WORKSAFE
Mahi Haumaru Aotearoa

Asbestos removal

Good practice guidelines for licensed and unlicensed asbestos removalists and other PCBUs

DRAFT FOR CONSULTATION
May 2025

When reviewing this draft guidance please note the following:

- This draft guidance forms part of a wider suite of asbestos-related guidance currently under development. You can find more information here: We are updating our asbestos guidance
- This draft does not necessarily present WorkSafe's final position on any matters contained within it.
- Images used in this draft are temporary placeholders. They will be replaced with NZ-based examples before final publication.
- Until otherwise announced, the existing Approved Code of Practice: Management and Removal of Asbestos (ACOP) will remain the primary point of reference for enforceable good practice in asbestos management and removal. The Regulations that underpin the ACOP and the redeveloped guidance documents remain unchanged.
- Please use a submission feedback form provided on WorkSafe's Consultation webpage to provide your feedback.

Submissions close Wednesday 21 May 2025

Completed submission forms can be sent to:

guidanceandeducationdevelopment@worksafe.govt.nz

Key points

- Buildings built before 1 January 2000 are likely to contain asbestos-containing materials (ACMs). For buildings built after 1 January 2000, the risk of asbestos material being present is lower.

- The removal of asbestos is covered by the Health and Safety at Work (Asbestos) Regulations 2016, the Health and Safety at Work (General Risk and Workplace Management) Regulations 2016, and the Health and Safety at Work Act 2015.

- There are different classes of asbestos removal. Each class has different regulatory requirements depending on how much asbestos material is being removed and the type of asbestos material being removed.

- Businesses involved in the removal of asbestos must ensure the health and safety of their workers and any other people that could be put at risk by the work that they do.

Note to readers

Use of 'must' and 'should'

The words 'must' and 'should' indicate whether:

- an action is required by law, or
- is a recommended practice or approach.

Term	Meaning
Must	Legal requirement that must be complied with
Should	Recommended practice or approach. Alternative approaches may be adopted, if those provide for equivalent or greater levels of safety.

Key terms

A list of technical words, terms, and abbreviations used in these guidelines can be found in the glossary at the end of these guidelines. The glossary explains the meaning of each technical word, term, or abbreviation.

Lists

Lists of examples used in these guidelines are not complete lists. They may list some examples, but not all possible examples.

Images

Images used in these guidelines are a guide only. Images are not intended to provide technical specifications.

Contents

1.0 About these guidelines

Asbestos can harm people's health if it is not removed safely. These guidelines help asbestos removalists to manage risks related to asbestos removal and comply with relevant regulations.

1.1 What are these guidelines about?

These guidelines provide good practice advice for the safe removal of asbestos from buildings and workplaces.

These guidelines will help PCBUs that conduct asbestos removal (called removalists in these guidelines) to comply with:

- the Health and Safety at Work Act 2015 (HSWA)
- the Health and Safety at Work (Asbestos) Regulations 2016
- the Health and Safety at Work (General Risk and Workplace Management) Regulations 2016

These guidelines do not cover surveying contaminated land. For more information, see New Zealand Guidelines for Assessing and Managing Asbestos in Soil.

1.2 Who should read these guidelines?

These guidelines are for any PCBUs that carry out asbestos removal. There are two main types of asbestos removalists:

- licensed asbestos removalists:
    - those licensed to remove Class A types of asbestos
    - those licensed to remove Class B types of asbestos.
- unlicensed asbestos removalists
    - those who remove restricted quantities of non-friable asbestos as part of other work they do (for example, some tradespeople).

For details on who can remove different types and quantities of asbestos, see Section 2.0: Unlicensed asbestos removal and Section 3.0: Licensed asbestos removal

These guidelines may also help PCBUs working in other parts of the asbestos management contracting chain including:

- PCBUs that own, lease, or manage a building that has or could have asbestos in it
- PCBUs that do asbestos surveys

- PCBUs that do asbestos assessments
- building surveyors.

These guidelines are not intended for people that are not a PCBU (such as homeowners and residential tenants).

1.3 Where to find other information about asbestos and asbestos management

This guide focuses specifically on good practice for removing asbestos from buildings and workplaces. There is guidance available for other aspects of the management of asbestos.

This guide should be read in conjunction with this guidance:

- Asbestos in New Zealand – information about what asbestos is, the risks of asbestos and why it should be managed
- Managing asbestos in your building or workplace – guidelines for PCBUs about how to manage asbestos in their building or workplace (including when to engage an asbestos surveyor to assist with this)
- Protective clothing and equipment for working with or near asbestos - guidance for PCBUs that carry out any work where there is a risk of exposure to asbestos fibres
- Conducting asbestos surveys [placeholder] – good practice guidelines for asbestos surveyors
- Asbestos assessments [placeholder] – good practice guidelines for asbestos assessors
- Asbestos in the home – information for homeowners about how to manage asbestos in their home, and how to engage asbestos professionals for the safe management and removal of asbestos.

1.4 The Health and Safety at Work Act 2015 (HSWA)

HSWA is the primary work health and safety legislation in New Zealand. HSWA applies to all work and workplaces unless specifically excluded.

Primary duty of care

All PCBUs (including removalists) have a primary duty of care under HSWA. The primary duty of care means that, PCBUs must make sure, so far as is reasonably practicable, the health and safety of:

- any workers that are influenced by their business (for example, their own workers, workers of other PCBUs, contractors, subcontractors, and apprentices)
- other people that could be put at risk by their work (for example, tenants, visitors, customers, and passers-by).

For removalists, this duty inlcudes any risks a worksite may create while they have control over it for asbestos removal (from the start to the end of the removal process, not just while removal is actively being removed).

More information about the primary duty of care (and other duties under HSWA) is available on the WorkSafe website: Introduction to the Health and Safety at Work Act 2015 – special guide

Overlapping duties

When working with other asbestos professionals in a contracting chain (such as with building owners, surveyors and assessors) removalists are likely to have overlapping duties. Sometimes, multiple PCBUs share the same health and safety duties for an activity. This is called overlapping duties.

Under HSWA, where there are overlapping duties, all PCBUs involved must, so far as is reasonably practicable:

- consult each other
- cooperate with each other
- coordinate their activities.

This is to make sure that all workers across all the PCBUs, (and other people) are not put at risk before, during, and after the asbestos removal process.

For more information about managing overlapping duties, see WorkSafe's webpage: Overlapping duties

More information about managing risk in a contracting chain, see WorkSafe's webpage: PCBUs working together: advice when contracting

1.5 The Health and Safety at Work (Asbestos) Regulations 2016

The Health and Safety at Work (Asbestos) Regulations 2016 specifies how to manage asbestos risks. Complying with regulations made under HSWA is mandatory.

Removalists have specific duties under the Asbestos Regulations. They cover (for example) requirements for:

- licensing requirements for removalists

- training and supervision
- asbestos removal control plans (ARCPs)
- notifying WorkSafe and others about removal work
- signage
- controlling access to removal areas
- decontamination
- disposal of asbestos waste and used personal protective equipment (PPE)
- clearance inspections and certificates
- air monitoring.

For a detailed explanation of the asbestos regulations, see [placeholder for Asbestos interpretive guidelines]

1.6 Health and Safety at Work (General Risk and Workplace Management) Regulations 2016 (The GRWM Regulations)

The General Risk and Workplace Management Regulations covers general requirements for all workplaces and some more specific requirements for high-risk work which includes asbestos removal. They cover (for example) requirements for:

- managing risks associated with substances hazardous to health
- PPE
- training
- exposure monitoring
- health monitoring.

For a detailed explanation of the GRWM Regulations, see:

- General risk and workplace management - part 1
- General risk and workplace management - part 2
- [Placeholder for Asbestos interpretive guidelines]

2.0 Unlicensed asbestos removal

Unlicensed asbestos removal can still expose people to harmful asbestos fibres. It is important to manage the risks effectively and follow good practice.

2.1 What is unlicensed asbestos removal?

Unlicensed asbestos removal involves the removal of up to 10m² of non-friable asbestos. Unlicensed asbestos removal can be carried out by an asbestos removalist or another tradesperson (such as plumbers, electricians, or roofers).

For asbestos removal to be unlicensed, **all** the following apply:

- only non-friable asbestos or asbestos-contaminated dust may be removed (up to 10m²)
- the 10m² restriction applies cumulatively to the whole asbestos removal project for the site.

Important: These requirements cannot be avoided by dividing a large site into sectors of 10m² or less and removing asbestos from each sector.

If it is unclear whether the area of asbestos material to be removed is over or under 10m², the area should be carefully measured.

Unlicensed asbestos removal must still follow all applicable requirements of the Asbestos Regulations and HSWA, and removal must be done in accordance with good practices for safe removal of non-friable asbestos.

Friable and non-friable asbestos

Asbestos can be classified into two categories based on its condition:

- **Friable asbestos** is flaky or powdery. It can be crumbled or reduced to a powder without much pressure. Friable asbestos can easily release fibres into the air. Friable asbestos is often called Class A asbestos.
- **Non-friable asbestos** usually has asbestos fibres bonded into another material such as cement. Non-friable asbestos is less likely to release asbestos fibres into the air unless it is disturbed or has started to deteriorate. Non-friable asbestos is often called Class B asbestos.

For more information about asbestos types, see WorkSafe's webpages:

- Asbestos in Aotearoa New Zealand | WorkSafe
- Asbestos in the home | WorkSafe

Removal of more than 10m² of asbestos material must be carried out by a licensed asbestos removalist.

This table shows examples of unlicensed asbestos removal work.

Example	Licence class required
Removing a single non-friable asbestos cement sheet (area 2m^2) to install an air conditioner	Licence is not required because the area of ACM is 10m^2 or less and is non-friable
Self-employed person has been engaged to remove a non-friable asbestos cement eave (1.6m^2 in total) to provide access for pipes	Licence is not required because the area of ACM is 10m^2 or less

Table 1: Examples of unlicensed asbestos removal work

2.2 Measuring non-flat surfaces

Many objects containing asbestos are not flat. For these objects, it is acceptable to calculate the overall dimensions of the object's surface. It is acceptable to ignore surface texture and holes when measuring asbestos.

How to apply the 10m² rule to curved or uneven surfaces (such as asbestos piping)

Measure the external surface area of the pipe. This can be worked out by multiplying the outside circumference of the pipe by its length. This equals the surface area in square metres.

Calculate the external surface area of a pipe using this equation:

$$\frac{10(m^2)}{\pi \times \text{diameter (m)}} = \text{Max length (m)}$$

No licence required

Example 1: For a 100mm (0.1m) pipe, 10m in length

3.14 x 0.1m x 10m	= 3.14m^2	No licence required

Example 2: For a 250mm (0.25m) pipe, 15m in length

3.14 x 0.25m x 15m	= 11.77m^2	Licence required

Example 3: Maximum length of 100mm (0.1m) pipe that can be removed without a licence

10 (m^2)	= 31.84m^2	Licence required
3.14 x 0.1 (m)		

Example 4: Maximum length of 250mm (0.25m) pipe that can be removed without a licence

10 (m^2)	= 12.73m^2	Licence required
3.14 x 0.25 (m)		

2.3 Removal of asbestos-containing dust or debris (ACD)

ACD must be removed by a Class-A asbestos removalist unless it is either:

- associated with and generated by Class B asbestos removal work, excluding ACD that was present before the work started, or
- a 'minor contamination' not associated with friable or non-friable asbestos removal.

What is minor contamination?

There is no legal definition of minor contamination. To determine whether a contamination of ACD is a minor contamination, the asbestos removalist or competent person will need to carry out a risk assessment.

Relevant considerations include:

- the time it would take for a person to carry out the clean-up job
- the size, area and extent of the contamination
- the number of workers and persons who will be or are likely to be involved in or exposed to the work
- the complexity of the work being undertaken
- the knowledge and skills required to complete the work safely
- the risks associated with the work and the complexity of the risk control measures.

The amount of ACD cannot exceed what would, in other circumstances, be associated with safely removing 10m^2 or less of non-friable asbestos.

Example 1: Removing a minor ACD contamination from a small area, such as an electrical box

Time	10 minutes for one worker
Area	Small
Distribution	No further spread of ACD to adjoining areas
Exposure	Possible release of asbestos fibres during clean-up is minimal, contamination can be removed with a vacuum cleaner used for asbestos work
Class A licensed removalist not required	

Example 2: Minor contamination from drilling into a wall/ceiling with ACM

Time	10 minutes for one worker

Area	Small
Distribution	No further spread of ACD to adjoining areas
Exposure	Possible release of asbestos fibres during clean-up is minimal, contamination easy to remove with wet wiping
Class A licensed removalist not required	

Example 3: Minor ACD contaminated generated by storm damage to a structure containing ACM

Time	One hour for one worker
Area	Medium
Distribution	Minimal spread of ACD to adjoining areas
Exposure	Possible release of asbestos fibres during the clean-up is minimal; contamination easy to remove with wetting down and picking up bonded pieces
Class A licensed removalist not required	

Example 4: A warehouse has surfaces covered in ACD. The ACD has come from the asbestos cement roof which has since been enclosed with a false ceiling

Time	Clean-up will take four hours for one person
Area	Medium to large area
Distribution	ACD on a number of different surfaces in adjoining areas
Exposure	Possible release of asbestos fibres is high
Class A licensed removalist required	

Example 5: A house roof has been cleaned illegally using high-pressure water, leaving dried ACD spread over a large area

Time	Clean-up will take two days for one person
Area	Medium to large area
Distribution	ACD on a number of different surfaces in adjoining areas
Exposure	Possible release of asbestos fibres during the clean-up is high
Class A licensed removalist required	

Organising a clean-up of a 'minor contamination'

Step 1	Isolate the area and determine whether asbestos is present—the workplace PCBU may need to assume asbestos is present. Check asbestos records (if any) for the workplace.
Step 2	Determine whether the contamination is minor. A risk assessment is required for this. If unsure, hire a competent person to do the risk assessment or a licensed asbestos removalist for the clean-up job
If the ACD contamination is minor:	
Step 3	Organise the clean-up. This should include: - collecting all cleaning items, for example: disposable cleaning rags, a bucket of water, 200 µm plastic sheeting, waste disposal bags, spare PPE, warning signs and a vacuum cleaner used for asbestos work if required - establishing the removal area and moving all items out of the area, or covering them with 200 µm plastic sheeting if they could be contaminated during the clean-up - organising suitable PPE, and - organising RPE: suitable the respiratory protection for this task is P2 RPE if a proper fit can be assured.

Step 4	Clean up the minor contamination: - pick up any asbestos debris; use a vacuum cleaner used for asbestos work to collect the ACD and use damp cloths to wet wipe surfaces - place the waste into a 200 µm plastic waste bag or suitable alternate waste container dedicated for asbestos waste that is clearly labelled to indicate the presence of asbestos, and - after all the debris and contaminated dust, used rags and waste have been placed in waste containers and all tools have been cleaned, begin the personal decontamination process.
Step 5	Carry out personal decontamination in a designated area. The method of personal decontamination may vary. For example: - clean the PPE and RPE while it is still worn. Coveralls can be cleaned using a vacuum cleaner used for asbestos work, damp rag or fine water spray; the RPE can be cleaned with a wet rag or cloth - while the RPE is still being worn, remove coveralls, turning them inside out to entrap any remaining contamination and then place them into an asbestos waste bag. Remove the RPE and place it into an asbestos waste bag (if disposable) or waste container dedicated for asbestos waste.
Step 6	Visually inspect the area to make sure that all the ACD and debris is removed.
Step 7	Dispose of the waste lawfully: - make sure all waste bags are goose-neck tied, the exterior cleaned then double-bagged; all waste containers must be sealed and labelled - transport and dispose of the waste in accordance with local or territorial authority requirements.

3.0 Licensed asbestos removal

Licensed asbestos removal involves higher-risk work that must be carried out by appropriately trained and authorised removalists.

3.1 What is licensed asbestos removal?

Licensed asbestos removal is the controlled and regulated activity of removing asbestos-containing material (ACM) from buildings or workplaces. Specific licences are required based on the type and amount of asbestos being removed.

3.2 Classes of asbestos removal licences

There are two types of licences available for conducting licensed asbestos removal.

Class A asbestos removal licences

A **Class A** asbestos removal licence permits the removal of any type or amount of asbestos and ACD.

