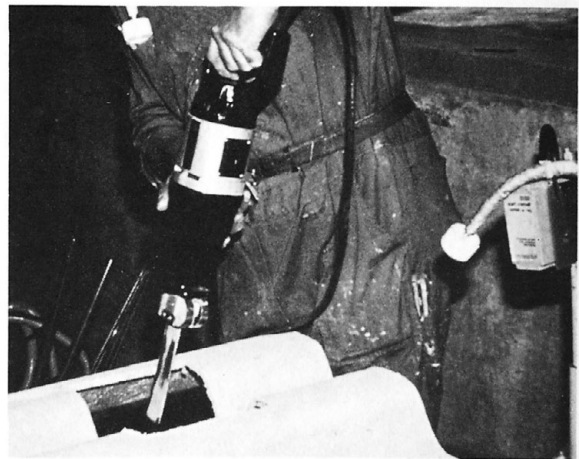
#### NON-FRIABLE MATERIALS

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

##### 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.

*Three examples of asbestos cement products*



**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) 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.

**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.

**5) Roofing felts**

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.

**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 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.

**7) Drywall joint-filling compound**

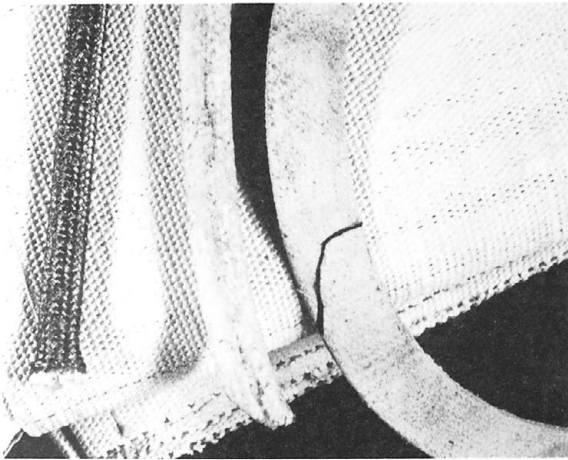
Early drywall joint-filling compounds contained significant amounts of asbestos fibre. This particular use was specifically prohibited in 1975. Still, it continued to be used at least until 1980.

**8) Coatings and mastics**

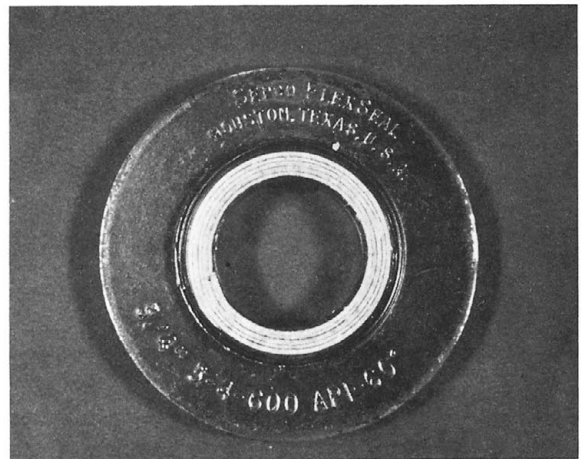
Since asbestos was relatively inexpensive and withstood weathering, it was widely used as a filler in many coatings and mastic products such as roofing cement and caulking materials.

### 9) Gaskets and packings

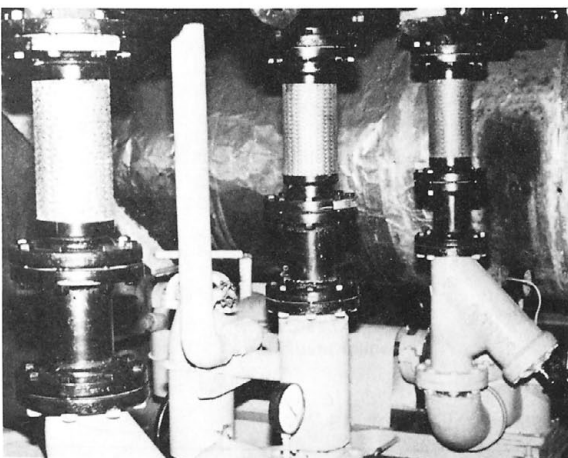
Several different types of gasket material contained asbestos. One common type was a rubber/vinyl/asbestos mixture which could be cut to size or came in standard sizes and patterns. Woven or pressed asbestos material was also widely used on doors and other openings on boilers, furnaces, and kilns (a).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



a



b



c



d

**4. QUICK REFERENCE**

**Typical locations**

Table 1 summarizes where asbestos products have been generally used. Figures 1-3 indicate typical locations of asbestos materials in various types of construction.

**Table 1**

<b>ASBESTOS PRODUCTS IN CONSTRUCTION</b>			
<b>Product</b>	<b>Residential</b>	<b>Commercial/ Institutional</b>	<b>Industrial</b>
Sprayed-On Fireproofing		XX*	
Pipe and Boiler Insulation	X	X	XX
Loose Fill 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