A **Class A** asbestos removal licence is required for the removal of ACD unless the ACD is:

- associated with and generated during Class B asbestos removal work, excluding ACD that was present before the work started
- a 'minor contamination' not associated with friable or non-friable asbestos removal.

Class B asbestos removal licences

A **Class B** asbestos removal licence permits the removal of:

- any amount of non-friable asbestos
- ACD associated with and generated during the removal of non-friable asbestos or ACM, excluding ACD that was present before the work started.

This table shows the licence required depending on the type and quantity of asbestos material being removed.

Type of licence	What asbestos can be removed?
Class A	Any type or quantity of asbestos material, including:

Type of licence	What asbestos can be removed?
	- Any amount of friable asbestos material. - Any amount of ACD. - Any amount of non-friable asbestos material.
Class B	- Any amount of non-friable asbestos material. - ACD associated with and generated during the removal of non-friable asbestos or ACM. - This excludes ACD that was present before the work started.
No licence required	- Up to and including 10m² of non-friable asbestos material, cumulatively over the whole course of the removal project for the site. - Asbestos-contaminated dust associated with and generated during removal of 10m² or less of non-friable asbestos material. - This excludes ACD that was present before the work started.

Table 2: Licensed and unlicensed asbestos removal

Examples include:

Class-B licensed asbestos removalist contracted by a building owner PCBU to remove 12m² of non-friable asbestos cement sheets from a factory toilet block.

Class-A licensed asbestos removalist contracted by a building owner PCBU to remove 0.5m² of friable asbestos lagging from a pipe.

3.3 Who can hold an asbestos removal licence?

Only PCBUs can apply for and hold a Class A or Class B asbestos removal licence. WorkSafe administers Class A and B asbestos removal licences.

For more information about asbestos licensing, see WorkSafe's webpage: Asbestos licensing

3.4 Asbestos removal licence register

WorkSafe keeps a register of every currently licensed, cancelled and expired asbestos removalist. The register includes:

- the licence holder name
- licence status
- licence number
- licence class
- licence expiry date
- nominated supervisor name(s).

For more information, see WorkSafe's website: Asbestos licence holder registers

4.0 Training and instruction

Asbestos removal workers must be properly trained and qualified to do the job safely. Provide clear instructions and make sure they are competent before any removal work begins.

PCBUs must make sure that workers engaged in asbestos removal work or carrying out asbestos-related work, are trained in the identification and safe handling of, and suitable control measures for, asbestos and ACM.

WorkSafe strongly recommends refresher training for all people working with asbestos.

4.1 Qualifications for asbestos removal workers

Licensed asbestos removalists must make sure all their workers have the correct/relevant certificate for the class of licensed asbestos removal work to be done.

This table shows required certificates for licensed asbestos removal workers.

Class of licensed asbestos removal	What certificate is required?
Class A	Unit Standard 29766: For undertaking Class A work
Class B	Unit Standard 29765: For undertaking Class B work

Table 3: Required certificates for licensed asbestos removal workers

Workers who do less than a combined four weeks of Class B asbestos removal work a year (12-month period) do not have to meet the requirements in Table 3. The four weeks counts across all jobs and removalists they may work for in that year.

A worker with the Unit Standard for Class A removal cannot undertake Class B removal work unless they also hold the Class B unit standard.

4.2 Instructing asbestos removal workers

The licensed asbestos removalist must give appropriate instructions to workers carrying out licensed asbestos removal work. The instructions must be specific for the:

- location and type of workplace where the work is done
- the work to be carried out.

Get this information from the asbestos removal control plan (ARCP) for the site. For more information, see Section 6.0: Asbestos removal control plan (ARCP)

Before the start of each asbestos removal job, instruct workers on:

- the nature of the hazards and risks of asbestos
- how asbestos can affect a person's health
- the risks from exposure to airborne asbestos
- the control measures in place and maintenance of the ARCP for that job
- the methods and equipment to use for the job
- choosing, using, and caring for PPE and respiratory protective equipment (RPE)
- decontamination procedures
- waste disposal procedures
- emergency procedures
- the importance of health monitoring
- any other requirements from other laws, if applicable.

4.3 Training records for asbestos removal workers

A licensed asbestos removalist must keep a training record for each worker who does licensed asbestos removal work for them. These records must be:

- kept while each worker is carrying out licensed asbestos removal work
- retained for five years after the worker has stopped carrying out licensed asbestos removal work for the removalist
- readily accessible at the asbestos removal area and available for inspection by a health and safety inspector.

Note: Records can be kept in hardcopy versions or electronically.

5.0 Supervising licensed asbestos removal work

Class A and Class B licensed asbestos removal work must be supervised by a nominated supervisor.

Licensed asbestos removal work must be supervised by a supervisor nominated on the licence of the removalist undertaking the work. The supervisor must be nominated under a licence that covers the type of asbestos work being done.

For information on applying for a licence, see WorkSafe's webpage: Apply for an asbestos removal or assessor licence:

- Nominate a supervisor for licensed asbestos removal work
- Qualifications to supervise licensed asbestos removal work
- Experience to supervise licensed asbestos removal work.

5.1 Class A asbestos removal supervision

For asbestos removal work that requires a Class A licence, the nominated supervisor must be present at the asbestos removal area whenever the work is carried out.

5.2 Class B asbestos removal supervision

If the asbestos removal work requires a Class B licence, the nominated supervisor must be in the vicinity and readily available. The work must still be supervised effectively.

It is important to consider these factors when deciding whether to be there:

- the workers competence and experience
- the work being carried out and the risks involved, what might go wrong, and the ability of the workers to immediately recognise and remedy this
- how the supervisor can be contacted and be readily available to return to the removal area.

This table shows more examples of factors to consider when deciding whether to be on-site.

Factor	What to consider
Worker competence and experience	Assess the skill level and experience of the workers performing the removal work. More experienced workers may require less direct supervision.
Nature of the work and risks involved	Evaluate the specific tasks and associated risks. Higher risk activities are more likely to require the supervisor to be present to make sure asbestos removal is carried out safely.
Potential issues and response	Consider potential problems that could arise during the removal process and the workers' ability to recognise and address these issues promptly.
Communication and availability	Make sure the supervisor is easily contactable and can return to the site quickly if needed.

Table 4: Examples of considerations for supervising Class B asbestos removal work

Example 1: Class B supervision

The supervisor is supervising workers that are competent, reliable and experienced in the type of removal being carried out. The supervisor decides that they need to check on the workers periodically during the day, but otherwise they will be working in a different part of the building. The workers are instructed to contact the supervisor by phone immediately if anything unexpected occurs, or if removal is not going according to plan. In these cases, the supervisor will return to the removal area.

Example 2: Class B supervision

The supervisor is supervising workers that are still training and are inexperienced. In this case, direct supervision is always needed.

What does 'in the vicinity' and 'readily available' mean?

In the vicinity means in the general area nearby, in person. The exact meaning depends on the situation and must be considered with the definition of **readily available**.

A supervisor is not 'in the vicinity' if they are:

- only available remotely
- not able to reach the workplace in a reasonable period.

Readily available means able to be reached quickly and easily. The exact meaning will depend on the situation and must be considered alongside the definition of **in the vicinity**.

A supervisor is not 'readily available' if they:

- can only be reached through a one-way channel (like a text message or email)
- cannot easily access the site due to obstacles
- cannot be reliably reached due to issues with their method of contact/travel. For example, commuting across a busy urban centre during rush-hour traffic.

When considering *in the vicinity* and *readily available*, it is important to factor in scale and complexity of the removal. For example, asbestos cement cladding on a garage which is relatively simple to remove versus multiple non-friable ACMs across a school refurbishment project, with vulnerable people present.

When workers are recently trained, the licence holder may wish to ensure the supervisor is always on site to oversee proportionately more of the workers' activities.

Example 1

If an incident occurred on a Class B licensed asbestos removal site (such as a cut needing minor first aid or the breakdown of a piece of equipment with competent removalist workers), the nominated supervisor is contactable by phone and able to arrive in person at the workplace within 30 minutes of being notified, WorkSafe would likely regard them as *in the vicinity* ***and*** *readily available*.

Example 2

If the same incident occurred with recently trained removalist workers, and the nominated supervisor is away from site, contactable by phone and able to return to the site within 15 minutes of being notified that support is needed, WorkSafe would likely regard them as *in the vicinity* ***and*** *readily available*.

Example 3

If there are two licensed class B jobs happening at the same time but they are 30 minutes apart in light traffic, and both are supervised by the same person, managing a minor issue at one site might be tricky due to the distance. If a serious problem happens at the other site during busy traffic, it will take the supervisor longer to get there. In such a case, WorkSafe would likely regard the supervisor not to be '*in the vicinity and readily available'* to manage the problem.

6.0 Asbestos removal control plan (ARCP)

Use an ARCP to manage risks and protect workers and the public when removing asbestos.

6.1 What is an ARCP?

An ARCP is a document that identifies the specific control measures that will be used to make sure that workers and other people are not put at risk during the asbestos removal process.

An ARCP can help to plan an asbestos removal job effectively and make sure that asbestos material is removed safely.

Include the following details in asbestos removal control plans:

- how the removal will be done, including the method, tools, equipment, and personal protective equipment to use
- from an asbestos demolition/refurbishment survey - the asbestos to be removed, its location, type, and condition
- a description of the asbestos removal area and any air monitoring points
- how the asbestos waste will be transported and disposed of.

While ARCPs are only required for licensed asbestos removal work, they can also be useful for planning unlicensed asbestos removal work. The structure of the ARCP can be generic, but each plan must address the specific requirements of each job.

A template ARCP is provided in Appendix 1.

6.2 Who is responsible for preparing an ARCP?

A licensed asbestos removalist must prepare an asbestos removal control plan (ARCP) for any licensed asbestos removal work they are commissioned to do.

It is important the removalist prepares the ARCP before the removal work starts. When preparing it, the removalist is responsible for consulting with:

- the PCBU that commissioned the work
- any PCBUs that manage or control workplaces that may be affected by the asbestos removal work
- workers and their representatives
- the assessor that will be doing air monitoring and site clearance.

If the licensed asbestos removal work is being carried out at a home, the removalist should also consult with the person who commissioned the removal work and the owner or occupier of the home (if different).

6.3 Who needs access to the ARCP?

Once the ARCP is prepared, the removalist must provide a copy of it to the person who commissioned the licensed asbestos removal work.

A copy of the ARCP must be kept for two years after the work is completed. If there is an incident that needs to be notified to WorkSafe, the ARCP must be kept for five years.

The ARCP must be readily accessible on site for the duration of the removal work and available for the following to read:

- any PCBU at the workplace
- workers and their representatives
- the occupants of the home
- a WorkSafe as the regulator (under HSWA).

6.4 Notifying WorkSafe about licensed asbestos removal work

The licensed asbestos removalist must notify WorkSafe in writing at least five days before the licensed asbestos removal work starts.

This information must be included in the notification.

Item	Description
1	The name, licence number, and business contact details of the licensed asbestos removalist
2	The name and business contact details of the supervisor of the licensed asbestos removal work
3	The name of the competent person or licensed asbestos assessor engaged to carry out a clearance inspection and issue a clearance certificate for the work
4	The name and contact details of the person for whom the work is to be carried out
5	The name (including registered business or company name) of the PCBU with management or control of the workplace where the asbestos is to be removed, including its address and the kind of workplace

Item	Description
6	If the workplace is large, the specific location of the asbestos removal
7	The date of the notice
8	The date on which the asbestos removal work is to start and the estimated duration of the work
9	Whether the asbestos to be removed is friable or non-friable
10	If the asbestos to be removed is friable, how the area of removal will be enclosed
11	The estimated quantity of asbestos to be removed and the means of transport and disposal of the asbestos waste
12	The number of workers who are to carry out the asbestos removal work
13	A summary of the training for each worker carrying out the asbestos removal work

Table 5: WorkSafe notification details for licensed asbestos removal work

The *Notification of Licensed Asbestos Removal form* is available from WorkSafe's website: https://services.worksafe.govt.nz/notifications/triage/

Send any updates/changes to the notification to asbestos@worksafe.govt.nz as soon as they arise.

6.5 Limited circumstances where removal work may start immediately

Removal work may start immediately in either of these limited circumstances:

- a sudden, unexpected event (such as equipment failure) that may expose people to respirable asbestos fibres, or creates a risk of exposure (such as a burst pipe lagged with asbestos)
- an unexpected breakdown of an essential service (such as gas, water, sewage, or telecommunications services) that needs urgent repair to keep the service running.

If this happens, the licensed asbestos removalist:

1. Must immediately notify WorkSafe by telephone and in writing within 24 hours after the verbal notice was provided.
2. Immediately notify WorkSafe at the email address: asbestos@worksafe.govt.nz

7.0 Indicate the asbestos removal area

Warning signs and barriers are essential to clearly identify the asbestos removal area and protect people from exposure.

The area where asbestos removal is being carried out should be clearly indicated. Use clear signage and appropriate barriers to prevent unauthorised access.

Precautions should be taken to make sure the removal area is secure. Responsibilities for the security and safety of the asbestos removal site should be specified in the ARCP.

The asbestos removalist should consider not only the hazards associated with asbestos removal, but also the hazards related to the work and work environment.

7.1 Using warning signs

Warning signs can be used to indicate that asbestos removal work is taking place. They can effectively alert workers, visitors, and the public to the presence of asbestos and the associated risks.

When placing warning signs to indicate the asbestos removal area, think about:

- **Placement:** Place warning signs at all main entry points to the asbestos removal area where asbestos is present.
- **Visibility:** Make sure that signs are weatherproof and securely positioned in prominent locations, so they are easy to see.
- **Compliance with standards:** Signs should comply with NZS/AS 1319 Safety signs for the occupational environment, covering aspects such as size, illumination, location, and maintenance.
- **Regulations:** Any signs used must comply with any applicable safe work instrument.

7.2 Installing access barriers

Barriers are used to physically isolate the asbestos removal area. They can help control traffic to the asbestos removal area and prevent unauthorised access.

Types of barriers:

- **Solid barriers:** Solid barriers should be used for friable asbestos removal work to make sure the area is well contained. If in a big site, secondary barriers may be needed.
- **Tape barriers:** For work involving the removal of non-friable asbestos over a brief period, a tape barrier may be sufficient.

The placement of barriers should be based on an assessment of the physical environment and the level of risk at the asbestos removal site.

Factors to consider when placing barriers:

- **Friability of asbestos material**: Friable asbestos will need to be contained by a solid barrier
- **Activity levels**: Consider the activity around the asbestos removal area, including workers, visitors, and the public, to assess the risk of exposure
- **Existing barriers**: Utilise existing barriers such as walls and doors where possible.

8.0 Asbestos removal enclosures

Enclosures help contain asbestos during removal to prevent the spread of fibres. It is essential to understand their set up and management.

Enclosures are an important control measure during asbestos removal work. They are normally required to:

- prevent the spread of asbestos
- prevent other people (employees and others) from being exposed to asbestos.

This section explains the function and purpose of enclosures and gives practical advice on their design, construction and use during work with asbestos.

8.1 Definition and use

An enclosure is a physical barrier around the asbestos work area designed to contain asbestos dust and waste resulting from the work, preventing the spread of asbestos materials to the surrounding environment.

Access to the enclosure is controlled through entrance and exit openings called airlocks (Figure 1). Airlocks control the movement of workers, waste, and equipment in and out of the work area and enable the preliminary decontamination of workers, equipment, and waste items on exiting the unit.

The enclosure and airlocks must, so far as is reasonably practicable, be:

- airtight
- under negative pressure, unless glove bags are used for Class A asbestos removal (Section 10.6: Dry stripping with control at source)
- tested for leaks if used for removing friable asbestos.

Figure 1: Enclosure with three-stage airlock

Enclosures by design and function will lead to increased amounts of dust and debris inside the enclosure area. Anyone entering or working inside an enclosure must wear suitable protective clothing and RPE and must thoroughly decontaminate themselves on leaving the enclosure.

For more information, see Section 13.0: Decontamination after asbestos removal work and Section 15.0: Personal protective equipment (PPE)

Enclosures must be constructed before any asbestos removal work starts, including placing injection needles.

8.2 When is an enclosure required?

Most Class A removal work requires an enclosure including:

- when removing asbestos thermal insulation (such as boiler and pipe insulation, and sprayed asbestos applied for fire protection, anti-condensation, and acoustic control)
- when removing AIB products such as ceiling tiles or panels or boards containing asbestos.

There are situations where enclosures should also be considered for unlicensed work, including:

- where asbestos cement sheets are being removed, and there is a lot of breakage and fine debris being created
- the work is happening close to occupied or sensitive areas.

Enclosures may also be necessary as a secondary containment option in situations where, a primary control such as glove bags are in use but there is significant risk to other people near the work area if the control should fail. In these situations, the enclosure provides protection against potential contamination of the area if the primary control fails.

When enclosures may not be required

Enclosures are not usually required for unlicensed removal work, including when:

- the level of risk is low because the operations are very small scale and of short duration
- the potential for fibre release and the spread of surface contamination is low
- the location is extremely remote and the risk to workers or the public is very low
- the work is at height and an enclosure is not practical due to the height or complexity of the structure (such as pipework in the open air at high level), or its exposure to severe weather conditions

- there are practical difficulties in obtaining an effective seal on the structures, such as soffits around building roofs

- the work involves cleaning up minor contamination or external contamination

If an enclosure is not used, control measures still need to be put in place to prevent any contamination of the surrounding area or exposure to other people. Examples of other control measures include:

- having clearly defined boundaries around the work area to keep people at a safe distance. This area should be clearly defined with physical barriers and clear signage. The boundary area should extend well beyond the immediate work area

- using work methods and procedures that minimise dust generation and contamination (Section 10.0: Controlled removal and repair techniques)

- regulating the movement of workers, equipment and waste from the designated work area

- following preliminary decontamination procedures and waste bagging. Full decontamination facilities will still be necessary in most cases

- conducting air sampling may also be required.

A clearance certificate will also be required in most situations (with similar exceptions) although clearance air monitoring may not be necessary in external locations (Section 8.9: Securing external enclosures).

8.3 Preliminary planning

Enclosures are a key feature in the risk management of asbestos. Plans for how enclosures will be constructed and used should be considered as early as possible in the planning process.

Enclosures can be used in many different situations and conditions. While there are common features to most enclosures, they will need to be designed specifically for the circumstances of the individual job. Factors to consider when planning an enclosure include:

- clearance of the work area

- removal of mobile or portable items

- the need for a pre-clean

- the size and shape of the work area

- the enclosure being as airtight as possible

- plant being switched off (such as boilers) after communication with the client

- creating sufficient and uniform negative pressure (without short circuiting) within the enclosure and airlocks
- ensuring sufficient air movement through the enclosure
- allowing for safe and easy access for personnel, equipment and waste
- making sure the enclosure will be robust for the conditions
- security and prevention of damage to the enclosure
- provision of viewing panels
- actions to take in an emergency
- the need for fire prevention materials (such as fireproof polythene).

The following may also need to be considered:

- additional controls if work in happening in an occupied building
- securing external enclosures.

8.4 Enclosure design and main features

This illustration shows the main components of a typical asbestos removal enclosure.

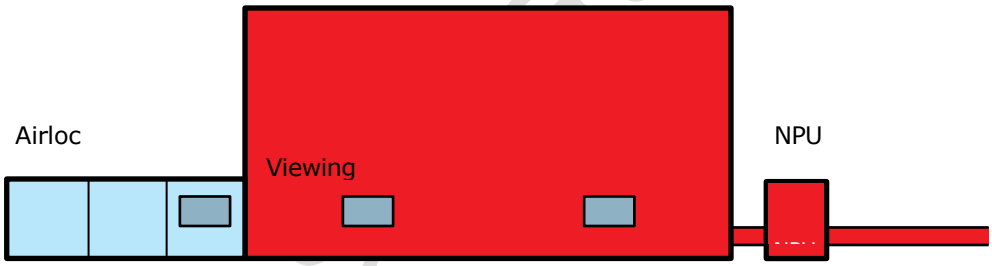


Figure 2: Schematic diagram of the main components of an enclosure.

Enclosure size

When designing the enclosure consider the following:

- the location of the asbestos to be removed and access requirements
- make sure it is big enough for the work activity, for example:
    - the number of workers involved
    - the size and shape of the items or materials to be removed

    - the space needed for any plant or equipment to be used. Examples include lengths of pipework and plant such as scissor lifts or platforms.

- avoid oversized enclosures, as these will increase the spread of asbestos and the size of the area to be cleaned and increase ventilation requirements.

Using existing structures as part of an enclosure

Enclosures can make use of parts of the existing building structure or be self-supporting temporary structures purpose-built around the asbestos working area. Existing rooms or walls, ceilings and floors can be used where possible to provide part or all of an enclosure.

The surfaces of the enclosure should be smooth and solid. If any existing surface is unsuitable, such as rough, damaged, or friable surfaces, it should be pre-cleaned and then lined with material such as polythene sheeting.

The integrity of the enclosure must, so far as is reasonably practicable, be maintained and tested for leaks as work progresses. For example, when AIB ceiling tiles are removed opening the ceiling void. The void will become part of the enclosure. It will need to be smoke tested, and the area volume included in the ventilation calculation. If these areas are sealed back again as work progresses, they will need to be cleaned and subject to clearance procedures.

Sealing the enclosure

The enclosure should be effectively sealed and be as airtight as possible:

- seal all joints and corners (particularly in purpose-built structures)
- seal all windows, doors, ventilation grilles, airbricks, inlets, and exhausts
- seal any gaps or holes around pipes, ducts, conduits, structural or other items (including inside cupboards or units) that pass through to adjoining rooms or floors
- All leaks should be identified and sealed.

Openings or gaps, or holes should be sealed using a combination of materials such as tape, sealing compounds such expanding foam (Figure 3), and waterproof sheeting. If complete sealing is not possible, additional controls should be used. These can include mini enclosures within large enclosures, glove bags, and enhanced negative pressure.

Figure 3: Enclosure sealed with expanding foam

Using sealants and foams

Certain foams and adhesives can produce high concentrations of harmful vapors when used in very confined spaces, or on hot pipework. Follow the products safe use instructions. The risks of using foams and sealants should be considered in the overall risk assessment and appropriate controls and protective equipment should be used.

Foam should be trimmed to size after setting.

If any foam or sealant is to remain after the removal work is done, check that it will not interfere with any fire safety regulations.

8.5 Enclosure extraction (negative pressure)

Creating a negative pressure environment inside the enclosure provides an additional control in case there are accidental leaks. However, air extraction should not be treated as an alternative to a well-sealed enclosure. Negative pressure also helps to control air movement when workers are entering or exiting the enclosure.

There should be sufficient negative pressure (mechanical extract ventilation) within the enclosure and the pressure should be as uniform as possible throughout the unit.

The pressure differential will depend on:

- the extracted air rate from the enclosure
- the physical size and shape of the structure
- the extent of leakage (the effectiveness of the sealing)
- external weather conditions, such as a change in wind direction which can positively pressurise an enclosure.

For more information, see Section 8.12: Air extraction equipment

Large work areas

It may be difficult to achieve good, uniform negative pressure for extremely large enclosures. Consider sub-dividing a large space into a number of smaller enclosures. For example:

- where the work area consists of a series of rooms (such as in office blocks or hotels)
- where large extensive plant or long stretches of pipework are to be stripped of asbestos.

Air movement

Air movement in the enclosure should be designed to make sure that there is uniform airflow as far as reasonably practicable in all areas. NPUs (negative pressure units) and supplementary air inlets should be located where they will achieve good flow and avoid dead spots. For more information, see Section 8.12: Air extraction equipment

Figure 4: An NPU

Air movement should be checked during the smoke test (checking that smoke is cleared efficiently from all areas of the enclosure) and by using smoke tubes and/or differential pressure monitors.

In situations where negative pressure is difficult to achieve, over-extraction may be used to compensate but the extraction level should not damage the integrity of the enclosure.

If the removal process involves opening other parts or sections of the premises, such as when removing ceiling tiles or dividing walls, the ventilation rate should be calculated based on the final enclosure volume, which includes the initial area and the ceiling void.

8.6 Enclosure access

Design all enclosures with access points for workers, plant, equipment, and asbestos waste removal, which prevent dust escaping into the general environment.

Ideally, asbestos workers should enter the enclosure directly from the DCU (Figure 5).

Figure 5: Example of a DCU attached directly to an enclosure

Where the DCU cannot be attached directly to the enclosure, a transiting system is required. In transiting systems, workers will enter the enclosure through a three-stage **airlock** (Figure 6).

Figure 6: Example of an airlock used in transiting

Airlocks and baglocks

Enclosures should be designed and constructed with separate systems for asbestos waste removal. A system similar to the worker transit facility (airlock) can be used for the removal of waste asbestos from the enclosure (called a baglock).

This illustration shows the design of the baglock system.

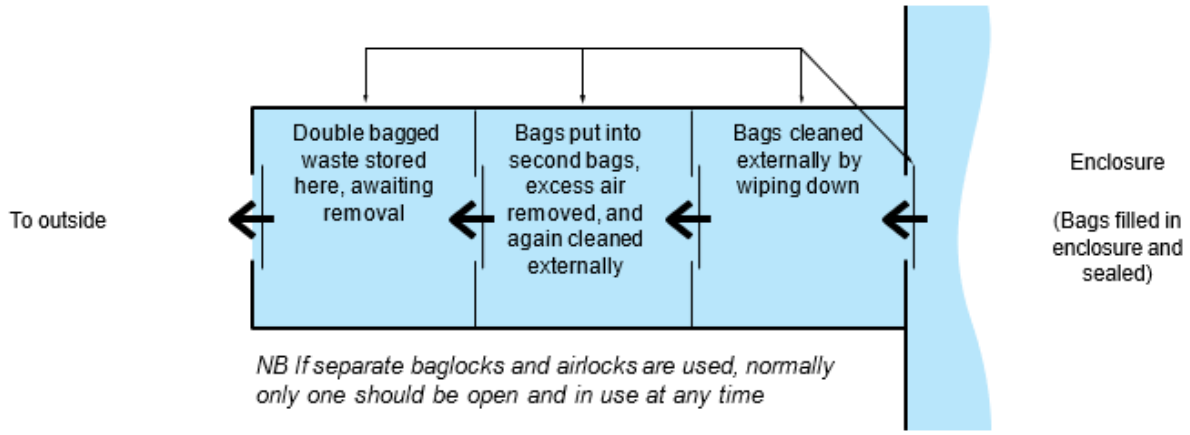


Figure 7: Typical three-stage baglock design to remove waste from an enclosure

Where it is not possible to have separate airlock and baglock systems, a hybrid arrangement can be used.

The design of the hybrid system will depend on whether the DCU is connected directly to the enclosure or whether a three-stage transiting airlock is involved.

These illustrations show the various options for setting up airlocks and baglocks in asbestos enclosures.

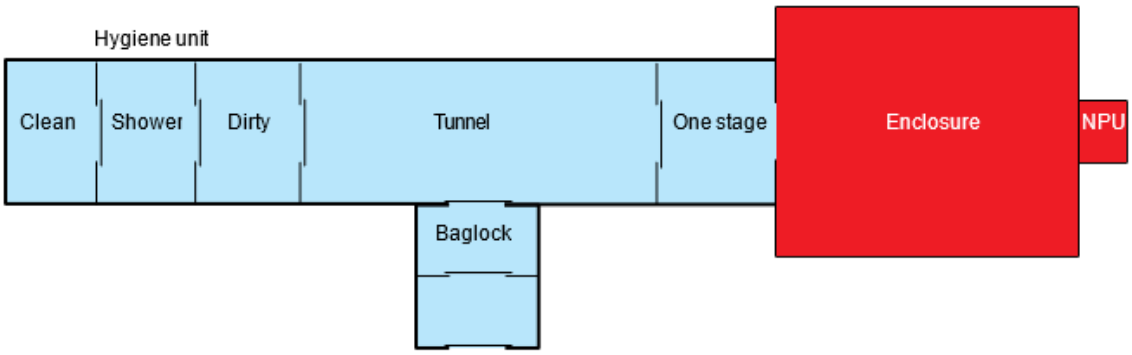


Figure 8: Combined airlock/baglock setup (limited space)

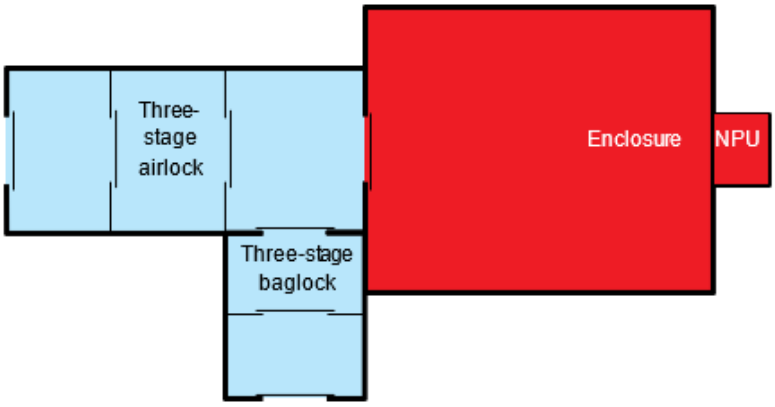


Figure 9: Airlock/baglock setup for transiting with limited space

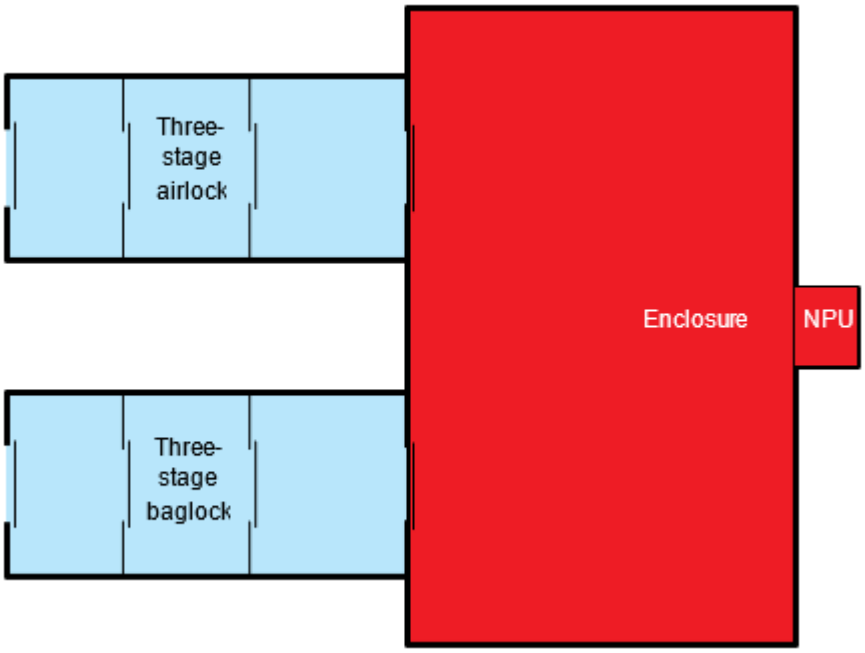


Figure 10: Airlock/baglock setup for transiting with sufficient space

8.7 Viewing panels

Clear viewing panels should be included in the walls of the enclosure so the site supervisor can see what is going on inside without having to enter (Figure 11). This helps make sure the method detailed in the ARCP is being followed. The number and location of these panels will depend on the location, size, and complexity of the enclosure.

Figure 11: Viewing panel

Viewing panels should be used in the inner stage of airlock and baglock. Where viewing panels are impractical, alternative methods to observe and monitor progress within the enclosure should be used such as CCTV, or web-based cameras placed at appropriate locations.

Examples of situations where cameras might be needed instead of viewing panels include:

- underground locations
- multiple-floor buildings
- existing buildings where panels cannot be installed
- where work the location inside the enclosure is obscured or far away from the viewing panels.

Cameras should be covered in protective sheeting to prevent them becoming contaminated.

For details on constructing viewing panels, see Section 8.11: Asbestos enclosure construction

8.8 Occupied buildings

If other parts of the building will be occupied during asbestos removal, additional control measures will be needed to make sure the building's occupants remain safe and the enclosure is not compromised.