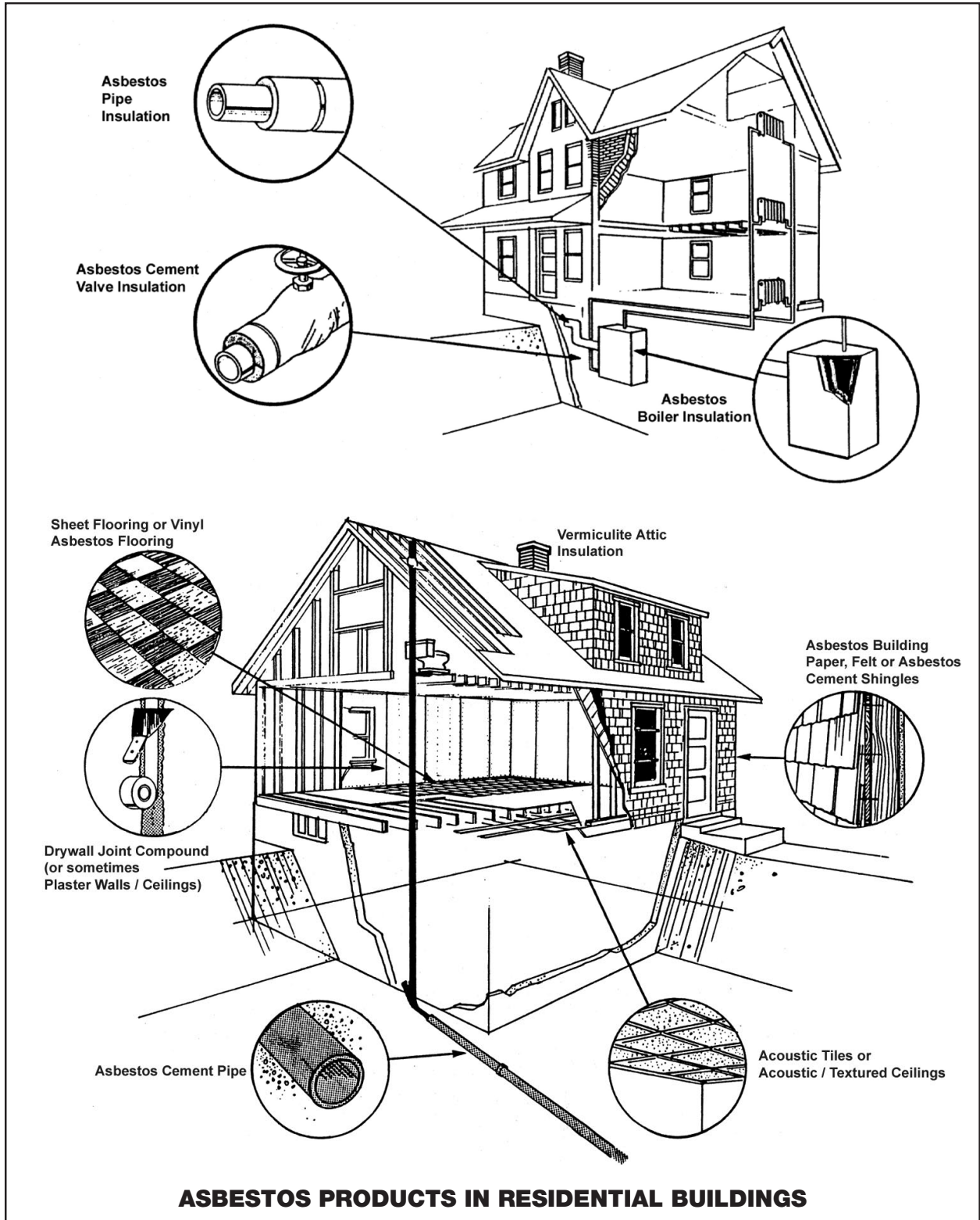


Figure 1

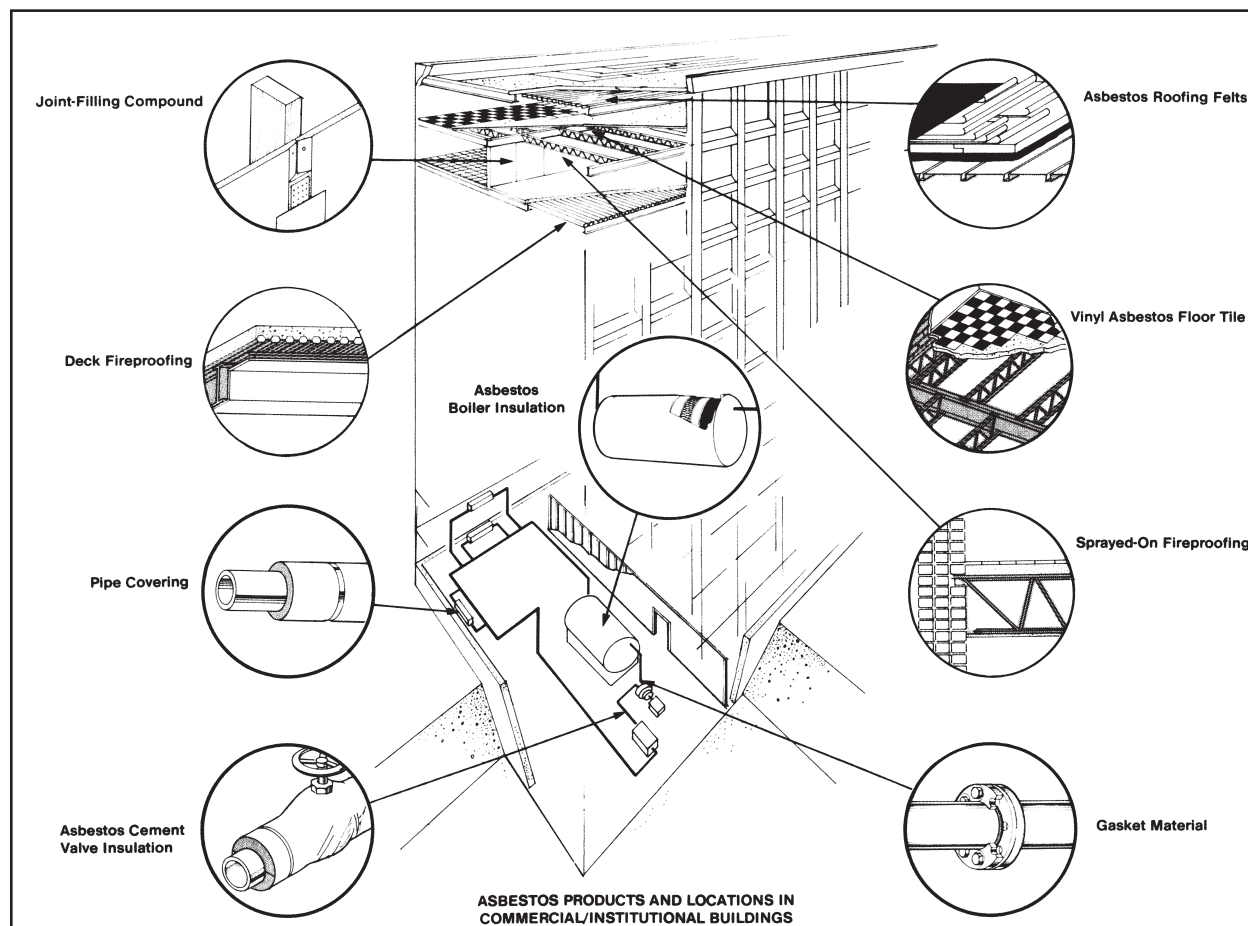


Figure 2

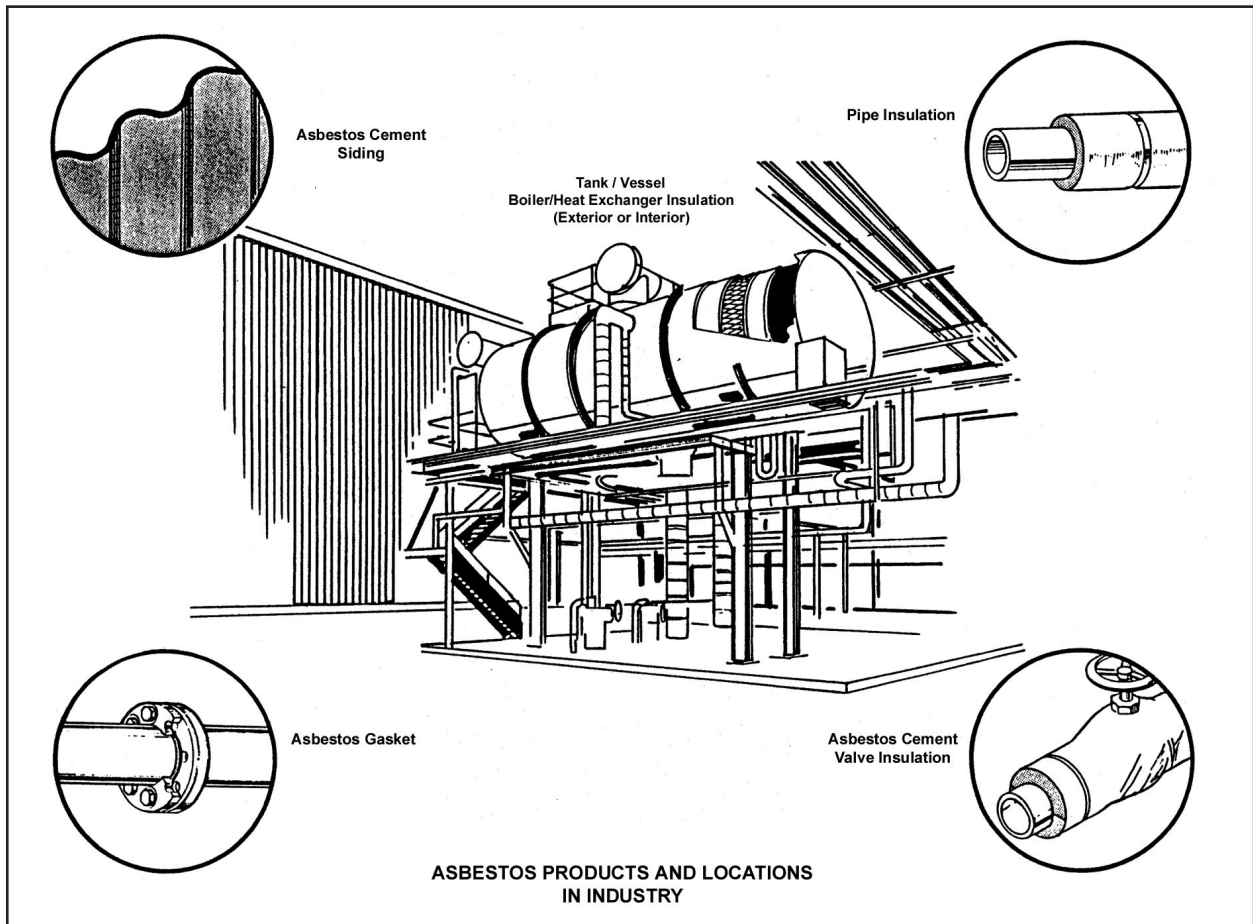


Figure 3

## 5. IDENTIFYING ASBESTOS-CONTAINING MATERIAL

Although the only true method of identifying asbestos is by microscopic analysis of samples, several rules of thumb indicate whether it's likely that asbestos is present.

### a) The age of the building or equipment

Asbestos pipe and boiler insulation was used extensively in all sectors of the industry until the 1970s, when substitutes such as fibreglass, mineral wool, and calcium silicate became more economical. Buildings and installations dating from before that period may contain asbestos in different forms.

Since the energy crisis in the late 1970s many owners of processes have upgraded their insulation. The original asbestos insulation may have been covered by some other material (e.g., fibreglass) and a surface inspection may not reveal any underlying asbestos.

In the case of fireproofing, 1974 marks the last major use of asbestos for this application.

### b) The type of construction

Structural steel frame buildings require fireproofing to protect the integrity of the structure until occupants can be evacuated. This resulted in widespread use of sprayed-on or trowelled-on fireproof coatings, most of which contained chrysotile.

Reinforced concrete structures do not normally require additional fireproofing since the concrete protects the reinforcing steel which provides the critical structural support. However, composite steel pan/concrete floor construction was often fireproofed with asbestos.

In low-rise residential construction, the use of friable asbestos material is usually limited to pipe and boiler insulation as described above.

### c) The nature of the equipment

Asbestos insulation materials were used on equipment exposed to extreme conditions such as high temperatures and corrosive environments. As a result, asbestos can be anticipated on high pressure steam lines, "hot" process piping, and refractory linings in furnaces and kilns.

Asbestos cement sheeting was often used in industrial settings for roofing, siding, and splash protection from corrosive material.

### d) The appearance of material

While mineral wool, calcium silicate, and asbestos are quite similar in appearance, other materials such as fibreglass are noticeably different. This fact can be used to eliminate certain materials from consideration and analysis.

In the case of pipe insulation, the corrugated type of material commonly called "air-cell" insulation was almost exclusively made with a significant amount of asbestos.

Factors a) and d), along with a review of original plans and specifications, can be used by the client or the client's representative in conducting an inspection and preparing the required report. Any suspect materials which cannot be positively identified as asbestos or as something else must be sampled and analyzed to provide a definite answer.

## 6. RISK OF EXPOSURE

Although science and medicine have not been able to determine a "no-effect" level of exposure to asbestos, it is fairly clear that the risk of illness increases with the duration and intensity of exposure.

Generally, the lower the exposure, the lower the risk of contracting an asbestos-related illness.



### 1) Nature of material

Friable or easily crumbled asbestos 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, shaped, or otherwise worked with power tools or are deliberately crumbled or pulverized.

### 2) Nature of activity

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

### 3) Application of alternate controls

The use of water to prevent the creation and spread of dust is a practical control in many cases. It is not practical, however, in areas with live electrical machines or delicate electronic equipment.

### 4) Duration of exposure

To some extent, 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 does not pose the same risk to bystanders as handling it in an occupied building where the dust may recirculate.

The Ministry of Labour uses these five factors to categorize the asbestos-related activity into one of three types: Type 1, Type 2, or Type 3.

## 7. TRAINING

Whenever work is planned at a location where asbestos is present, constructors and employers must inform workers about

- the location of asbestos-containing materials or materials assumed to contain asbestos
- whether the material is friable or non-friable, and
- the type of asbestos (e.g., chrysotile, amosite, tremolite, etc.) if the material is sprayed.

Constructors and employers must then ensure that workers are trained on asbestos hazards and controls as detailed below.

Employers performing regular service or maintenance work on behalf of owners have these same training requirements. Such employers should develop safe work practices. They should also become familiar with the owner's asbestos procedures and communicate them to their employees.

### Content of training

Each person working in a Type 1, Type 2, or Type 3 operation – as well as other workers who could be exposed to asbestos – 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.

**Note:** The above applies to facility owners and tenants whose staff undertake work involving the removal or disturbance of asbestos-containing material or who contract with other employees to do so.

Training should also include

- methods of recognizing asbestos, including identification of building materials that contain asbestos
- the relationship between smoking, asbestos, and lung cancer
- the kinds of operations that could result in exposure to asbestos
- classification of Type 1, Type 2, and Type 3 operations
- required work procedures and controls to minimize exposure, including engineering controls, work practices, respirators, housekeeping procedures, hygiene facilities, protective clothing, decontamination procedures, emergency procedures, and waste disposal procedures
- the requirements of the medical-surveillance program
- the requirements for signs and labels.

The joint health and safety committee or the health and safety representative must be informed about when and where the training will take place.

### **Asbestos Abatement Training Program**

After November 1, 2007, every worker and supervisor involved in a Type 3 operation must successfully complete the Asbestos Abatement Training Program approved by the Ministry of Training, Colleges and Universities.

## **8. NOTIFICATION**

### *Informing the Ministry of Labour of Type 3 and Type 2 glove bag operations*

You must notify the Ministry of Labour, orally and in writing, before beginning a Type 3 operation or 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

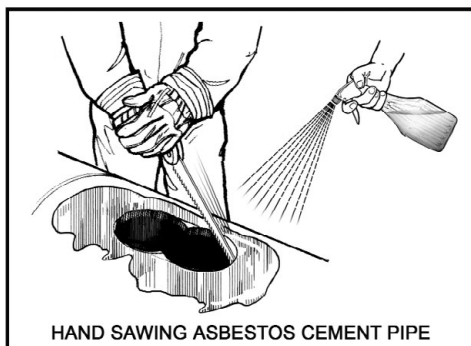
- the name and address of the person giving the notice
- the name and address of the owner of the place where the work will be done
- the exact address and location where the work will be done
- a description of the work that will be done
- the starting date and expected duration of the work
- the name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

## 9. TYPE 1 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.



4. Removing less than one square metre of drywall where asbestos joint-filling compound was used (usually used before 1980).

If these operations are done properly, it is unlikely that exposure will exceed acceptable limits.

### 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, pg. 41) 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.

Protective clothing is required for two reasons:

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

Members of asbestos workers' families have historically developed illnesses from the dust brought home in work clothes.

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 2, page 43.

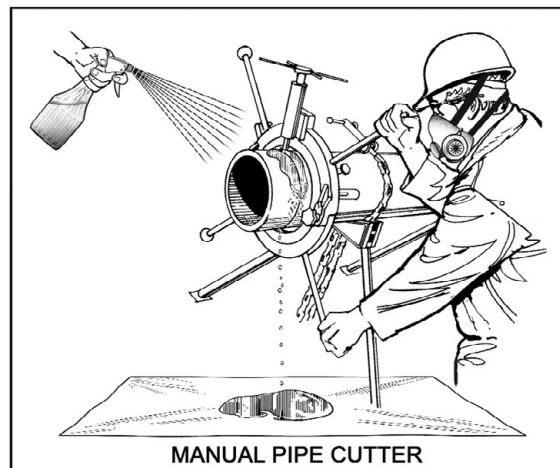
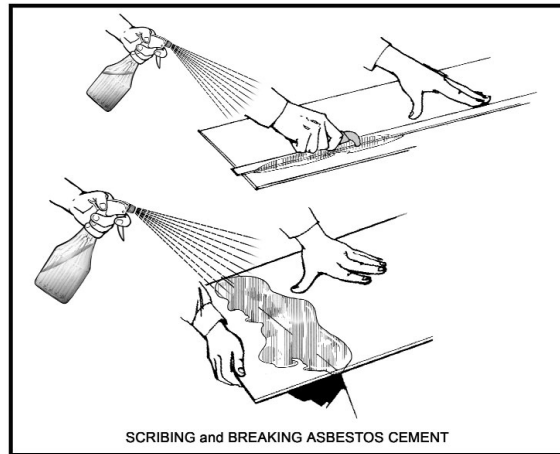


4. Never use compressed air to clean asbestos dust off surfaces. This just blows the fibres into the air.
5. When you wish to cut, shape, or drill the non-friable materials as mentioned in 9.1.3 above, you must wet the work (water plus wetting agent—see box below) and use only hand tools such as nibblers, rasps, files, shears, knives, hand drills, or hand saws. Using hand tools will 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.



6. You must use a dropsheet of 6-mil polyethylene below the work area to help control dust.
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 disposal coveralls must be placed in dust-tight containers and labeled with warning signs (see Section 12.6 for more information on clean-up and disposal).
10. You must never reuse dropsheets. After the work is done, dropsheets must be 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 Section 12.6).
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 dust is 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 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.

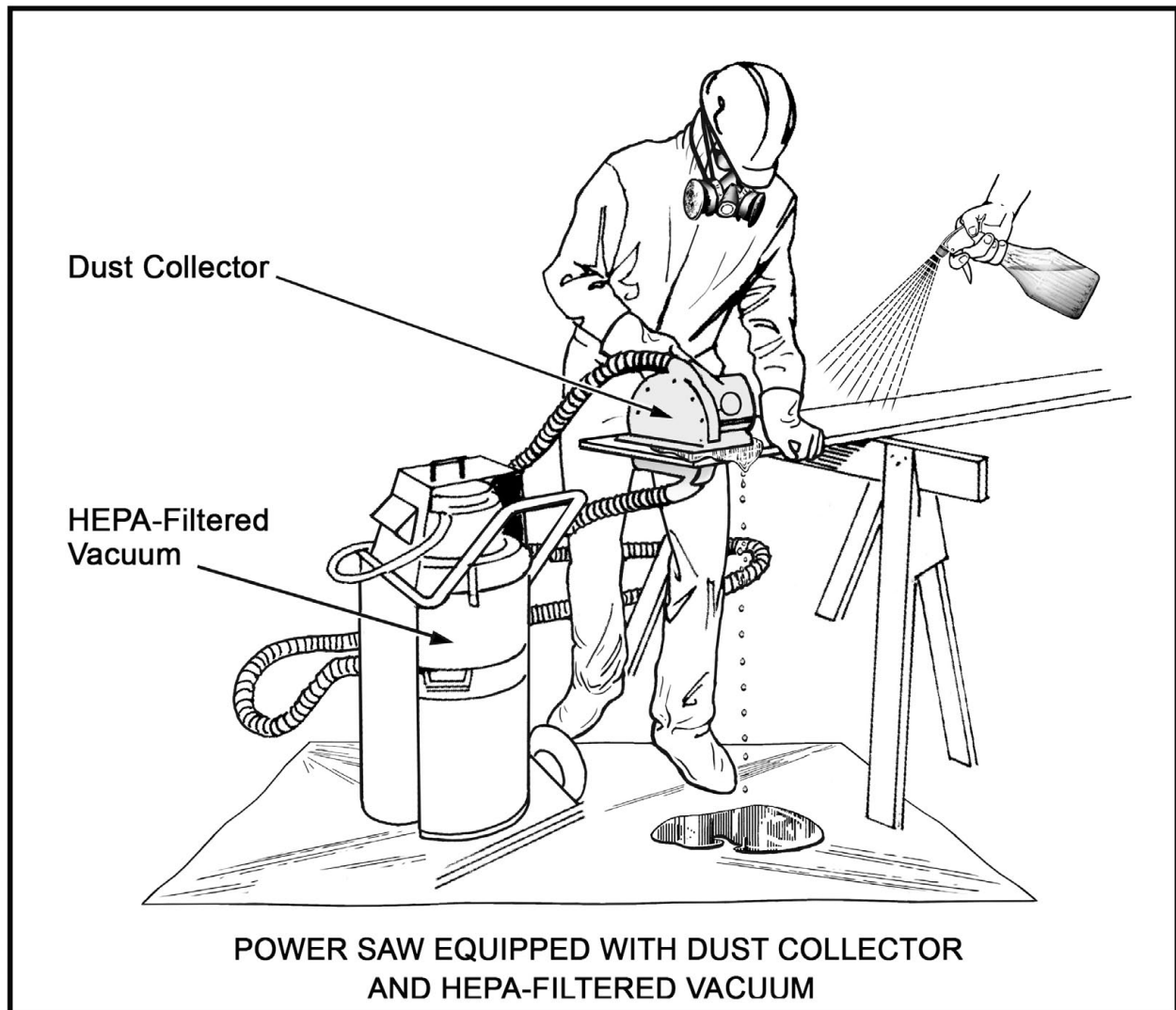
**Note:** The classification of drywall compound removal is being reviewed. Please check with the Ministry of Labour.