For example:

- If possible, plan to do the asbestos removal work during periods when the area will be unoccupied (such as after office hours).
- Consider greater isolation of the asbestos removal area. For example:

    - consider using a hoarding to form a barrier between the asbestos removal area and the adjoining occupied areas
    - erect a plastic-lined barrier within this hoarding and reserve a buffer area between the hoarding and occupied areas
    - erect platforms and fixed scaffolding during the early stages of the work
    - erect these structures on the outside of the enclosure.
- Do daily visual inspections and airborne sampling outside the enclosure to confirm the effectiveness of the enclosure (Section 8.13: Testing, monitoring, and maintenance).
- Make sure enclosures do not obscure or block any fire exits. If this is unavoidable, alternative arrangements must be made and clearly communicated to the building occupants and asbestos removal workers.
- Check that existing mechanical air movement (such as heating, or air conditioning) within the building will not compromise the negative pressure inside the enclosure, and also that process emissions are not drawn into the enclosure.
- Check that the movement of any lifts will not cause changes in air pressure that could affect the negative air pressure inside the enclosure.
- Make sure existing ventilation systems cannot be contaminated through inappropriate siting of NPU discharges near to ventilation intakes.

Protect existing fittings and furniture from contamination

All moveable items should be removed from the asbestos removal area before asbestos removal work begins. Where removing items from the enclosure is not possible:

- items should be moved as far away as possible from the immediate asbestos removal area and covered with two layers of plastic sheeting, with a minimum overlap of 300 mm between the layers. Both layers should be double taped
- cover all non-moveable items such as fixtures and fittings with plastic sheeting and seal the joints
- protect floors with at least one layer of woven plastic to prevent penetration during the asbestos removal work. The joints should be lapped by 300 mm and sealed with double-sided tape and duct tape.

8.9 Securing external enclosures

Secure enclosures properly to prevent toppling or falling over. This is particularly important for external units which can be subject to changing weather conditions.

Attach enclosures securely to the building or scaffolding. Consider the security of the enclosure to make sure unauthorised people/members of the public cannot enter.

8.10 Site preparation

Before any preparation and construction work begins:

- assess what PPE and RPE will be required for the initial preparation work and construction of the enclosure and make it available to workers
- make sure the DCU is set up and operational.

This table includes steps that may help with site preparation and pre-cleaning.

Preparation step	Details
Inspect the proposed work area	The inspection area should include: - the planned enclosure area - surrounding areas such as transit and waste routes - the area next to the enclosure location. Inspect these areas to identify: - areas that will need pre-cleaning - where sheeting may be needed - items that can be removed - any factors that may affect clearance certification.
Pre-clean if any asbestos is found	If minor asbestos debris or dust is present, do a pre-clean before constructing the enclosure. Loose material should be cleaned up using appropriate methods such as: - type H vacuuming - surface wiping - temporary encapsulation (PVA, tape, or cling film) - spray wetting - bagging. Non-asbestos dust and debris should be disposed of as normal waste. Otherwise, it will be treated as hazardous waste once work starts. In cases of significant contamination (such as after a fire), where the enclosure cannot encompass all the material,

Preparation step	Details
	loose visible asbestos dust, debris, and other items should be removed before constructing the enclosure.
Remove all movable or portable items	Remove all mobile or portable items from the work area. Remaining items such as plant or electrical equipment should be pre-cleaned, covered with polythene sheeting, and securely taped to prevent contamination.
Seal plant with flues	Flues in boilers or similar equipment inside the enclosure should be sealed to prevent asbestos spread.
Consider and plan for any live plant	Avoid including live operating plant within an enclosure if possible. If unavoidable, consider factors like live plant ventilation, or emergency access to live plant.
Protect hard-to-decontaminate areas	Pre-clean as much as possible, then protect areas that will be difficult to decontaminate (such as earth floors, or behind radiators/pipes) or areas that are likely to generate dust during cleaning (such as concrete)

Table 6: Steps to help with site preparation and pre-cleaning

8.11 Asbestos enclosure construction

The enclosure should be designed and constructed in a way to prevent disturbance of asbestos materials until construction is finished. This is especially important in areas with extensive contamination on floors or other surfaces.

Construction and composition of the enclosure will depend on things such as:

- use of the existing building structure
- job duration
- work location.

Existing structures may reduce potential leaks but could present ventilation and access issues. Most enclosures are temporary, self-supporting units made with a frame securely fixed to sheeting material.

This table lists factors to consider when constructing an enclosure.

Factors influencing enclosure construction	Details
Sealing openings	All openings (vents, doors, windows, holes, etc.) must be sealed to prevent asbestos fibre escape.
Polythene sheeting material	Polythene sheeting is commonly used due to its flexibility, imperviousness, and ease of erection. As a minimum, 250 – 500 microns opaque sheeting should be used.
Fire hazard considerations	In fire-prone areas, fire-retardant polythene should be used.
Alternative materials for strength	In exposed locations, reinforced PVC sheets or solid barriers (such as panels or wooden boards lined with polythene) may be used for added strength.
Timber framework	Timber dimensions should provide adequate fixing and support. For internal work, 50 mm x 50 mm clean timber is typically sufficient. Secure sheeting to the timber using staples, tape, and spray tack.
External sheeting on timber framework	If sheeting is attached to the outside of the timber, protect the timber (for example, tape it up) or thoroughly decontaminate it after use to prevent asbestos fibre retention.
Internal sheeting on timber framework	If sheeting is attached inside the timber, it requires reinforcement: additional timber, frequent staples taped over, continuous fabric tape at timber/polythene contact, and increased framework support.
Scaffold **framework**	Scaffold frameworks with internally fixed boards or proprietary metal/plastic frameworks can be used if rigidly connected or properly designed to be free-standing. For scaffold frameworks, sheeting should be fixed inside the framework. For timber frameworks, sheeting can be attached either inside or outside, with considerations for contamination and strength.

Table 7: Factors to consider when constructing an enclosure

Sealing joints

All joints in the sheeting material should be sealed. Where adhesive tape is used to seal joints on polythene sheeting, apply it to both sides of the joint. Vinyl tape is suitable where an enclosure is to be used for a relatively short period. For longer-term use, use fabric-based tape (such as 75mm width polycloth).

Viewing panels

The enclosure should contain enough viewing panels (and/or CCTV or webcam systems) to allow all parts of the enclosure to be visible from the outside. The clear plastic panels should be inserted into the sheeting during construction.

Panels should be taped on both sides. Panel size should be at least 600 mm x 300 mm unless it is impractical. Panels should be located at a convenient height for viewing (usually about 1.5m from the floor surface).

For more information, see Section 8.7: Viewing panels

Airlocks and baglocks

Airlocks and baglocks should be as big as possible to allow the necessary changing, cleaning and transfer activities for workers and waste items and bags. The airlocks and baglocks should be at least 1m x 1m x 2m (height). They will have to be bigger in situations where larger items of waste, such as sections of piping, ducting or board, are being removed.

Where space is restricted in one direction, such as along a corridor, the airlocks and baglocks should be extended in the other direction (for example, 0.8m x 2m x 2m). Separate airlocks and baglocks should be used where space allows.

Airlocks need to be constructed with access openings between each compartment which prevents asbestos dust passing from one compartment to the next. This can be done by:

- cutting vertical slits in the sheeting and fixing polythene sheets across the opening (Figure 12)
- reinforcing the vertically shaped opening at the top
- placing the vertical sheet on the enclosure side of the partition with an adequate overlap so that air can move inwards, but outward air movement is restricted
- weighing down the bottom of the inner flaps with timber, a metal bar, or a length of chain. This will allow flexibility in all directions to improve control of airflow
- fitting the outer compartment with a further vertical sheet (a security sheet on the outside) which is used to cover over the entrance at the end of the shift. It should be taped back onto the roof area when the airlock is being used.

Figure 12: Flap arrangements for airlocks

Floors

Cover floors with thick watertight material, such as polythene unless the existing floor has a waterproof surface which can be thoroughly cleaned after asbestos removal work is completed. Polythene can become slippery. If polythene is used, consider covering it with hardboard, or similar material to minimise this risk. Where hardboard or similar materials are used, they will need to be disposed of as asbestos waste afterwards.

8.12 Air extraction equipment

It is typically not possible to make an enclosure completely airtight, so there is always a risk of contaminated air escaping. To manage this risk, mechanical extract ventilation should be used to maintain the air pressure inside the enclosure slightly below atmospheric pressure (known as negative pressure).

This makes sure that the airflow through any leaks in the enclosure will be inwards rather than outwards, keeping asbestos dust contained within the enclosure.

This is normally done by allowing clean air to be drawn into the enclosure through the airlock with the help of an air extraction unit (called an NPU) pulling air out somewhere else in the enclosure.

Extraction units need to be able to be turned on and off from outside the enclosure. Switches should be clearly identified. When workers are not on site, reasonable steps need to be taken to prevent the enclosure and extraction units from being tampered with.

When to use air extraction equipment

Air extraction systems should be turned on before work starts, and be left running continuously throughout the removal work, including when workers are not on site.

If it is not reasonably practicable to leave the system running continuously outside normal workdays, it should be left on during breaks and for at least one hour at the end of each shift to clear the enclosure of airborne dust. During these times, access points to the enclosure should be closed and sealed. Automatic time-delay switches can be used for this purpose.

Positioning of NPUs

NPUs should be located opposite the airlocks. Figure 13 shows the ideal position. However, the exact location will depend on the layout and shape of the enclosure and the accessibility or suitability of walls for setting up equipment.

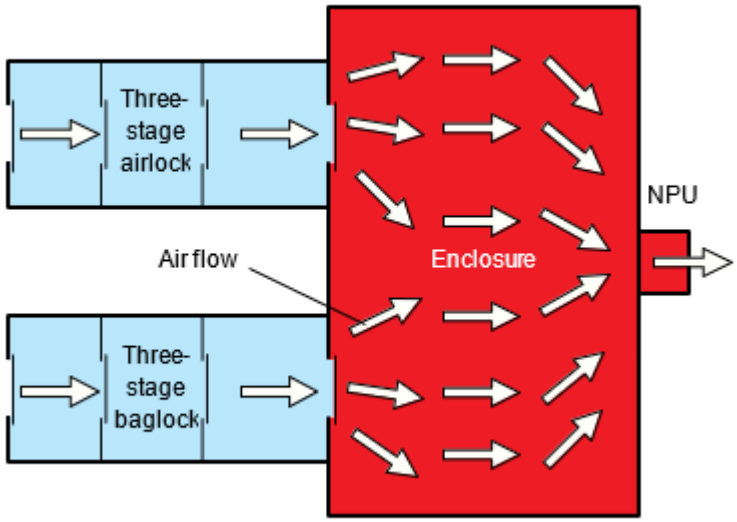


Figure 13: Ideal NPU position

NPUs should be positioned so the airflow passes through most of the enclosure. Avoid setting up NPUs near to the air intake area as this will limit the airflow to that immediate area. Ducting within the enclosure can be used if the NPU cannot be placed directly in the best location.

Figures 14 and 15 show examples of good and poor airflow management.

NPUs should normally be located outside the enclosure with only the pre-filter visible from the inside. If flexible ducting is required inside the enclosure, the pre-filter will also be inside the enclosure. Any damage to the ducting could allow the pre-filter to be

bypassed. Flexible ducting should be protected and regularly inspected to make sure there is no damage.

Larger or more complex enclosure set ups may require additional air inlets than just the airlock. PCBUs should consider taking advice from an appropriately qualified ventilation expert when deciding where to position additional intakes and NPUs. Any additional air inlets should have filtration (pre-filter) in them and be sealed if the enclosure is left overnight with the NPUs turned off.

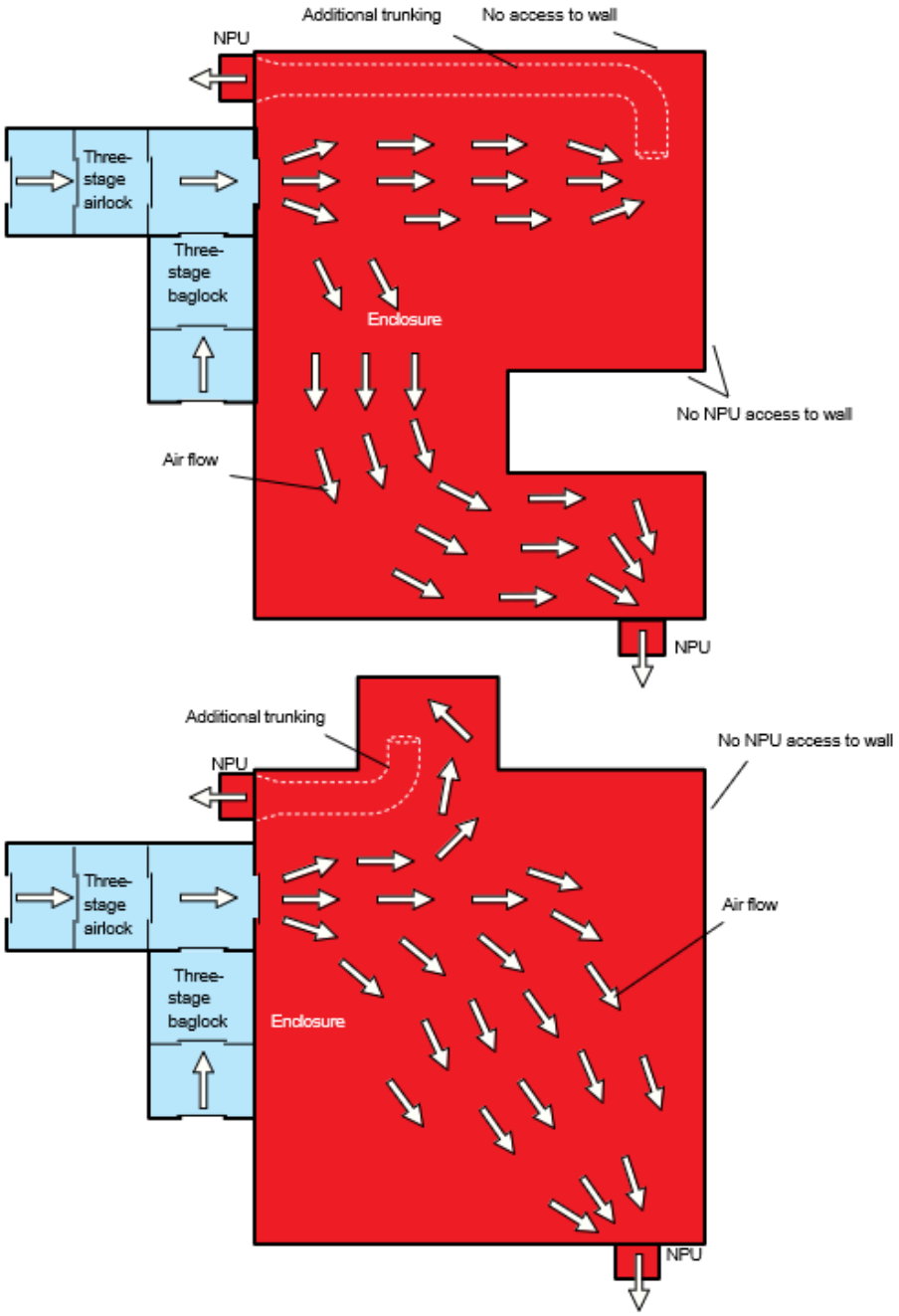


Figure 14: Good airflow management in buildings of different shapes

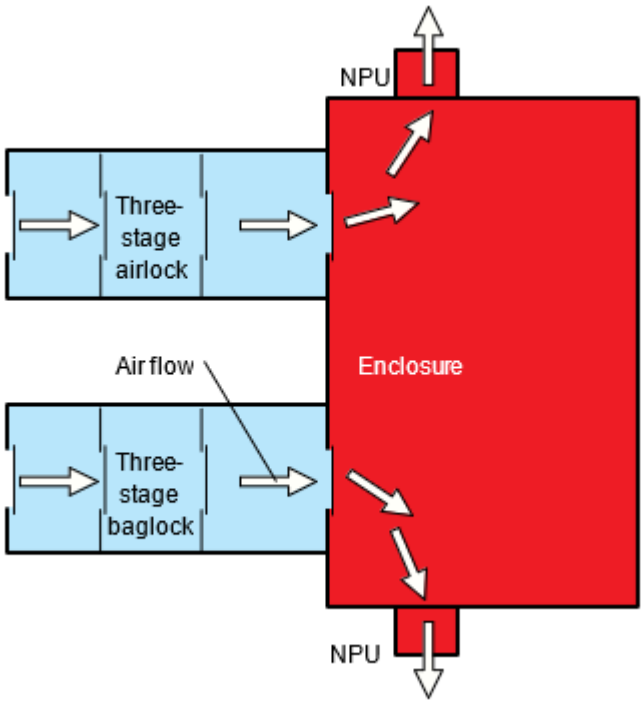


Figure 15: Example of poor airflow management in a building

Required features of NPUs

Extract ventilation (NPUs) should be provided by a purpose-built unit incorporating a fan and suitable filters.

This table shows the main characteristics of a NPU for asbestos removal.

Characteristic	Requirements
Filtration	- The system must incorporate a HEPA filter with at least 99.997% efficiency (see Vacuum cleaners in WorkSafe's webpage: Management and removal of asbestos). - The HEPA filter must be installed on the negative pressure side of the fan and sealed to prevent leakage. - To extend its lifespan, a coarse pre-filter and possibly a second high-efficiency filter must be included. - The unit must be tested altogether to make sure at least 99.997% efficiency.
Fan performance	- The fan must run for extended periods and sustain its rated airflow against resistance from filters, ducting, and wind pressure.

Characteristic	Requirements
	- Airflow losses due to ducting: 0.05-0.07m³/s (100-150 CFM) per 6m length. - A centrifugal fan is recommended. - Typical fan sizes range from 0.084-2.36m³/s (200-5000 CFM).
Construction	- The system must be built for continuous operation and withstand wear and tear, transportation, and rough handling.
Reverse flow damper	- A damper or similar device must be installed to prevent reverse airflow due to fan failure or wind conditions. - Reverse airflow could create positive pressure, leading to unfiltered air leakage.
Indication of flow	- An airflow indicator (manometer or similar device) must be installed. - A visual or audible warning should alert for low airflow (for example, due to filter blockage). - Low airflow is defined as falling below the unit's specified output, linked to the minimum eight air changes per hour. - The manometer reading should be checked at the start of each shift.
Discharge ducting	- Extracted air must be safely discharged outside, away from air intakes, windows, and occupied areas. - Preferably discharge away from building sides or obstructions to avoid back pressure in high winds. - The length and diameter of the ducting depend on the extractor type and exhaust outlet diameter.

Table 8: Main characteristics of a good NPU

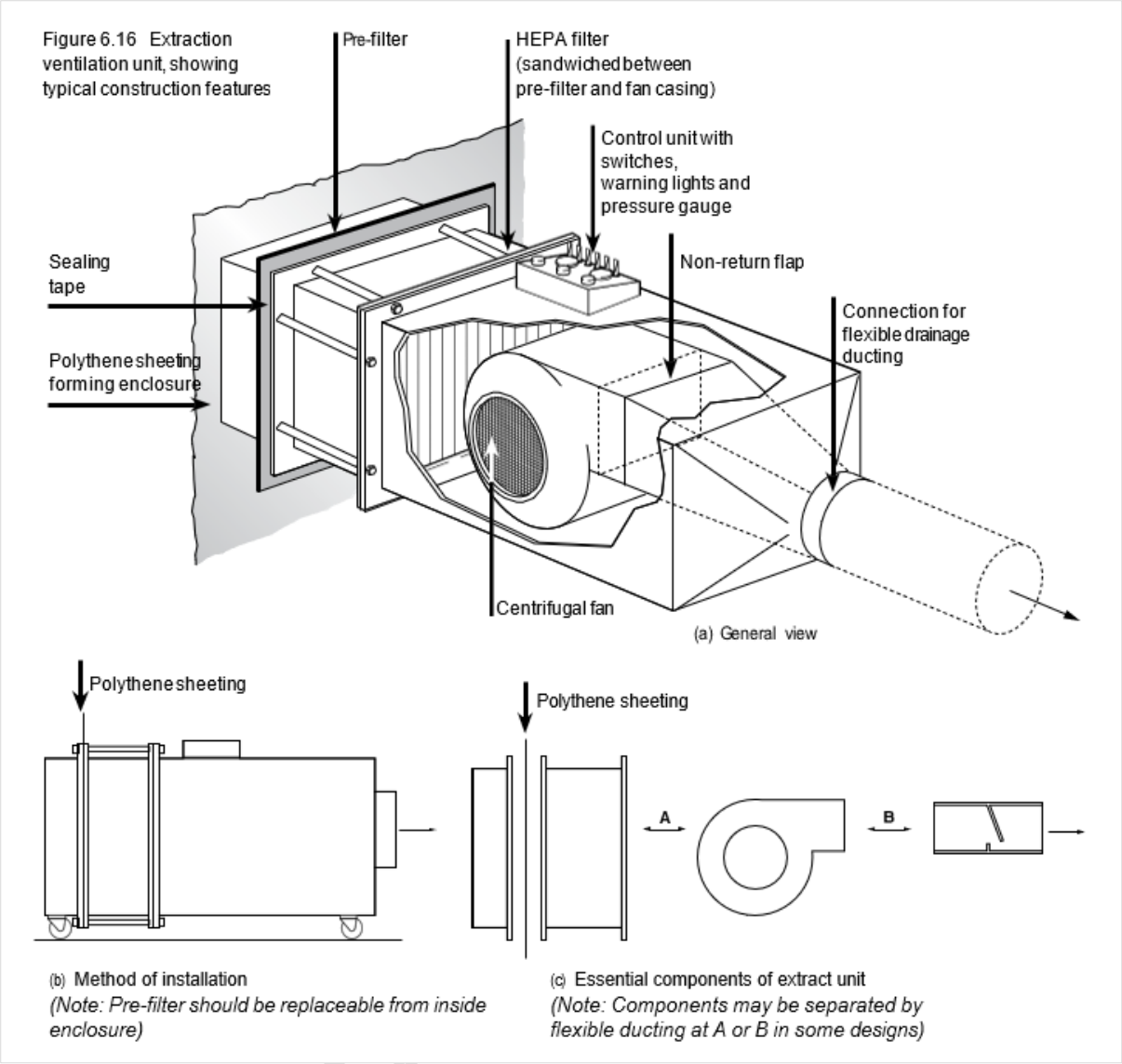


Figure 16: The main characteristics of a good extract ventilation system

Filter replacement

Pre-filters may need to be replaced during a job. The pre-filters should be accessible from inside the enclosure without disturbing the HEPA filter. When the pre-filter is being replaced the fan should be turned off and removal work should stop.

Replacement of the final high efficiency filter is more complex and will require special precautions. The whole NPU should be removed from the enclosure and replaced. Filter replacement would subsequently be carried out by a competent trained person wearing adequate PPE under controlled (ventilated) conditions elsewhere.

After replacement of the HEPA filter, the NPU should be DOP tested to make sure that the filter is correctly installed and sealed.

Calculating ventilation rates

The rate of ventilation required to achieve the right level of negative pressure within the enclosure will depend on several factors:

- the extract flow rate
- the extent of leakage from the unit
- the volume of the enclosure and the volume of the airlock and baglock.
- allowances for reduced airflow due to the filters and ducting
- external influences (such as wind pressures).

The ventilation rate selected on the unit will only be a guide to the negative pressure within the enclosure because the actual pressure will depend on these factors.

The exact ventilation requirements will vary between set-ups and should be determined on a case-by-case basis. A flow rate of about $0.2m^3/s$ for each $100m^3$ of enclosed volume is recommended. This is equivalent to approximately eight air changes per hour in the enclosure.

Where there are difficulties in getting an effective seal, over extraction can be used to compensate. Extraction rates should not be excessive as this can cause damage to the integrity of the enclosure (such as causing the walls to collapse inwards).

In very large enclosures, maintaining internal negative pressure may be difficult. In these cases, the work areas should be divided into multiple smaller enclosures. For more information, see Section 8.4: Enclosure design and main features

Example: method using smoke to check for an adequate ventilation rate

Assuming eight air changes an hour is required, you can measure the time smoke from a smoke machine takes to clear the area after it is turned off.

Since 60mins /8 = 7.5 mins, the smoke should take about 7 mins 30 sec to clear.

Anything quicker than 7 mins 30 sec will be greater than the best practice threshold. If the smoke takes longer than 7mins 30 sec to clear, the ventilation rate is not high enough.

Note: If the removal process involves opening other parts or sections of the premises, such as when removing ceiling tiles or dividing walls, the ventilation rate should be calculated based on the total enclosure volume, which includes the initial area and the ceiling void.

8.13 Testing, monitoring, and maintenance

The enclosure should be regularly tested and systematically monitored to make sure it is functioning correctly. Checks should include:

- **before work starts:**
    - a visual inspection
    - smoke test
- **before each shift:**
    - a visual inspection
    - checking the NPU pressure gauge.
- **if the building is occupied:**
    - daily checks with smoke tubes and pressure testing inside the enclosure
    - daily air sampling:
    - in the vicinity of the enclosure
    - near weak spots (such as sealed joints)
    - near airlocks and NPU discharge point(s).

In other situations (such as unoccupied buildings), the same tests should be done soon after work starts and then periodically.

Recording testing, monitoring and maintenance activity

Procedures for testing and monitoring should be clearly documented. It should include the required frequency of inspections.

Nominate a trained and competent person to be responsible for:

- making sure testing and monitoring is done at the agreed intervals
- recording the results of inspections, monitoring and maintenance in a logbook.

All tests, test results, monitoring, and maintenance activity should be recorded in a logbook that is kept onsite and accessible at all times. Managers or supervisors should frequently inspect the logbook to make sure procedures are being followed.

Visual inspection

Before removal work starts and before each shift, the enclosure should be visually inspected to make sure that it has been constructed correctly and that it is effectively sealed. For example, the following should be checked:

- seals
- airlocks
- joints
- the fitting of sheeting around irregular objects such as pipes, pipe trays, and conduits.

Using smoke to test for leaks

Before removal work starts, the enclosure should be tested by releasing smoke from a smoke generator inside the enclosure with the air extraction equipment switched off (Figure 17). Escaping smoke indicates leaks which need to be dealt with, as far as possible.

Figure 17: An enclosure being smoke tested

Once the enclosure is full of smoke, all external areas should be checked for the presence of smoke. This should include any less obvious locations where smoke could emerge such as:

- any floors above and below
- through cavity walls.

Leaks may not always be easy to spot. Smoke may take some time to emerge such as in complex buildings, or where enclosure walls have multiple folds and pleating. The visual check should be done over a sufficient period to allow any smoke to become detectable.

Even minor leaks can still result in significant contamination of adjacent areas.

Minor leaks can be detected by shining a torch beam along the area being checked (Figure 18). Minor releases of smoke will be shown up across the beam of light.

Figure 18: A torch being used to find smoke leaks

Consider doing smoke tests daily if the risk assessment shows it is needed. For example: when there will be occupants in other parts of the building, or where the work is being done near areas like schools or childcare centers.

Using smoke to test airflow

Smoke can also be used to assess airflow inside the enclosure. After leak testing is complete, turn the air extraction equipment back on and look to see how the smoke clears. Areas where smoke remains concentrated or is slower to clear can indicate dead spots where additional extraction may be needed.

Testing air extraction equipment

Once the smoke has been cleared and any leaks eliminated as much as possible, the enclosure needs to be further tested to make sure there is slight negative pressure being maintained when the extraction equipment is running. If negative pressure is achieved the airlock flaps should be lifted by the airflow through the system and the enclosure walls will bow inwards ensuring that any residual leaks are inwards.

Any additional leak testing can be performed externally using smoke tubes, while the air extraction equipment is running, noting any smoke sucked inside. Smoke tube testing should be carried out around the seals and joins to make sure they are effective.

Checking differential pressure monitors

Before each shift, differential pressure monitor gauges should be checked to make sure negative pressure is being maintained inside the enclosure. They help make sure that air is not leaking out into the building.

A pressure difference of 5 Pascals or more (0.5mm water gauge) is usually enough to prevent air from escaping.

The person nominated to check differential pressure monitors should be trained on how to check monitors and interpret readings correctly.

External factors can affect air pressure, such as:

- wind and drafts (from open doors/windows), these can affect readings by changing air pressure inside the enclosure
- varying pressure between different parts of the enclosure.

Daily inspections and maintenance

At the start of every shift (especially for occupied buildings), a visual check should be done to make sure:

- there are no breaches in the enclosure
- the enclosure sides are pulled inwards (showing negative pressure is maintained)
- the NPU is functioning correctly. Check the NPU pressure gauge to confirm airflow is adequate
- the enclosure walls remain taut
- the airlock flaps are positioned correctly

Smoke tests should be done daily if the risk assessment requires it.

Viewing panels

Viewing panels should be checked frequently and cleaned as necessary to make sure it is easy to see in the enclosure.

Airborne dust frequently adhering to viewing panels can indicate excessive dust generation within the enclosure. If they need to be cleaned regularly, this may indicate poor or ineffective stripping techniques.

Air monitoring

Air monitoring is used to confirm that control measures are working effectively. For example:

- that the enclosure, airlocks, and air extraction equipment are working effectively
- that no asbestos has spread outside the enclosure.

Air monitoring is required for all Class A asbestos removal and may be needed for some Class B removal work.

For Class A removal work:

- air monitoring must be done by an independent licensed asbestos assessor
- air monitoring must be done during the removal work and next to any negative pressure enclosure
- the assessor may require air monitoring before the work starts if they think the air might have asbestos fibres at levels higher than trace amounts.

For more information on air monitoring see Section 9.0 Air monitoring

Testing and maintaining air extraction equipment

Workers in charge of operating and maintaining air extraction plants must be trained on how to operate the system correctly. A competent person needs to properly install and inspect the system before use to make sure it is in good condition and correctly assembled.

Set up a maintenance schedule that includes instructions on what to do if the unit fails or does not meet specified performance, such as stopping work and replacing the equipment.

Air extraction equipment must be examined and tested at least every six months by a trained and competent person. This process typically involves:

- thorough decontamination
- dismantling of the equipment
- a detailed visual inspection to confirm all components are in good working order
- replacing all filters unless there is no significant loss of airflow.

The performance of the unit should be checked after reassembly to make sure the airflow through the unit and the pressure drop across the HEPA filter still meets the manufacturer's specification.

Where the airflow has dropped below its design capacity (for example, a 2000 CFM unit is only achieving 1500 CFM), this should be clearly marked on the unit itself and the lower figure used in ventilation calculations.

A record of all inspections, examination, maintenance, and any defects related to air extraction units must be kept available for inspection.

8.14 Dismantling and disposal of enclosures

After the asbestos removal work has finished, and clearance inspection stages 1 to 3 have been completed (see Section 11.0: Clearance inspections), the enclosure can be dismantled.

Exposure risks during dismantling

Dismantling the enclosure should be done carefully and methodically. Workers should regularly check for any hidden asbestos that may be uncovered during dismantling. Asbestos fibres can remain trapped in parts of the enclosure such as between polythene sheets or other crevices or corners. Workers should wear PPE, including coveralls and half-masks while dismantling.

Polythene sheeting removal

To reduce the risk of releasing asbestos fibres from polythene sheeting during dismantling workers should:

- spray the polythene sheeting with PVA sealant
- carefully remove, roll or fold, and place sheeting in waste bags immediately
- dispose of sheeting as asbestos waste - do not reuse sheeting.

Dealing with contamination

If contamination is found during dismantling, further decontamination must be done, and the visual inspection and air sampling (see Section 11.0: Clearance inspections) must be repeated.

Negative pressure unit (NPU)

Make sure the NPU is sealed before transport. It can either be taken to the next job or sent for decontamination if needed. Do not send equipment for maintenance unless it has been decontaminated first.

Cleaning access equipment

To make it easier to clean access equipment afterwards, prepare and protect access equipment from contamination before taking it into the enclosure. For example:

- cap scaffold tube ends
- cover boards with polythene (unless it creates a slipping hazard)
- protect working parts of mobile equipment working platforms (MEWPs) with robust, adjustable sheeting (make sure to allow for exhaust gas dispersion).

Decontaminate all exposed items before site clearance.

Final inspection

Conduct a final visual inspection after removing all equipment, partial enclosures, or protective sheeting.

Reassurance sampling

Reassurance sampling may be done post-certification to confirm no residual asbestos risk. This is not part of the formal clearance but may be needed for inaccessible crevices, complex equipment, or porous materials. [Add link to assessors GPG]

Site clearance without an enclosure

Follow the normal process with adjustments: perform a preliminary check of site condition, thorough visual inspection, and decide on air monitoring based on circumstances (outdoor work may not require air monitoring).