#### **DRYWALL JOINT-FILLING COMPOUND**

Early drywall joint-filling compounds contained significant amounts of asbestos fibre. This particular use was specifically prohibited in 1975. Still, it may be found in buildings constructed several years afterwards (at least until 1980).

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 12.9.

To prevent electric shock, any power tools used around water must be equipped with a ground fault circuit interrupter (GFCI) and be maintained properly.



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. An operation that is not Type 1 or Type 3.

### 10.2 Controls for Type 2 operations

1. Workers involved in Type 2 operations must wear a NIOSH-approved respirator as outlined in the respirator chart, pg. 41. 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.

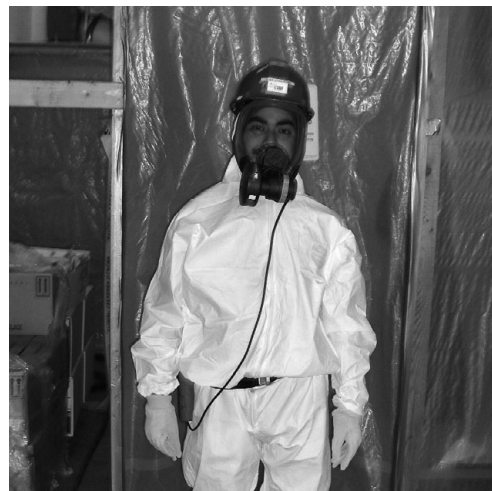
2. Workers must wear protective clothing impervious to asbestos with tight-fitting cuffs at the wrist, ankle, and neck, as well as a hood or head cover. This usually means one-piece disposable coveralls—ones which are easy to clean of surface contamination before you throw them away. Torn or

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.

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 exposures to asbestos.

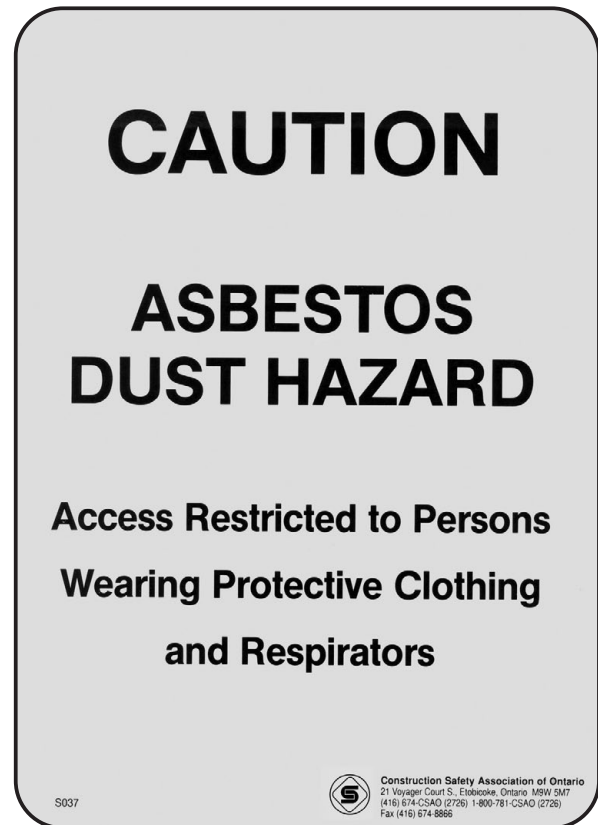
Members of asbestos workers' families have historically developed illnesses from the dust brought home in work clothes.



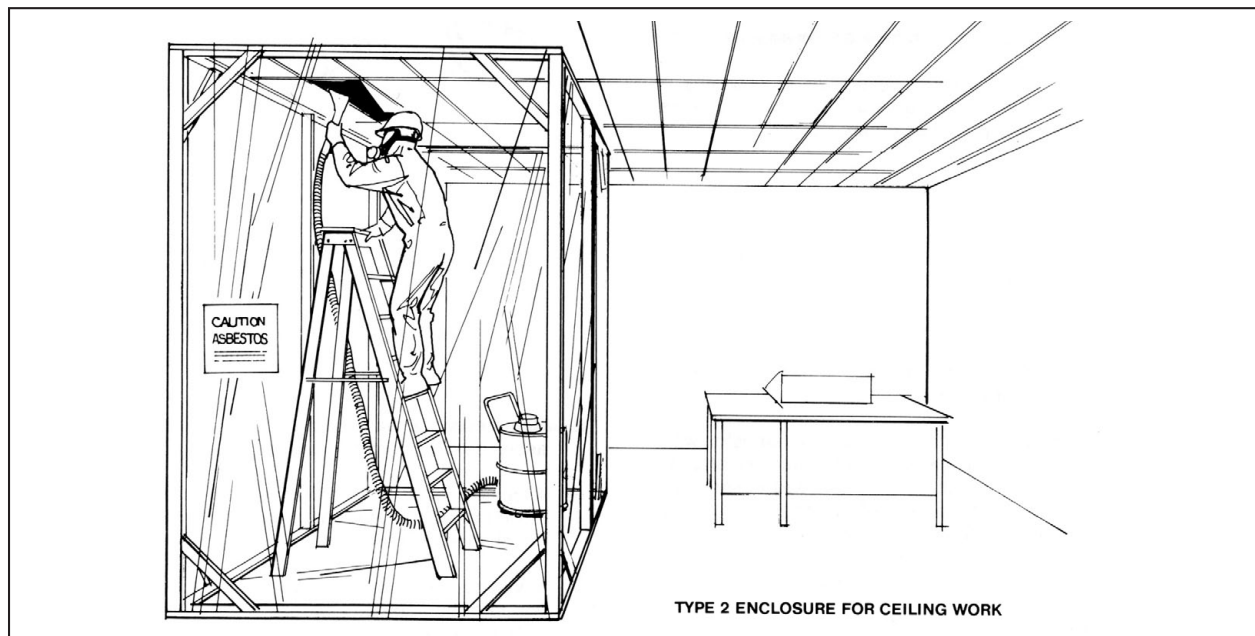


3. Only those workers wearing the required respirators and protective clothing are permitted in the work area.
4. You must never eat, drink, smoke, or chew gum in the work area.
5. Never use compressed air to remove asbestos dust from a surface.
6. You must wet asbestos-containing material before you remove it to lessen the chance of creating dust.
7. You must add a wetting agent to the water. See page 18.
8. Any dust on exposed surfaces must be cleaned by damp-wiping or HEPA-vacuuming before starting work which may disturb the dust.
9. Warning signs (see at right) are required for all Type 2 activities.

*Continued on page 24*



10. For ceiling removal (to gain access to a work area) and removal of less than 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 removed 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 Section 12.6 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.



## 11. 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 place 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.
5. You must not use a glove bag if you can't make a proper seal because of the condition of the insulation, the temperature of the surface, or the type of jacketing.
6. Check the glove bag for damage or defects.
7. Be careful not to puncture the glove bag.
8. When you've finished removing the asbestos,
  - damp-wipe and HEPA-vacuum the tools
  - wet down the inside walls of the glove bag
  - thoroughly wet the material inside the glove bag
  - wipe down the pipe (or whatever the asbestos was removed from) and seal it with a suitable encapsulant
  - evacuate air from the bag using a HEPA-vacuum and place the glove bag, with the waste inside, in a suitable dust-tight container
  - clean up the work area by damp-wiping or HEPA-vacuuming.