8.15 Emergency procedures

Responding to incidents or injuries

Removal work often involves working at height or in confined spaces within enclosures. These types of work activities carry their own risks that must be controlled. Emergency

procedures for evacuating ill or injured workers from enclosures must be planned and these details should be included in the removal plan.

An adequate number of workers should be trained on how to provide appropriate first aid without unnecessarily exposing themselves or others to asbestos. For example:

- if the victim can be moved safely, they should be taken outside the enclosure
- follow safe procedures for removal of a victim's respirator.

Decontamination should be performed as much as possible, by vacuuming themselves, the victim, and sponging down RPE and boots. However, evacuation of a seriously ill or injured person should not be delayed by overcomplicated decontamination efforts.

Safety of emergency responders

Removalists must include procedures in emergency plans about the potential presence of asbestos to warn emergency responders in advance, so they can prepare for related hazards. Spare disposable protective clothing and RPE should be available for emergency responders who lack their own equipment.

In cases where emergency responders have had to administer treatment inside the enclosure, they should decontaminate themselves in the DCU afterward.

Evacuation procedures

Workers should be familiar with emergency evacuation procedures for the premises where they are working. This should be covered in the site induction and include:

- location of fire alarms and fire extinguishers
- making sure alarms can still be heard from inside the enclosure
- location of emergency exits and escape routes
- emergency access to and from the enclosure.

In an emergency requiring evacuation, prioritise leaving the premises, but do not let decontamination delay escape. Leaving the premises first must come first.

If RPE inhibits escape, it should be removed inside the enclosure. After reaching safety, PPE and RPE should be decontaminated as much as possible.

9.0 Air monitoring

Use air monitoring to measure airborne asbestos levels to help check if control measures a working effectively.

9.1 What is air monitoring?

Air monitoring is a process of measuring the concentration of airborne asbestos fibres to evaluate the effectiveness of asbestos removal control measures.

The purpose of air monitoring is to show:

- that control measures (such as wet stripping) are effective and being properly used
- that the RPE worn is sufficient to provide adequate protection (in addition to primary control measures).

Other reasons for carrying out air monitoring include:

- benchmark monitoring before asbestos removal starts
- during Stage 3 of the four-stage clearance procedure (see Section 11.0: Clearance inspections)
- leak sampling to check the ongoing integrity of the enclosure (see Section 11.0: Clearance inspections)
- reassurance air sampling after removal work has been completed.

There are two main ways to do air monitoring:

- **static monitoring** where monitoring stations are in specific areas inside and outside of an enclosure
- **personal air monitoring** where workers wear portable air monitoring devices.
    - The data from personal air monitoring devices may be used to inform worker exposure data as well (Section 17.0: Exposure monitoring).

Static air monitoring results cannot be used for worker exposure monitoring.

9.2 When is air monitoring required?

Air monitoring is required in certain situations, as shown in this table.

For Class-A licensed asbestos removal work	For Class-B asbestos removal and unlicensed asbestos removal
Air monitoring **must** be done: - immediately before Class-A asbestos removal work starts (if the licensed asbestos assessor determines it is likely the air contains respirable asbestos fibres in concentrations greater than trace level) - during Class-A asbestos removal work and during Stage 3 of the clearance inspection.	Air monitoring is not required but may be carried out to check if the asbestos removalist is: - complying with their duty to eliminate or minimise exposure to airborne asbestos - not exceeding the airborne contamination standard for asbestos. Air monitoring should also be considered if the asbestos removal work is being done in, or next to a public location.

Table 9: When to perform air monitoring

9.3 Who can do air monitoring?

Air monitoring can be carried out by specific people, as shown in this table.

For Class-A asbestos removal work	For unlicensed asbestos removal work
- An independent licensed asbestos assessor	- a licensed asbestos assessor, or - a competent person.

Table 10: Who can carry out air monitoring

For detailed information on what makes an assessor independent, see Section xx: [name] in [Assessor guide placeholder].

A **competent person** is a person who has relevant industry experience, skills, and knowledge. They must also hold either of the following qualifications:

- a certificate from a training course, specified by WorkSafe for asbestos assessor work
- a tertiary qualification in occupational health and safety, occupational hygiene, science, or environmental health.

For detailed information, see Section xx: [name] in [Assessor guide placeholder].

9.4 How often should air monitoring be done?

Air monitoring should be done once work starts and then periodically to confirm that the enclosure, airlocks, and air extraction equipment are working effectively, and no asbestos has spread outside the enclosure.

Daily monitoring should be done when the enclosure is in an occupied building.

The requirement for monitoring and its extent will depend on the nature of the work and location. The licensed asbestos assessor will decide the best locations, and frequency for testing.

Air monitoring in the vicinity of the NPU discharge outlet(s) is necessary where it vents inside the building. This is particularly important if it has been necessary to replace the NPU during the operation.

For detailed information, see Section xx: [name] in [Assessor guide placeholder].

Developing an air monitoring plan

The asbestos assessor will develop a plan to make sure that the correct monitoring is done at the correct times, and that monitoring will test a representative range of jobs and work methods (see Section xx: [name] in [Assessor guide placeholder]).

Occupational exposures can vary from day to day and even throughout a shift. The plan should take account of the range of circumstances and conditions that can occur. For example, different:

- asbestos types
- work methods
- work areas
- work durations.

Air sampling results should be used to inform and modify control measures, as necessary.

9.5 Assessing air monitoring results

The asbestos assessor should interpret the results and provide advice if any action needs to be taken, particularly if results show that respirable asbestos fibre levels are exceeding prescribed action levels.

For more information on assessing monitoring results, see Section xx: [name] in [Assessors GPG placeholder].

Data from personal air monitoring can be included in exposure data for the worker who was wearing that monitoring device. For more information, see Section xx: [name]

9.6 Action to take if asbestos fibres are exceeded

During **Class A removal work**, if the results of static air monitoring outside the enclosure show that respirable asbestos fibre levels exceed the prescribed action levels, the licensed asbestos removalist must take immediate action.

This table summarises the prescribed action level and actions for Class A asbestos removal static air monitoring (outside of enclosures).

Action level	Control	Immediate action
< 0.01 fibres/ml (trace level)	No new control measures are necessary	Continue with existing measures.
≥ 0.01 fibres/ml but < 0.02 fibres/ml	1. Investigate	Investigate the cause.
	2. Implement	Put controls in place to prevent exposure.
	3. Prevent	Prevent further fibre release.
≥0.02 fibres/ml	1. Stop	Order Class A asbestos removal work to stop straight away.
	2. Notify	Notify WorkSafe as a notifiable incident as soon as possible. Include the results of the air monitoring.
	3. Investigate	As soon as possible: 1. Determine the cause of the high fibre levels. 2. Conduct a thorough visual inspection of the enclosure (if used) and associated equipment in consultation with all asbestos workers. 3. Review controls.

Action level	Control	Immediate action
	4. Put controls in place to prevent exposure and further asbestos fibre release	As soon as possible: 1. Extend the isolated/barricaded area around the work area/enclosure so far as is reasonably practicable (until fibre levels are at or below 0.01 fibres/ml). 2. Wet-wipe and vacuum the surrounding area, seal any identified leaks (for example, with expandable foam or tape). 3. Smoke test the enclosure until it is satisfactorily sealed.
	5. Conduct further air monitoring	Do not re-start until fibre levels are at or below 0.01 fibres/ml.
	6. Retain records for five years	

Table 11: Class A asbestos removal static air monitoring actions (outside enclosure)

9.7 Communicating air monitoring results

For Class A asbestos removal, the PCBU who commissions the licensed asbestos removal work must make air monitoring results are given to:

- workers at the workplace
- worker representatives
- PCBUs at the workplace
- other people at the workplace
- other people living or working in the vicinity of the workplace if it is likely they may be affected by the contamination (so far as is reasonably practicable).

9.8 When the workplace is a home

If the workplace is a home, the licensed asbestos removalist must make sure the results of the air monitoring are given to:

- the PCBU who commissioned the work, such as the landlord or property management company
- workers at the workplace

- worker representatives
- PCBUs in relation to the workplace
- the occupier of the home
- the owner of the home (if not the occupier)
- other people at the workplace.

10.0 Controlled removal and repair techniques

Controlled techniques help minimise risk during removal and repair of asbestos and asbestos-containing materials (ACMs).

10.1 Choosing an asbestos stripping technique

There are two main types of controlled stripping techniques:

- controlled wet stripping
- dry stripping with control at source.

For more information on using these methods safely, see Sections 10.3: Controlled wet stripping through to Section 10.6: Dry stripping with control at source

There are several factors to consider before deciding what stripping technique, or combination of techniques, to use (these should be detailed in the assessment and ARCP).

Factors to consider include:

- the requirement to minimise the amount of fibres generated at the point where asbestos is being stripped:
    - choose the stripping method (or combination of methods) to cause the least amount of disturbance.
    - minimise disturbance in the enclosure to keep air concentrations lower, help keep workers safer and make later decontamination easier.
- the type of asbestos being removed
- any coatings applied to the asbestos (this can affect how easy it is to wet the asbestos)
- how the asbestos is attached (for example, screws, nails, clips, or glue)
- what the asbestos is attached to (for example, asbestos applied onto a bituminous layer). This can affect the ease of removal.
- what the most appropriate wetting method is for the type of product (spray or injection, or both)
- the location of the asbestos and ACM and the nature of the work area, such as accessibility and environmental conditions (for more information on working in hot environments, see Section 10.2: General good practice for stripping)
- the need to prevent the escape of asbestos fibres from the enclosure to the general environment.

In addition to the requirement to reduce exposure to asbestos as low as reasonably practicable, removalists need to make sure their chosen stripping method does not create other risks. For example, the:

- presence of live electrical equipment may prevent, or restrict, the use of controlled wet stripping
- presence of chemicals may present a direct risk to the workers or prevent the use of controlled wet stripping techniques
- use of wetting agents may create a risk of slips. This is particularly important when working at height.

10.2 General good practice for stripping

This table shows general good practice for stripping asbestos.

Good practice	Details
Worker training	Provide adequate training, including refresher training, on controlled stripping techniques. Site supervisors require more detailed training to oversee work effectively.
Site supervision	Maintain close supervision to make sure control measures and safe work methods are followed. Use viewing panels in enclosures to monitor workers.
Maintenance of equipment	Regularly maintain all equipment to make sure it operates effectively throughout the work.
Waste control	Use good waste management practices, such as clearing waste as work progresses to maintain a safe and controlled environment.
Avoid breakage wherever possible	Always attempt to remove asbestos and ACM (such as AIB) without breaking it. Where breakage is the only option use wetting on exposed surfaces to prevent dust being created. Use shadow vacuuming as well.
Removing nailed boards	Spray any unpainted surfaces first then place heavy-duty tape over the areas where there are nails and carefully ease the board away from the wall using a crowbar (or similar) without breaking the board. Once a nail has been exposed between the board and other surface, if possible, cut the nail.
Locating hidden nails or screws	Use magnets to locate screws or nails which have been hidden by paint or other coatings. If the nails or screws

Good practice	Details
	cannot be easily found use the method for removing glued boards.
Removing glued boards	If the boards cannot be easily lifted without breaking, then scribing and breaking can be used. This should only be used if other safer methods will not work as there can be significant fibre release. Use wetting and shadow vacuuming to minimise fibre release.

Table 12: Good practice for asbestos stripping

10.3 Controlled wet stripping

Using wetting agents

The amount of asbestos fibre released during removal can be reduced by soaking or wetting the asbestos with water or a wetting agent. Wetting agents contain additional chemicals to help penetrate ACM (such as an added surfactant). Even though some types of asbestos can be wetted with water, wetting agents should always be used, as a mixture of asbestos types may be present. Some wetting agents can also ease removal by loosening the binding agents within the ACM.

Wetting agents should always be used according to the manufacturer's instructions.

PPE, including RPE, should always be used when injecting or applying wetting agents.

Asbestos stripping workers should receive specific and detailed training in the use of controlled wet stripping techniques, and in the problems which may be encountered.

Wetting agents can be applied by injection or spraying. For more information on these techniques, see Section 10.4: Controlled wetting by injection and Section 10.5: controlled wetting by spraying

The asbestos should be wetted all the way through to reduce fibre levels as much as possible. This table lists important factors to make sure wetting is effective.

Factors for wetting	Details
Allow enough time for the wetting agent to thoroughly penetrate the ACM.	The time taken will depend on the type of ACM being injected: - More porous and less dense materials, such as sprayed asbestos coatings, become saturated more quickly.

Factors for wetting	Details
	- Denser and less porous materials such as hand applied, and high calcium silicate pipe lagging may take longer. - Some materials may be removed after only 3-4 hours soaking, while others may require up to 24 hours. - With some ACMs, there is a visible colour change when adequate wetting has been achieved. - The degree of penetration and wetting should be checked by visual examination before attempting removal. If the wetting agent is being used to suppress fibre release during preparation for injection, only a few minutes may be necessary.
Avoid over-wetting	Over wetting may cause: - wetting agent to seep out of cracks in the asbestos - asbestos coating or lagging to become sodden, causing the asbestos to fall off under its own weight

Check for signs that it is safe to start removal	- With some ACMs, there is a visible colour change when adequate wetting has been achieved.
	- Lagging should be of a dough-like consistency when adequately wetted.
	- Take small samples to check the degree of penetration and wetting. When wetting by injection:
	  - Take samples from areas further away from the pump, near the last group of needles.
	  - During testing use shadow vacuuming in case any dry patches are found.
	  - Any dry patches should be sprayed immediately and then re-injected.

Table 13: Key factors for effective wetting of asbestos

Workers carrying out the wetting should have sufficient training and experience to judge when it is safe to begin removal. Supervisors should be available to provide advice or confirmation if needed.

10.4 Controlled wetting by injection

Injection techniques can be used when the outer surface of the asbestos is sealed, covered, or coated and the skin will prevent loss of fluid (Figures 19 and 20).

Injection and preparation for injection should be done after the enclosure has been built and smoke tested. PPE and RPE should be worn.

When using wet injection, consider the following:

- what injection system to use
- needle type and size
- needle placement
- flow rate of wetting agent
- surface thickness to be injected.

Figure 19: Wet injection on pipework

Figure 20: Wet injection on a large pipe

Choose the right injection system

Injection systems come in two basic forms: multi and single point. This table explains the differences between them.

Multi-point system	Single-point injection
Multi-point systems have a number of needles connected together and are connected to a common injection pump: - **hedgehogs** (where the needles are grouped together on a flat board) can be used for flat surfaces (Figure 21) - **string of needles**, usually set 10-15 cm apart and linked by tubing from the injection pump can be wrapped around the item containing asbestos (Figure 22). Needles in this system can be fitted with individual flow control values which allows adjustment to make sure the appropriate volume of fluid is delivered to each needle.	Single-point injection systems (such as needle guns) deliver wetting agent to single small areas each time: - they can be useful for inaccessible areas, where it is difficult to set up a multi-point unit - single-point injection systems should only be used when multi-point systems cannot be used.

Table 14: Comparison of multi-point and single-point injection systems

Needle type and size

Injection needles are available in many sizes and designs. The specification of the needle will depend on the characteristics of the asbestos and ACM, particularly thickness, shape, and condition.

Thin coatings or insulation (1 cm or less), such as a sprayed coating, require needles with holes at the tip, or long, angled needles. This allows the needle to be pushed into and flat with the thin coating (Figure 22). These angled needles help the lateral movement of the wetting agent.

Thick coatings or insulation require long needles with holes along their length, sufficient to penetrate the full depth of the insulation. The holes should face the substrate.

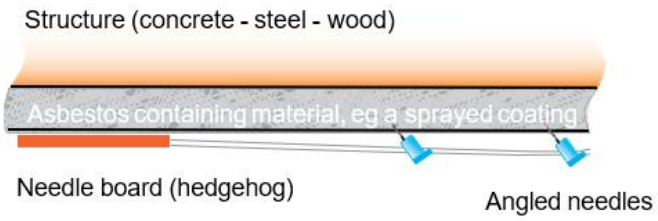


Figure 21: Needle board multi-point injection system for thin asbestos layers

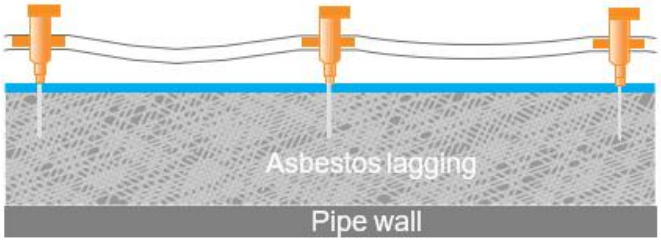


Figure 22: Controlled multi-point injection delivery through a network of fine needles

Needle placement

Once the needles have been selected, consider carefully where to place them:

- If needles are placed too far apart, dry patches may occur.
- The greater the number of needles, the more likely it is that uniform penetration will be achieved.
- Where reasonably practicable, place needles on the top side so gravity helps move the wetting agent through the asbestos.

- Horizontal pipes should have needles running along the top of the pipe, spaced 10-15 cm apart (Figures 19 and 20), allowing the wetting solution to diffuse down from the top of the lagging.
- Large diameter pipes may need additional runs of needles, again towards the top of the horizontal pipe.
- Vertical pipes should have needles placed horizontally around the top of the pipe, allowing wetting solution to diffuse as a wet band down the lagging. They should not spiral down the pipe.
- Tall vertical pipes may need additional horizontal rings of needles every 1-2 metres.

Flow rate of wetting agent

Wet injection techniques should be operated at a low pressure (under 50 psi) to make sure controlled, uniform wetting of asbestos and ACM. Capillary action aids penetration, with gravity assisting downward flow. Higher pressure may cause the wetting agent to follow paths of least resistance, leading to uneven wetting.

Penetrating dense or thick surfaces

For lagging covered with a cement-like layer (typically 6mm thick), holes may need to be drilled to allow needle access by either:

- use hand drills and shadow vacuuming (Figure 23)
- drill using a low-speed drill with a cowl around the bit and fitted with LEV (Figure 24).

If pipe or vessel lagging is covered in metal cladding, carefully remove it to expose the lagging. If the lagging is damaged, use airless sprays and shadow vacuuming while removing the cladding. Make sure casings that can be drilled are fully wet before continuing.

Some surfaces (such as lagging on some industrial plant) may be so thick that thorough wetting cannot be achieved in one attempt. In these cases, wetting should be done progressively:

- remove any outer layers (such as metal cladding)
- inject the material using the longest needles available, or liberally spray with a wetting agent
- allow the agent to soak into the outer layer of the lagging.
- once the outer material is wetted, carefully remove it until the material is starting to look dry again.
- re-inject or re-spray and repeat the process.

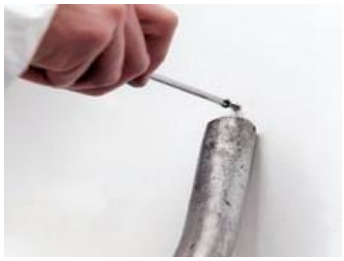


Figure 23: Shadow vacuuming during unscrewing of board

Figure 24: Drilling using a low-speed drill with cowl and fitted with LEV

Injecting damaged ACM

Injection may disturb or break damaged asbestos. If damage is minor, use a generous amount of wetting agent. If there is a risk asbestos may fall off, or there is obvious cracking, wrap the material in impervious sheeting, tape it, and inject carefully.

Insulation that has internal cracks or varying porosity can make even wetting difficult. Position needles carefully for cracked areas and adjust flow rates for materials with variable porosity.

10.5 Controlled wetting by spraying

Spray wetting can be used in the following applications:

- where the ACM is unsealed and porous (such as thin, sprayed coatings)
- where the ACM is thin (less than 1 cm thick)
- in preparation for injecting (such as before the injection of damaged pipe lagging)
- for the removal of AIB
- for asbestos textiles, including blankets and rope seals
- when used with glove bags

- when removing asbestos debris
- when working on asbestos cement.

The method of application will vary depending on the type of material. This table shows examples of how different asbestos materials are applied.

Product or surface to be wetted	Application method
Unsealed sprayed coatings	- Use a wide-angled and fine spray. - The spray should be moved continuously back and forth across the surface, avoiding disturbance. - The number of spraying passes required will depend on the material.
Unpainted AIB boards and tiles	- Vacuum unpainted surfaces to remove all dust and debris, then spray as described for unsealed sprayed coatings. - Once they are thoroughly wet, carefully remove by unscrewing while shadow vacuuming.
Painted IB boards and tiles	- Where the unpainted surface is not accessible, remove a single tile or board by unscrewing while using shadow vacuuming. A magnet can be used to locate screws hidden by paint. - Vacuum the unpainted top surface and spray it (Figure 25). - Once access is available to the upper surfaces of the surrounding boards or tiles, vacuum and spray them - Wetting the upper surfaces of ceiling tiles can be done using long metal tubes with holes along their length. The metal tubes can be laid on the surface of the AIB and the wetting agent fed through in a controlled manner.
Insulating blankets, ropes, and quilts	- Spray wetting agents over all accessible surfaces
Hard plastered or coated surfaces	- These surfaces are typically impermeable to sprayed wetting agents or direct injection. - Pre-drilling holes under controlled conditions followed by injection can be used (see Section 10.4: Controlled wetting by injection). - Alternatively, remove this material by carefully cracking it while applying a fine spray:

	- Once cracks appear, the spray can be directed along the cracks to aid wetting. - The material should then be carefully removed without further breakage. Shadow vacuuming can also be used in some circumstances. - Because this material does not readily soak up wetting agent, there may be some spilling of the agent. Polythene sheeting or a suitable container should be placed under the spraying point to collect any spillage.
Small areas	For relatively small applications, such as the preparation for injection or removal of AIB tiles (Figure 25), use hand-pressurised and operated spraying equipment, like those used in gardening.
Large areas	For larger areas use a low-pressure spraying machine (less than 50 psi). Multi-point tubes can be used to cover a wider area (Figures 26 and 27).

Table 15: Application methods for different types of asbestos materials

Figure 25: Spraying AIB ceiling tiles

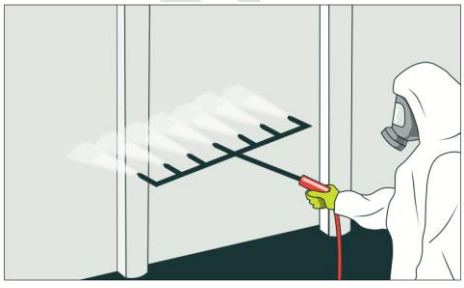


Figure 26: Multi-point spray system

Figure 27: Spraying thin coating

Troubleshooting wet stripping techniques

There are situations where the use of wetting agents can cause other risks or problems. Control measures must be put in place to address these.

This table shows control measures to address the risks of using wetting agents.

Risk	Control measure
Wetting agent may cause skin irritation	Workers should already be wearing full PPE when applying wetting agent. If workers are accidentally exposed to wetting agent directly on their skin check the manufacturer's safety data sheet and follow instructions on what precautions to take
Wetting agents causing wet floor surfaces, creating slip hazards	Place drip trays or troughs under the area being treated. Where it is not possible to put down trays, put down non-slip flooring (this will have to be disposed of as asbestos waste afterwards). Any spills should be removed as soon as reasonably practicable.
Extreme temperature conditions affecting performance of wetting agent	In freezing weather conditions wetting agent may not spread properly. Wetting agents can be treated to allow for this. Liquids are also available that work at up to 240°C, although hot work should be avoided as much as reasonably practicable, see Section 10.9: Working on or near hot plant
Wetting agents staining building materials	Added dyes in wetting agents can lead to the discolouration of the fabric of the building.

Risk	Control measure
	Use of polythene sheeting on susceptible surfaces to prevent this.

Table 16: Control measures for risks from wetting agents

10.6 Dry stripping with control at source

There may be some situations where it is not possible to use wet stripping techniques. In these circumstances, other methods should be used to control asbestos at source.

At source controls include:

- wrap and cut
- glove bags
- direct vacuuming
- enhanced air management.

Ventilated enclosures are not considered a control at source

Ventilated enclosures do not provide control at source. They do not regulate fibre release at the point of removal. Their primary purpose is to reduce the spread of asbestos.

Wrap-and-cut

Wrap-and-cut is where the asbestos is left in-situ on or in the object (such as a piece of plant or lagged pipework) and the entire object is wrapped up/sealed and removed.

Enclosures are usually still required when wrap-and-cut methods are being used. Always wear full PPE and RPE while wrap-and-cut methods are used.

Wrap-and-cut is only suitable in certain circumstances:

- The object is no longer needed or will be replaced.
- Any contents of the object have been removed.
- The object has been cleaned, where necessary, to remove any residual hazardous materials.

The object needs to be manageable in size:

- Ideally it should be small enough to be removed through the baglock and fit inside waste containers for transporting.
- It needs to be small enough that workers can handle it without causing injuries.
- If it is too big there is a greater chance of the polyethene sheeting ripping during handling.
- Some disposal facilities may have size limits for wrapped waste.

Wrapped items too large to pass through the baglock should remain in the work area until the four-stage clearance has been completed and the enclosure removed. These items will be subject to the four-stage clearance process. For more information, see Section 11.0: Clearance inspections

Figure 28: Wrap-and-cut example on pipework

Wrap-and-cut does not eliminate asbestos disturbance or release. For example, when lagging needs to be removed to allow cutting of the exposed pipework, or from disturbing damaged areas of lagging.

The following steps will help minimise disturbing asbestos when wrapping and cutting lagging:

- Treat lagging with a penetrating encapsulant which will bind the asbestos fibres together.
- Wet the lagging using injection or spraying with a wetting agent.
- For small areas of damage near the area to be wrapped and cut, seal with polythene sheeting and tape.
- Where there are several areas of damage along a length of pipework, the entire run can be dampened using sprays and wrapped in polythene sheeting.
- Glove bag systems can also be useful for stripping short sections of pipework (see Glove Bags in Section 10.6: Dry stripping with control at source

Dividing pipework or plant into manageable sections

Long stretches of pipe work will have to be reduced before they can be removed:

- Look for breaks in the lagging where flanges could be unbolted or pipe hangers removed, or the bare pipe cut without disturbing the asbestos.
- Where such breaks do not occur naturally, or if they are not at convenient positions, short sections of lagging will have to be removed.
    - Make sure enough lagging is removed to allow cutting/burning to take place, without disturbing the remaining asbestos. At least 20-30 cm of pipework should be exposed.
    - Wrap the lagging with heavy-duty polythene and seal the end sections securely with tape.
- Pipework can be cut using:
    - Hacksaws for very small diameter pipes.
    - Abrasive cut-off wheels and flame-cutting techniques for larger diameter pipework. Be careful to avoid damaging the wrapped ends of the lagging and use flame retardant sheeting.
- Support pipework while it is being worked on.
    - Wrapped sections of pipework should be carefully supported during cutting and/or unbolting, such as using sheet metal bands at sling attachment points.
- Pipework sections should be transferred to the skip/disposal container as soon as reasonably practicable.

Glove bags

Glove bags are made of strong clear plastic materials that are designed to allow stripping activities inside the bag by an external worker using integrated plastic gloves. The top part of a glove bag fits around the item to be stripped while the bottom part acts as storage for tools and asbestos waste. A vacuum should be attached to create slight negative pressure.

Enclosures are usually still required even when glove bags are being used. This is because if the bag fails (for example, a failed or punctured seal) there would be no way to stop asbestos spreading.

Only use glove bags without an enclosure where the risk assessment shows minimal risks to others if the glove bag leaks or fails (where the site is remote and far away from people).

Figure 29: Example of glove bag setup with HEPA vacuum

Figure 30: Example of glove bag for removing sprayed asbestos coatings on ceiling

Glove bags should:

- be made from a strong material that does not tear
- have shoulders wide enough to seal the bag properly to the pipe or vessel
- have internal zips to seal and isolate waste at the bottom, so the top can be purged once the work is done. This helps minimise fibre release when removing the bag
- have an entry port to insert a spray nozzle to wet the asbestos or a vacuum nozzle to create negative pressure and purge the top of the bag once work is done.

When using glove bags, make sure:

- workers have had specific training on the use of glove bags
- the operators wear suitable PPE and RPE
- the work area is well-defined; movable items such as furniture are removed, and ledges and other surfaces are covered in polythene sheeting
- the glove bag completely covers the section of pipe or other structure being worked on
- the glove bag fully seals in the work area - smoke-test using a smoke tube to confirm this before starting work.
- where reasonably practicable, that the work is carried out with the glove bag under slight negative pressure
- wet stripping techniques are used where reasonably practicable (small spray bottles may be useful)
- the glove bag is only used once and not reused
- the glove bag is not moved, do not slide it along pipes
- the glove bag is not used for jobs requiring more than two glove bags, unless the assessment shows that this is safe for the job in hand
- the glove bag needs two operators to use it safely
- removed asbestos waste is fully sealed while still inside the glove bag
- contingency plans, and equipment for spillages and clean-up, are in place.

Have a safe system for using and removing the tools from the glove bag, without compromising the glove bag's integrity. For example:

1. Hold the tool in one hand within the glove of the glove bag.
2. Pull the tool out (keeping it within the glove sleeve).
3. Twist the lower end of the sleeve to enclose the tool in a pouch at the end.
4. Seal the twisted end at two points several centimetres apart.
5. Cut between the two points, this will leave the tool sealed in the glove and the elbow or shoulder of the glove sealed to prevent any escape of fibres.
6. The glove pouch can be placed in the next glove bag for use or in a container of water for cleaning later.

Direct vacuum removal

Direct vacuuming removal is removing and vacuuming asbestos at source using purpose-designed vacuum equipment. It can be used for removing loose asbestos (such as thermal or noise insulation), where wetting could cause it to bond to other surfaces.

Enclosures are still required when direct vacuum removal is being used. Always wear full PPE and RPE.

When using direct vacuum removal consider the following:

- Vacuuming will not work properly on wet asbestos. Any wet asbestos will have to be removed using other techniques, with appropriate controls in place.
- The asbestos being removed will need to be transported, isolated, and bagged under controlled conditions. The bagging unit should be in a separate ventilated enclosure at negative pressure to prevent leaks.
- Exhaust air must be filtered to a high standard (HEPA filtration).
- Have plans and procedures in place for if something goes wrong. For example, if the vacuum ducting gets blocked or there is a leak in the system:
    - securely cap both ends, draw it into the enclosure, open and clear the ducting
    - seal any openings immediately
    - include these details in the ACMP.

Enhanced air management

Enhanced air movement is when air is introduced by a blower near the work area and extracted at a higher rate to maintain negative pressure. The blower, equipped with a manometer, automatically shuts off if the pressure drops too low.

Enhanced air management can be used for any type of stripping work when wetting or other controlled techniques cannot be used. It can also be used as an additional control alongside other controlled stripping methods.

Due to the high exposure risks when stripping dry, careful planning and close monitoring are essential. To effectively reduce exposure:

- correctly position the push-pull air system to avoid dispersing asbestos fibres
- the blower and extraction points should be positioned close to and opposite the work area to draw contaminated air away from workers
- reposition the blower and extraction points as work progresses to make sure they stay close to the work area
- workers should stay to the side of the blower unit.

This complex system requires constant monitoring and is mainly used when other techniques are not suitable.

10.7 Uncontrolled dry stripping

Uncontrolled dry stripping refers to stripping ACM in its dry state inside an enclosure, without any direct controls in place to reduce exposure. Uncontrolled dry stripping can produce excessively high airborne asbestos fibre concentrations (up to 100-1000 f/ml for sprayed coatings). Levels this high will result in significant asbestos exposure even when workers are wearing RPE. No RPE can provide adequate protection for these fibre levels. Air extraction within the enclosure will also not be able to control levels this high.

Some form of control must always be used, such as direct control at source (for example, wet stripping or shadow vacuuming) or other specialised techniques, such as glove bags or enhanced air management.

For more information, see Sections 10.3: Controlled wet stripping through to Section 10.6 Dry stripping with control at source

10.8 Tools and equipment

Prohibited tools and equipment

High-pressure water spray and compressed air **must not be** used on asbestos material.

- **High-pressure water spray:**
    - Using high-pressure water spray on asbestos, ACM, or asbestos-contaminated dust is prohibited because it increases the chances of asbestos fibres becoming airborne.
    - High-pressure water spray may be used for firefighting or fire protection. It can also be used if WorkSafe has approved a method for managing the associated risks.
- **Compressed air:** Using compressed air on asbestos material is prohibited because it significantly increases the risk of asbestos fibres becoming airborne.