## 12. TYPE 3 OPERATIONS

### 12.1 What are Type 3 operations?

These operations require the most precautions because they can release substantial amounts of asbestos dust. Type 3 operations include the following:

1. Removing or disturbing more than 1 square metre of friable asbestos-containing material.
2. Spraying a sealant onto friable asbestos material.
3. Cleaning or removing air-handling equipment in buildings with sprayed asbestos fireproofing.
4. Repair, alteration, or demolition of kilns, metallurgical furnaces, and other installations with asbestos refractory materials.
5. Disturbing non-friable asbestos material in any way with power tools not equipped with dust collectors and HEPA vacuums.
6. Repair, alteration, or demolition of buildings which are or were used to manufacture asbestos products unless the asbestos was cleaned up and removed before March 16, 1986.



### 12.2 Controls for Type 3 operations

Controls for Type 3 operations include requirements for

- worker protection (section 12.3)
- site preparation (sections 12.4 and 12.5)
- removal, clean-up, and disposal of waste (section 12.6).

### 12.3 Worker protection

#### Clothing

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 exposures to asbestos.

Members of asbestos workers' families have historically developed illnesses from the dust brought home in work clothes.

Protective clothing must not readily retain asbestos dust or allow it to penetrate. It must have tight-fitting cuffs at the wrist and ankle as well as a hood or head cover (see page 22).

For Type 3 operations, we recommend one-piece disposable coveralls with hood—such as Tyvek coveralls.

On projects which last a long time or which involve hot work, workers may prefer to wear reusable protective clothing which is more comfortable than disposable clothing—but the reusable clothing must not be taken outside the work area. Any protective clothing (including rubber boots) or equipment exposed to the work area must be cleaned either by damp-wiping or HEPA-vacuuming before leaving the work area.

Protective clothing that will not be reused must be placed in a container as described in Section 12.6.

#### IT CAN GET HOT IN THERE!

The use of protective clothing can aggravate a worker's heat stress, especially in summer. Choose clothing that minimizes heat stress and discomfort.

Refer to CSAO's data sheet *Heat Stress: Guidelines for Recognition, Assessment, and Control in Construction* (DS034), available free at [www.csa.org](http://www.csa.org)

### Respirators

The primary hazard with asbestos is inhalation of airborne fibres. Workers involved in Type 3 operations will encounter airborne asbestos. For this reason, respirators are the most important control.

The type of respirator required for various operations depends on the type of asbestos and the type of operation (see respirator chart, page 41). The type of asbestos must be described in the client's report which must be given to you before the work contract is signed.

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

- fit testing and seal checking (page 42)
- 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.

When using supplied-air respirators, the air must be breathing-air quality. The supplied air must meet the requirements in the Canadian Standards Association's *Compressed Breathing Air* (CSA Z180.1-00). This standard limits the amount of carbon monoxide, oil mist, water vapour, and other contaminants permissible in such systems. Typical compressors without extensive filtering systems may not meet these requirements.

The employer must develop written procedures on the selection, use, and care of respirators. The employer must give a copy of the procedures to each worker required to wear a respirator, and review the contents with them. Only those workers who are physically able to use respirators can be assigned work that requires them.

For further information, refer to the chapter "Personal Protective Equipment" in the Construction Safety Association of Ontario's *Construction Health and Safety Manual* (M029), or the CSA standard *Selection, Use, and Care of Respirators* (CSA Z94.4-02).

### 12.4 Site preparation— indoor projects

Indoor Type 3 operations require strict controls to prevent asbestos dust from contaminating other areas.

1. The ventilation system serving the work area must be shut down and sealed off.



2. Any furnishings that can be removed should be damp-wiped or HEPA-vacuumed if dusty and taken out before other work begins. Items which cannot be moved must be cleaned and sealed with polyethylene sheeting.



3. The work area must be isolated from the rest of the location. When existing walls aren't enough you must put up temporary walls.



Any openings such as doors, windows, and pipe/conduit penetrations must also be sealed off.

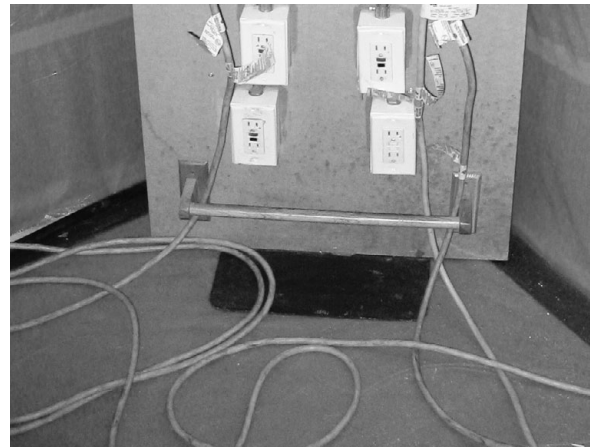


If your enclosure is opaque, it must have a transparent window to allow observation of the work.



4. Walls and floors should be lined with polyethylene sheeting to facilitate clean-up and to prevent damage. Use 4-mil polyethylene on the walls and heavier polyethylene on the floor (it must withstand foot traffic). All seams should be overlapped and taped to create a seal.

5. 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 using negative air units equipped with HEPA filters. A competent worker must measure the pressure difference between the inside and outside of the enclosure at regular intervals. A digital pressure differential/monometer will measure the differential pressure. A competent worker must inspect and maintain negative air units and HEPA filters. They must be in proper working order before you can use them. Clean replacement air must be taken from outside the enclosure. 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.
6. Warning signs must be posted outside and at every entrance to the work area (see page 23).
7. 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. Any temporary power supply for tools or equipment should have a ground fault circuit interrupter (GFCI).



**Type 3 operations require a negative pressure of 0.02 inches of water inside the enclosure relative to the area outside the enclosure, unless:**

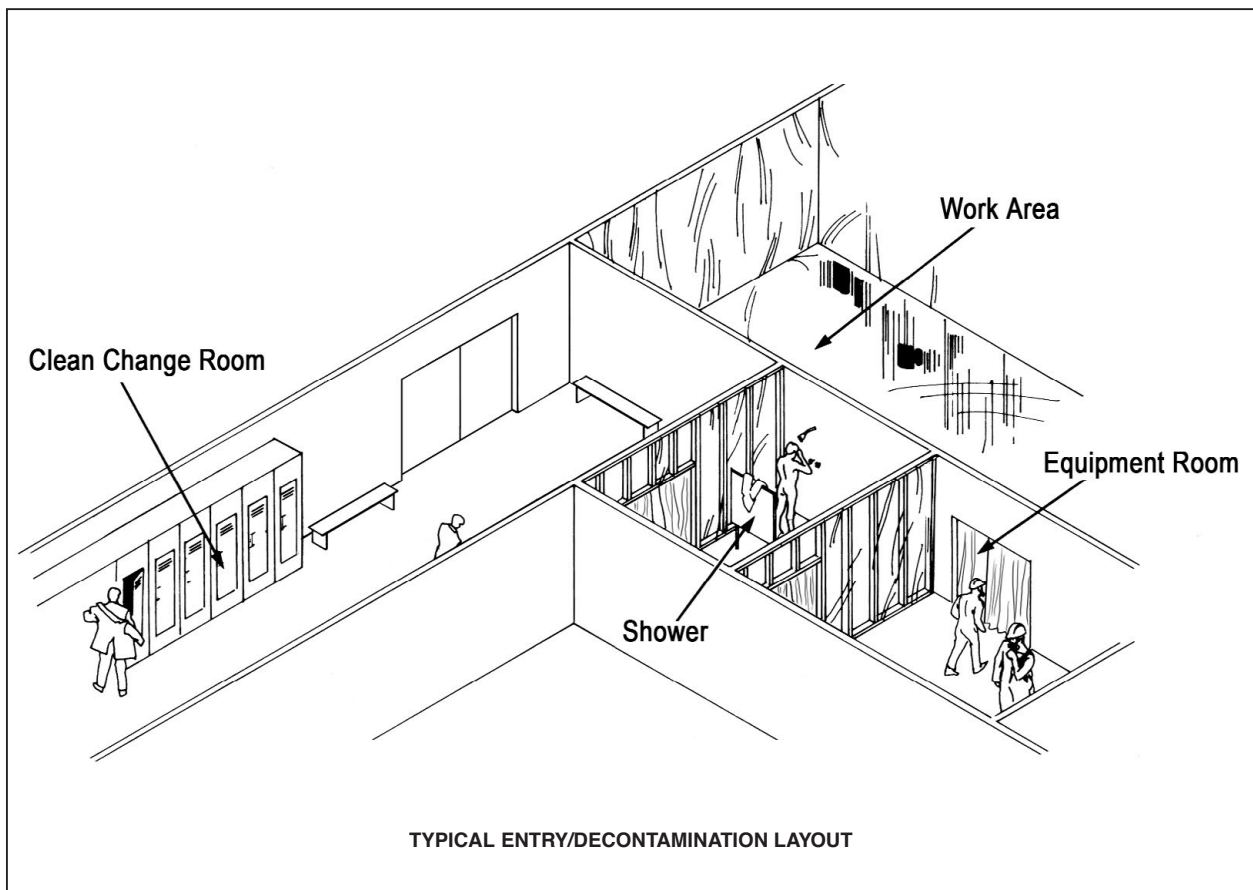
- the building will be entirely demolished following the asbestos removal work
- the asbestos removal is done outdoors.

Here's how you can verify negative air pressure inside the enclosure.

- 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.

### 12.5 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 below.





2. The doorways should be fitted with 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 enclosure, barriers, and decontamination facility at the beginning and end of each shift.

### Procedures for entry and decontamination

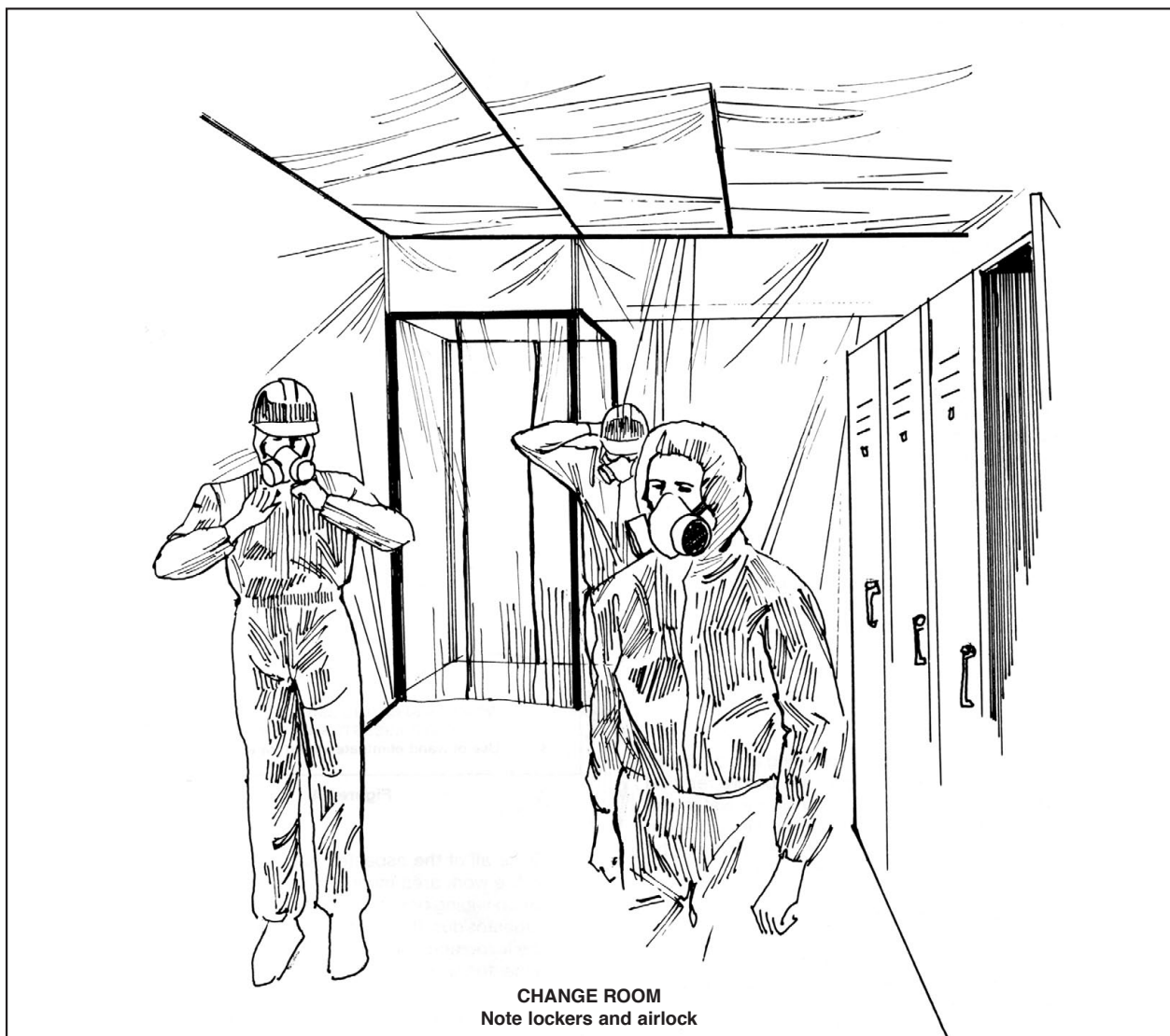
These entry and decontamination procedures must be followed every time workers enter or exit the work area.

#### Entry

1. Workers enter the clean change room and
  - remove street clothes
  - put on disposable coveralls
  - check their respirators
  - replace filters and perform other

maintenance (e.g., change power packs on powered air-purifying respirators)

- put on and fit-test respirators
  - go to the curtain 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 curtain doorway.



### Decontamination

1. Before leaving the dirty area and removing their protective clothing, workers remove any visible asbestos from their protective clothing by damp-wiping or HEPA-vacuuming.
2. They then proceed through the curtain doorway to the equipment room where they remove and discard their disposable coveralls (see Section 12.6 for disposal information) and store any tools and equipment to be reused. They continue to wear their respirators.
3. Workers enter the shower area via the curtain doorway and shower with their respirator on, rinsing off the respirator. They then remove the respirator and continue showering.

With most powered air-purifying 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 curtain doorway, and change into their street clothes.

Disposable boot covers should be provided for visitors who cannot leave their contaminated boots in the equipment room. Otherwise the person's boots should be cleaned by damp-wiping, washing, or HEPA-vacuuming.

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.

### 12.6 Removal, clean-up, and disposal

1. In buildings with sprayed-on fireproofing hidden above a false ceiling, the top side of the ceiling may be coated with a layer of asbestos dust. The dust must be damp-wiped or removed by HEPA-vacuuming before the false ceiling is taken down.
2. Wherever possible, asbestos-containing material should be wetted before removal starts. To improve penetration of the water and reduce runoff and dry patches, a wetting agent must be added to the water (see page 18). You may need to spray this amended water repeatedly to keep the asbestos damp.



3. Asbestos waste must be cleaned up frequently and regularly before it dries out. HEPA-vacuum the area, damp-mop, or wet-sweep.
4. Asbestos waste and protective clothing that will not be used 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.
5. 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 will be rigid and puncture-proof)
  - impervious to asbestos
  - properly marked that it contains asbestos waste (see label on page 35).
7. Don't place waste materials with sharp edges—such as floor, wall, or ceiling tiles—into the 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.
8. After cleaning up and removing the asbestos waste, the work area must be thoroughly washed down with water if it's possible to do so.

- dust-tight
- suitable for the type of waste (e.g., if the waste is sharp, such as floor tiles, the container will be rigid and puncture-proof)
- impervious to asbestos
- properly marked that it contains asbestos waste (see label on page 35).

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

You must always damp-wipe or HEPA-vacuum 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.

6. 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 clear polyethylene bag and seal it.



9. Any electric tools and equipment used in wet removal operations must be equipped with ground fault circuit interrupters (GFCIs) to prevent electric shock.
10. 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.

## CAUTION

**CONTAINS ASBESTOS FIBRES**


**AVOID SPILLING AND CREATING DUST**

**ASBESTOS MAY BE HARMFUL TO YOUR HEALTH**

IN CASE OF SPILL,

- wear (as a minimum) a NIOSH-approved N-100, R-100, or P-100 respirator
- wear disposable coveralls and boot coverings
- DO NOT DRY SWEEP. Wet material thoroughly, place it in a plastic bag, and seal bag
- damp-wipe or HEPA-vacuum exposed surfaces and clothing after clean-up
- wash hands and face or shower after clean-up.

IN CASE OF SPILL, CALL:


Construction Safety Association of Ontario  
1-800-781-2726 www.csaao.org

S036

*Warning label*



11. A competent person must conduct a visual inspection to ensure that the enclosure and the work area inside the enclosure are free from visible asbestos-containing material.
12. 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.

Only a competent worker can conduct clearance air testing after an acceptable visual inspection and after the work area inside the enclosure is dry.

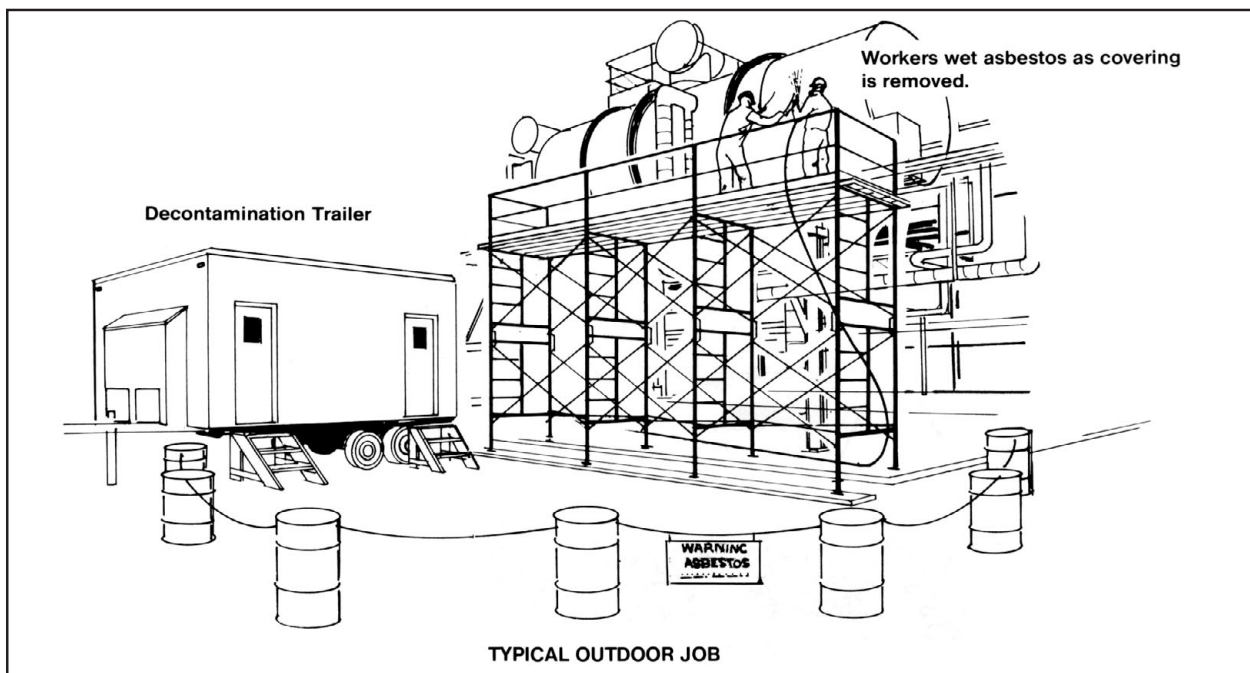
You must keep the barriers, enclosure, decontamination facility, and negative air pressure units operating until the work area inside the enclosure passes the clearance air test (less than 0.01 fibres/cubic centimetre).

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. For more information, see "Clearance Air Testing," Appendix 3, page 44.

13. 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.

14. 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.
15. 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.
16. 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.

### 12.7 Outdoor operations

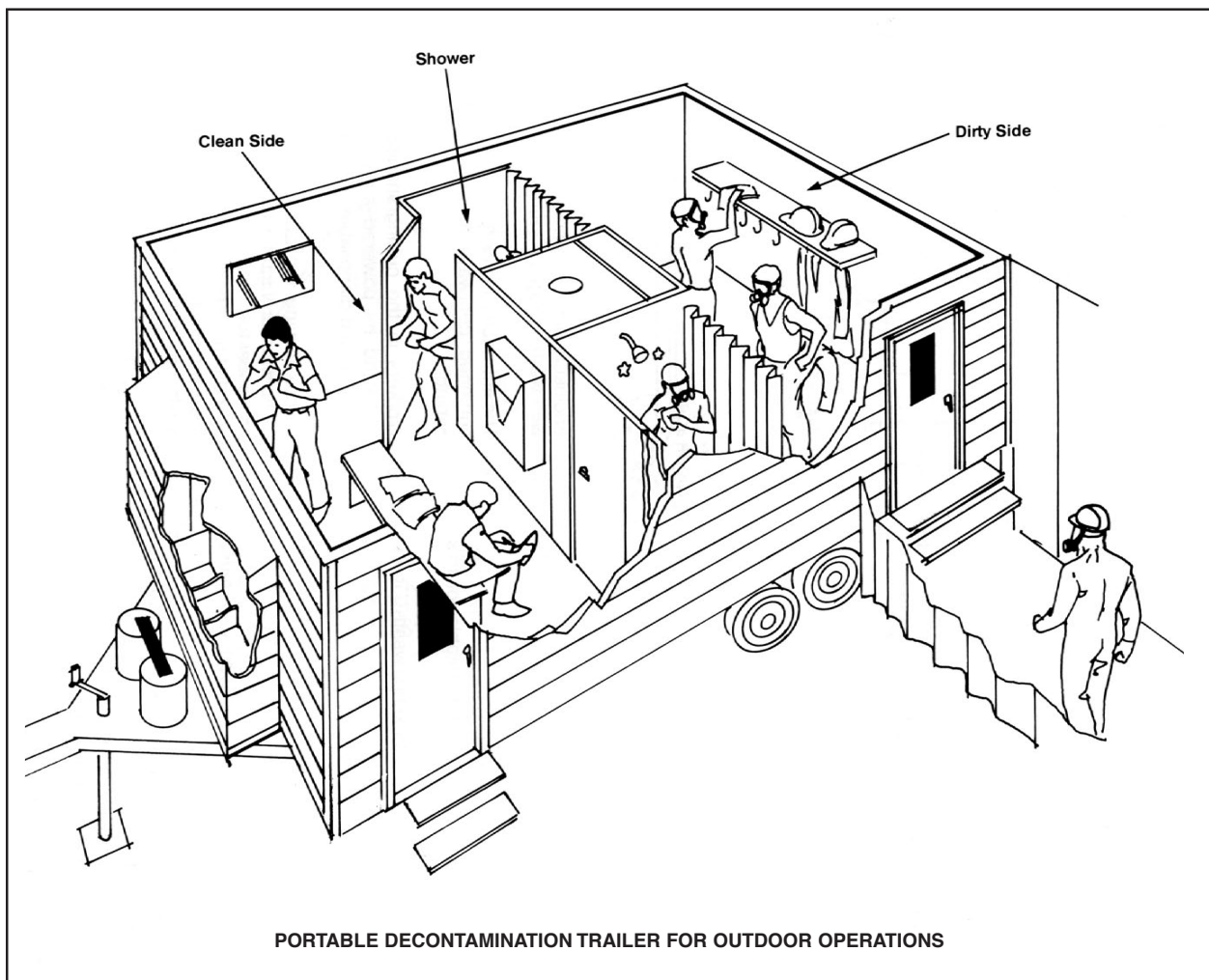
Outdoor operations can be safer than indoor operations. You can often use large quantities of water to thoroughly soak the material and reduce the amount of airborne dust. There's less risk to bystanders because of this increased wetting and the natural dispersion of asbestos dust in the air.

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 when using power tools **without** HEPA-filtered vacuums.

**Note:** This requirement is currently being reviewed. Check with the Ministry of Labour for an update.

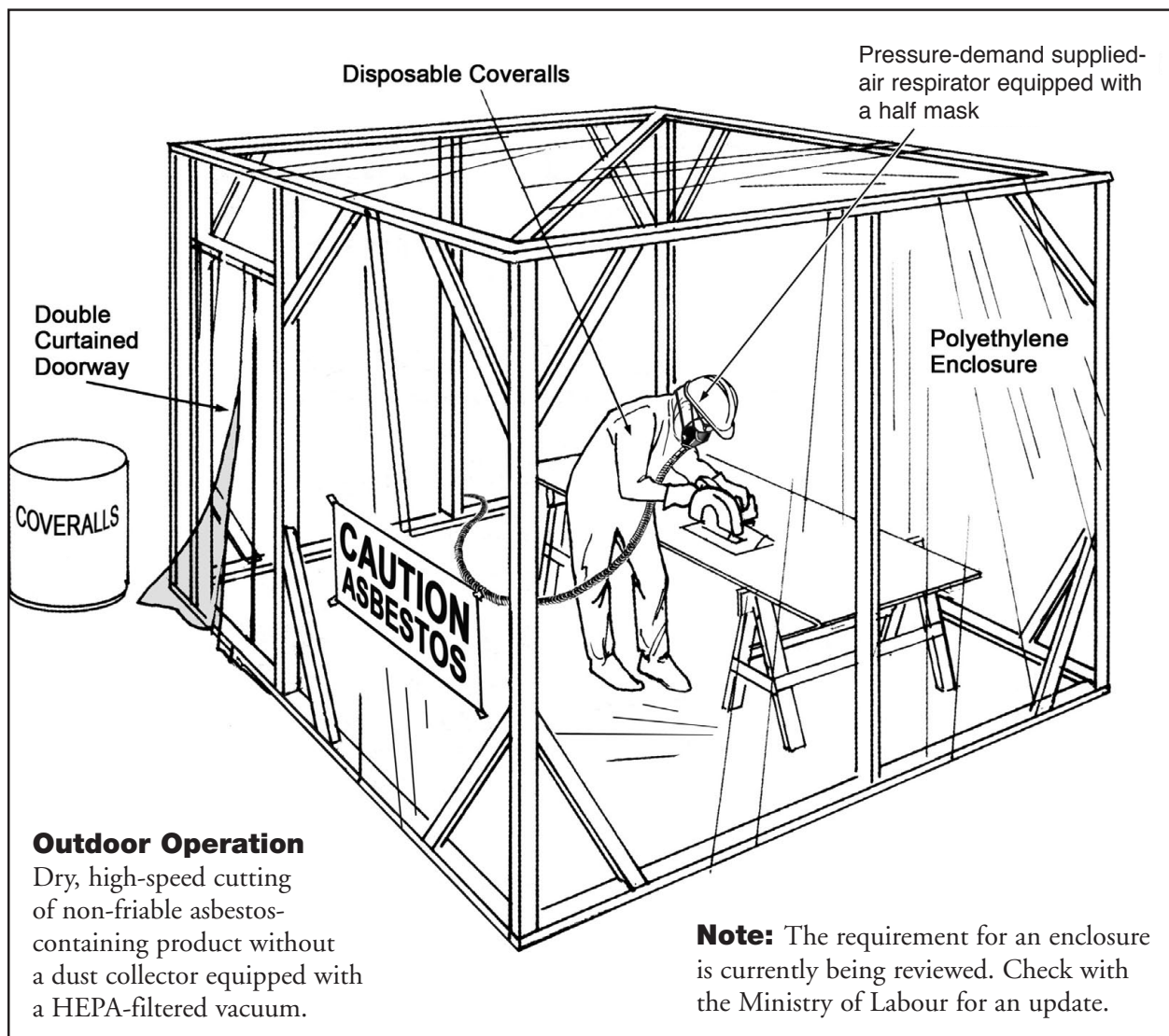
- All other Type 3 requirements apply.



For outdoor operations involving power tools **without** HEPA filters,

- A polyethylene enclosure is required.
  - Note:** This requirement is currently being reviewed. Check with the Ministry of Labour for an update.
- There is no requirement for creating a negative pressure inside the enclosure.

- No decontamination facilities are required, but wash-up facilities are required.
- No final visual inspection or clearance air testing is required after the removal operation.
- All other Type 3 requirements apply.





## 12.8 Demolition

Before any building is demolished, all asbestos-containing material that may be disturbed during the work has to be removed if possible.

Demolition involving Type 3 operations is exempt from

- creating and maintaining a negative air pressure of 0.02 inches of water within the enclosed area
- a final visual inspection and clearance air testing.

No one must enter the building that is to be demolished except for the workers involved in the demolition.

## 12.9 Disturbing non-friable asbestos with power tools not equipped with HEPA filters

Avoid disturbing (such as cutting and grinding) dry asbestos products because it generates high levels of airborne dust. If possible, use non-powered tools or power tools with HEPA-equipped dust-collecting devices. Also, use amended water to control the dust.

**To prevent electric shock, any power tools used around water must be equipped with a ground fault circuit interrupter (GFCI) and be maintained properly.**

If you use power tools without HEPA-equipped dust-collecting devices, then all Type 3 requirements for indoor projects apply, with three exceptions:

- If the work is outdoors or you're demolishing a building, you do not need to maintain a negative pressure of 0.02 inches of water inside the enclosure.

- If the work is outdoors or you're demolishing a building, you do not need to maintain a negative pressure of 0.02 inches of water inside the enclosure.
- You do not need full decontamination facilities. You must, however, decontaminate protective clothing and have facilities for workers to wash their hands and faces.
- You do not need a final visual inspection or clearance air testing.

## 13. OTHER METHODS

If you wish to use other equivalent methods than those described here, you must submit a proposal in writing to the joint health and safety committee or the health and safety representative. The equivalent method must provide protection equal to the protection provided by the method in the regulation.

## 14. ASBESTOS WORK REPORT

The employer must complete and submit to the Ministry of Labour an asbestos work report form (available from the Ministry of Labour) for each person working in a Type 2 or Type 3 operation. The employer must do this at least once a year and immediately on termination of a worker's employment.

## 15. ASBESTOS WORKERS REGISTER

The Ministry of Labour maintains an Asbestos Workers Register based on asbestos work report forms. Workers listed in the Register may be asked by the Ministry's Provincial Physician or their own physicians to voluntarily have a medical examination to determine if they are suffering from a condition resulting from asbestos exposure.

## **16. ASBESTOS WASTE MANAGEMENT**

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.

# RESPIRATOR CHART FOR ASBESTOS WORK

“ACM” means asbestos-containing material.

Description of work		Required respirator
<b>Type 1 operations</b>		
All Type 1 operations		If worker asks employer to provide a respirator: <b>A</b>
<b>Type 2 operations</b>		
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>B</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>B</b>
	Material is wetted to control fibres	<b>A</b>
All other Type 2 operations		<b>A</b>
<b>Type 3 operations</b>		
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	<b>C</b>
	Material is wetted to control fibres	<b>B</b>
<ul style="list-style-type: none"> <li>➤ 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.</li> <li>➤ Spraying sealant on friable ACM.</li> <li>➤ Cleaning or removing air-handling equipment, including rigid ducting but not including filters, in a building where sprayed fireproofing is ACM.</li> <li>➤ Repairing, altering, or demolishing all or part of a kiln, metallurgical furnace, or similar structure that is made in part of refractory ACM.</li> <li>➤ 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.</li> </ul>	Material is not wetted	<b>D</b>
	Friable ACM other than chrysotile was applied or installed by spraying, and is wetted to control fibres	<b>C</b>
	Friable chrysotile ACM was applied or installed by spraying, and is wetted to control fibres	<b>B</b>
	Friable ACM was not applied or installed by spraying, and is wetted to control fibres	<b>B</b>

## KEY TO RESPIRATOR CHART

<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>
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: <ul style="list-style-type: none"> <li>➤ Air-purifying full-facepiece respirator with N-100, R-100, or P-100 particulate filter.</li> <li>➤ Powered air-purifying respirator with a tight-fitting facepiece (either full or half facepiece) and either a high-efficiency filter or an N-100, R-100, or P-100 particulate filter.</li> <li>➤ Negative pressure (demand) supplied-air respirator with a full facepiece.</li> <li>➤ Continuous-flow supplied-air respirator with a tight-fitting facepiece (full or half facepiece).</li> </ul>	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 (see page 42).

## APPENDIX 1

### FIT-TEST AND SEAL-CHECK YOUR RESPIRATOR

#### Fit Test

Before using a respirator for the first time and each year thereafter, you must fit-test it with either qualitative or quantitative methods to ensure a proper mask-to-face seal.

**Qualitative** fit testing involves subjecting wearers to a substance they will smell, taste, or be irritated by if it bypasses the respirator seal.

**Quantitative** methods use instruments to measure if there is a good mask-to-face seal.

Fit testing procedures are outlined in the Canadian Standards Association (CSA) standard Z94.4-02 *Selection, Care and Use of Respirators*.

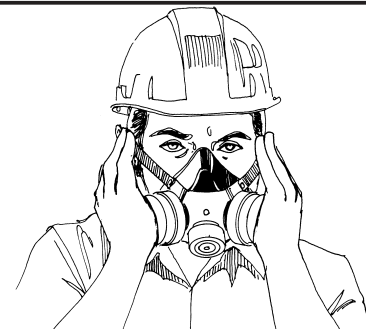
**Workers must be clean-shaven when wearing respirators. Beards, even stubble, will allow some substances to bypass the respirator and be inhaled.**

#### Seal Check

*Every time* you put a respirator on, check the seal using the negative-pressure and positive-pressure method.

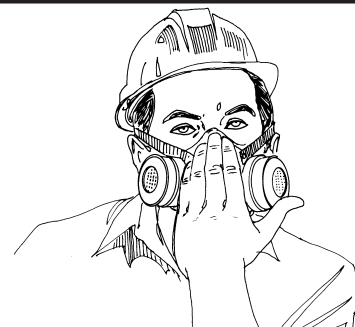
##### *Negative-Pressure Seal Check*

Put on the respirator according to the manufacturer's instructions and adjust the respirator until it feels snug but comfortable. Block the air inlets with your hands and inhale gently. If the respirator fits properly, it should collapse slightly and not allow any air into the facepiece. If you detect a leak, make adjustments and repeat the seal check until there's a good fit and there are no leaks.



##### *Positive-Pressure Seal Check*

Follow the same instructions as above except: cover the exhalation valve and exhale gently. The facepiece should puff up but not leak.



## APPENDIX 2

### 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 50 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. PPE will vary according to the hazard but may include an N100 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 when they're 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. You need specialized equipment and trained personnel to perform this test.
- 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.
- Inspect HEPA filters carefully for build-up and damage. If the filter appears to be clogged or damaged in any way, replace it with a new filter. Replace pre-filters as well.
- 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.

**As the HEPA filter becomes coated with more and more particles, the vacuum or negative air unit will lose efficiency. Change the filter.**

- 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.

## APPENDIX 3

### 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. Barriers, enclosures, and decontamination facilities must not be removed or dismantled until the work area inside the enclosure passes the clearance air test.

Only a competent worker can perform clearance sampling.

There are two methods of testing:

- 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.

Before and during sampling, use fans or blowers to disturb settled dust from all surfaces in the work area, including enclosure surfaces. Airborne dust is 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.

The clearance test passes if

- using PCM, all samples are less than 0.01 fibres per cubic centimetre in concentration
- using TEM, the average asbestos fibre concentration level inside the enclosure is statistically the same or less than the average asbestos fibre concentration outside the enclosure.

If the samples fail the clearance test by PCM, the employer has the option to re-analyze all of the PCM samples by TEM. Otherwise, decontamination, cleaning, and clearance air testing must be repeated until the enclosure passes the test.

The consequences of a failed clearance test are considerable. Project delays, additional abatement, and repeated sampling and analysis drive up the cost of a project. It's crucial that the 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.

#### WHEN IS CLEARANCE AIR TESTING NOT REQUIRED?

- 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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