Controlled tools and equipment

Power tools and other equipment (including angle grinders, sanders, saws, drills, brushes, and brooms) may only be used on asbestos material if:

- the equipment is:
    - enclosed while being used

    - designed to capture or suppress airborne asbestos and is used according to its design
    - used in a way designed to capture or suppress airborne asbestos safely, such as through engineering control measures like dust suppression or extraction ventilation
- a combination of the above.

Where possible, use non-powered hand tools. If more force is needed, consider using low-speed, battery-powered tools that can be used with wetting methods to minimise the release of dust.

10.9 Working on or near hot plant

Wherever possible, all plant that cannot be removed from the enclosure should not be operational while removal is taking place on or near it. Working on or near operational plant can create the following risks:

- Produce excessive heat within the enclosure - creating thermal risks for workers. For more information about the risks of working in extreme temperatures, see WorkSafe's webpage: Working safely in extreme temperatures
- Produce combustion gases within the enclosure that will need to be vented without compromising the integrity of the enclosure.
- May be incompatible with wet stripping techniques. For example, wetting of ACM insulation on hot pipes may not stay wetted long enough.
- Temperatures may increase further as asbestos-containing insulation is removed off plant or pipework.
- Excessive heat may soften polythene sheeting and weaken joints and seams of the enclosure. If the enclosure fails, strong warm air currents can escape causing significant contamination of the surrounding area.

Plan with the commissioning PCBU to arrange for plant to be removed or turned off wherever possible. This may mean doing the asbestos removal work during hours when the plant is not required. This information should be included in the ACRP.

Where work arises at short notice through incidents or emergencies and plant cannot be turned off at short notice, consider temporary repairs or encapsulation until the plant can be shut down and carried out with the plant cold.

If plant cannot be removed or turned off during removal work, and work cannot be delayed, put control measures in place to manage the risks. This table shows some examples.

This table shows control measures to use when plant must stay operating during asbestos removal.

Control measure	Details
Minimise heat sources	Operate equipment at minimum temperatures. For example: switch one boiler off, run the other at the lowest setting, and then reverse the arrangement.
Minimise heat spread	Use temporary insulation to cover exposed hot surfaces Shield radiant surfaces with radiant heat barriers.
Make sure air is effectively managed inside the enclosure	Increase ventilation rates: - remove air at higher levels - make sure supply and extract vents provide a positive rate of air change at the working position. - draw make-up air from outside the heat-affected area where the air is cooler - use air conditioning units to maintain cooler conditions.
Minimise the effects of excessive heat on workers	- Rotate workers frequently - Provide cooler rest areas - Supply cool water - Provide personal cooling vests For more information, see WorkSafe's webpage: Working safely in extreme temperatures

Table 17: Control measures when plant stays operating during asbestos removal

Working in hot environments in general

You should also consider other sources or causes of excessive heat that may present a risk to workers while removing asbestos. For example:

- working in direct sunlight
- working in warmer/summer weather conditions
- working in confined places
- working while wearing heavy PPE/RPE
- physically demanding removal work that can cause internal body temperatures to rise.

For information on the effects of extreme heat on the body and suggested control measures, see WorkSafe's webpage: Working safely in extreme temperatures

10.10 Removing asbestos waste from the enclosure

Sealed waste bags and wrapped items must be decontaminated before they are removed from the enclosure. Decontamination should be done in the baglock:

- **Inner stage of the baglock**: wipe down the bagged or wrapped waste. The bag/wrapped item should be clearly marked as containing asbestos waste. Once wiped down it can be moved to the middle stage of the baglock.
- **Middle stage of the baglock:** the bag should be placed in a second bag (usually transparent), sealed, and wiped down. The waste can then be taken to the outer stage of the baglock
- **Outer stage of the baglock:** the waste should be collected from the outer stage by an outside worker and transferred to the waste skip.

If there is no worker available for this, then the person putting the waste through the baglock will have to carry out preliminary decontamination before taking the waste to the skip or vehicle. For more information on personal decontamination, see Section 13.0: Decontamination after asbestos removal work

Where there is not enough space for a dedicated three-stage baglock, the decontamination should be carried out in an alternative baglock arrangement. For more information, see *Airlocks and baglocks* in Section 8.6: Enclosure access

Once the decontaminated waste package is outside the baglock it should not be left unattended:

- Have a worker based on the outside of the enclosure take the waste to the skip or vehicle being used for disposal. Make sure this worker is wearing appropriate PPE.
- This worker should always remain on the outside of the enclosure to avoid having to decontaminate.

For information about the next steps in disposing of asbestos waste, see Section 15.0: Containment and disposal of asbestos waste

10.11 Site cleaning and preparation for four-stage clearance

Use work methods and equipment which will prevent or minimise the build-up of asbestos debris and waste in the work area. This will make cleaning up easier.

- remove all asbestos waste from the work area without creating additional risks of spreading it

- ACM should be placed directly into waste bags as it is removed
- where wet removal techniques have been used – place waste into bags before it starts to dry out (or keep residue damp until it can be bagged)
- clean throughout the work period and make sure the area is clean at the end of each shift.

Cleaning methods

Cleaning methods should not create dust:

- Do not use brushes or brooms.
- Pieces of debris can be cleaned up using rakes and shovels. Damp cloths and wipes should be used for additional cleaning of surfaces.
- Dust and debris should be dampened down as necessary before cleaning.
- Use Type H vacuum cleaners which are designed for asbestos (Figure 31).
    - Type H vacuum cleaners are fitted with HEPA filters and is designed for dust-free disposal.
    - Do not use domestic or general-purpose vacuum cleaners (even those with HEPA filters)
    - Do not use type H vacuum cleaners on very wet material. Excessive liquid will damage the HEPA filter. Instead use vacuum cleaners suitable for wet surfaces. The vacuum cleaner will need immediate cleaning and decontamination after use, including removing and disposing of the filter.

Figure 31: Type H vacuum cleaner

Cleaning stages

Clear the enclosure (including airlocks and baglocks) of all asbestos waste and other non-essential items (such as tools and equipment). The only remaining items should be:

- Any wrapped waste that could not be removed through the baglock system.
- A type H vacuum cleaner, wipes, and waste bags which may be needed for any additional cleaning as directed by the assessor.
- Any equipment the assessor may need to perform the four-stage clearance procedure (such as a ladder).
- A type H vacuum cleaner and buckets for decontamination, which should be left in or near the airlock.

Once the area is cleared, it can be cleaned one last time to prepare for the four-stage clearance procedure. Final cleaning should include the following steps:

- Replace pre-filters on the air extraction equipment with new filters.
- Thoroughly clean the whole work area including all surfaces and items using dustless methods, including:
    - floors
    - walls
    - all sides of sheeted items
    - high-level surfaces
    - pipes
    - ductwork
    - cables
    - undersides of items (pipes, ledges)
    - behind and below plant
    - equipment and other furnishings and fittings.
- Use a type H vacuum cleaner for the initial clean.
- Surfaces should then be wiped as necessary with damp cloths or wipes to make sure all fine settled dust has been removed.
- Remove sheeting or boarding which has been used to protect any equipment, plant, items, or other surfaces (including sacrificial flooring)
    - Consider spraying sheeting with an adhesive sealant, such as PVA, before removal to reduce the potential for release of residual fine settled dust. But make sure sealant does not spread onto other surfaces which would inhibit the issuing of the clearance certificate.

    - After protective sheeting has been removed, check the underlying surfaces for any dust or debris which may have penetrated or settled on to them. Clean these as appropriate.

- Allow enough time for the work area to completely dry out before the four-stage clearance procedure is carried out.

- Finally, carry out a thorough visual and fingertip inspection to make sure that there has been complete removal of the ACM as planned and that the work area has been properly cleaned of visible debris and fine settled dust.

- Ideally, prepare a handover form from the supervisor that states they are confident the area is dust and debris free before the assessor enters for Stage 2. For an example of an asbestos removal area handover form, see Appendix 5: Asbestos removal area handover form

10.12 Approval of methods for managing risks associated with Asbestos

WorkSafe-approved methods can allow for work involving asbestos to be carried out that would otherwise be prohibited by the asbestos regulations.

This can apply to situations where existing approved methods for managing asbestos (including its removal) cannot be followed. PCBUs cannot use an alternative method until it has been approved by WorkSafe.

For more information on the criteria and how to apply for an approved method, see WorkSafe's webpages:

- Asbestos approved methods

- How we approve methods for working with asbestos

11.0 Clearance inspections

After asbestos removal work, a clearance inspection makes sure the area is free of harmful fibres and safe to reoccupy.

11.1 What are clearance inspections and who can do them?

A clearance inspection is carried out after licensed asbestos removal work to make sure the premises are safe to reoccupy. The person who commissioned the asbestos removal work at a workplace must make sure a clearance inspection of the asbestos removal area is completed, and a clearance certificate is issued. For removal work in residential homes the removalist must make sure the clearance inspection is completed.

Clearance inspections can be carried out by certain people, as shown in this table.

Class A asbestos removal work	Class B and unlicensed asbestos removal work
- an independent licensed asbestos assessor	- an independent licensed asbestos assessor - an independent competent person.

Table 18: Who can carry out clearance inspections

For detailed information on what makes an assessor or a competent person independent, see Section xx: [name] in [Assessor guide placeholder].

A **competent person** is a person who has relevant industry experience, skills, and knowledge. They must also hold either of the following qualifications:

- a certificate from a training course, specified by WorkSafe for asbestos assessor work
- a tertiary qualification in occupational health and safety, occupational hygiene, science, or environmental health.

For more detailed information see Section xx: [name] in [Assessor guide placeholder].

11.2 How to find a licensed asbestos assessor

The register of licensed asbestos assessors is on the WorkSafe website, Licence holder register

11.3 What does the inspection process involve?

There are four stages to the clearance inspection process. The assessor and removalist have actions to take at each step.

This table summarises these steps.

Stage	The assessor will	The removalist will
Stage 1: Preliminary check of site condition and job completeness	- Inspect the removal control plan - Check the decontamination facilities are still intact, operational and clean - Check for signs of contamination, leaks, burst waste bags or debris - Check the enclosure's integrity	- Fix any breaches - Clean and remove any debris found by the assessor
Stage 2: Visual inspection inside the enclosure or work area	- Check asbestos/ACM removal including underlying surfaces - Check for any visible ACD left inside the enclosure, airlocks, or work area - Check for any fine settled dust	- Make sure the removal area has been cleaned and dried before the inspection - Accompany the assessor to correct minor problems - Clear any debris or dust if they are found during the inspection
Stage 3: Air monitoring	**Class A removal:** Conduct surface testing by surface disturbance, then conduct air monitoring immediately after. **Class B removal:** conduct air monitoring and/or surface testing by surface disturbance, if the results of the visual inspection determine it is necessary	- Make sure NPUs are turned off and capped while clearance air monitoring is being undertaken
Stage 4: Final assessment post-enclosure and work area dismantling	- Check for any residual contamination following dismantling of the enclosure	- Dismantle the enclosure when the enclosure or work area has passed the visual inspection and/or air monitoring.

Table 19: Actions for each step of the four-stage inspection clearance process

11.4 Surface testing

Surface testing is a planned and controlled disturbance of enclosure surfaces immediately prior to clearance air monitoring.

Surface testing is mandatory for **Class A** asbestos clearance inspections and optional for **Class B** asbestos clearance inspections undertaken following completion of the asbestos removal work.

Surface testing by surface disturbance and air monitoring is carried out during Stage 3 of the clearance inspection by the licensed asbestos assessor or competent person.

Data from surface testing by surface disturbance and air monitoring helps assessors decide whether the area is safe to reoccupy.

For more information, see [Assessor guide placeholder].

11.5 Air monitoring

Air monitoring during clearance inspections is mandatory for **Class A** asbestos removal work, and optional for **Class B** asbestos removal work. For more information, see [Assessor guide placeholder].

11.6 Wet enclosures or work areas

Where practicable, the enclosure or work area should be clean and dry before the inspection begins. It may be hazardous for licensed asbestos assessors/competent people to conduct their inspections in a wet environment, it is also harder to inspect for the presence of fine dust.

11.7 Using sealant

Sealants, including PVA, may be used in limited circumstances. For example, where the enclosure also contains significant amounts of non-asbestos (for example, brick or wood) dust that may interfere with the air monitoring readings.

It should not be used to replace the need for thoroughly cleaning the enclosure.

Sealants should not be applied inside the enclosure before the visual inspection begins.

If a licensed asbestos assessor or competent person finds a sealant-sprayed enclosure, the asbestos removalist may be instructed to clean and dry the enclosure before the visual inspection starts.

If the licensed asbestos removalist is considering applying sealant before the visual inspection phase begins, it should seek advice from the licensed asbestos assessor/competent person first.

If the licensed asbestos removalist has used a sealant in the asbestos removal area, it should notify the client and advise them that the sealant may break down over time.

11.8 Clearance certificates

A clearance certificate will be issued if the licensed asbestos assessor's testing confirms that the asbestos removal area no longer poses a risk to health and safety from asbestos exposure.

The area must not be reoccupied until the PCBU who commissioned the work, or the licensed asbestos removalist (when the work is at a residential home) has obtained a clearance certificate for the asbestos removal area. This includes reoccupation for demolition, other work activities or normal use.

A PCBU must make sure, so far as is reasonably practicable, that only people involved in the asbestos removal work or authorised people, can enter the asbestos removal area before the clearance certificate is issued. Signs and barriers must remain in place until the clearance certificate is issued.

For more detailed information about the clearance process, see Section 7.0: [name] of The good practice guidelines for asbestos assessors

12.0 Containment and disposal of asbestos waste

Correctly containing and disposing of asbestos waste reduces the risk of asbestos fibre exposure.

Proper handling, containment, transport, and disposal of asbestos waste can help to minimise the risk of workers and others being exposed to asbestos fibres.

As well as all the asbestos material removed during the removal process, the following items should also be treated as asbestos waste:

- all enclosure building materials (such as timber and sheeting)
- any items that have been present (and unprotected) inside contaminated areas that cannot or will not be cleaned (including tools and equipment)
- all disposable PPE used in the enclosure, transit and waste routes and in the DCU.
- any disposable or discarded items used in cleaning and decontamination such as cloths, wipes and towels.

Wastewater from buckets in airlocks should be disposed of through the filtered drainage system in the shower of the DCU.

The asbestos removalist must:

- make sure asbestos waste is properly **contained and marked clearly** to indicate the presence of asbestos, before removing it from the work area
- make sure asbestos waste awaiting disposal is stored in sealed containers such as drums with removable lids, or a sealed skip (lockable to prevent any tampering)
- dispose of waste as soon as is reasonably practicable.

Asbestos removed as unlicensed removal of Class B Asbestos under 10m^2 should still be wrapped and disposed of as explained in this section.

12.1 Double bagging asbestos waste

Double bag friable asbestos and small pieces of non-friable asbestos in new heavy-duty 200-micron (minimum thickness) plastic bags to minimise the release of asbestos fibres.

To double bag asbestos waste:

- Lightly mist the interior and contents of the inner bag before gently removing excess air.

- Only fill the bag halfway with asbestos waste to minimise the risk of tearing or splitting.
- Twist the top of the bags tightly, fold the necks over (a 'goose-neck twist'), and seal with duct tape to fully enclose the contents (Figure 32).
- Clean the external surface of each bag to remove any dust before removing the bags from the asbestos work area.
- Clearly mark the outer bag with **Caution Asbestos – Do not open or damage bag. Do not inhale dust**.
- Close bags with a goose-neck tie.

There is purpose made heavy-duty asbestos waste bags available from hazardous waste suppliers that can also be used. They usually contain a zippered top, ensuring a tighter seal and are available in various sizes. Make sure they meet relevant New Zealand standards and follow the manufacturer's instructions before using.

Figure 32: Asbestos waste double bagged and sealed with a goose-neck twist

12.2 Polythene sheeting

Large items that do not fit into asbestos waste bags, such as asbestos sheeting, asbestos-lagged pipes and similar long or large items should be double-wrapped in heavy-duty 200 m (minimum thickness) polythene sheeting.

- Avoid using recycled polythene sheeting, as it may have rips or flaws.
- Apply adhesive tape to the entire length of every overlap to minimise the risk of tearing or splitting.

- Clean the external surface of the sheeting to remove any dust before removing it from the asbestos work area.

- Clearly mark the outer wrapping with **Caution Asbestos – Do not open or damage bag. Do not inhale dust**.

12.3 Asbestos waste drums or bins

Drums or bins used for storing and disposing of asbestos waste should be well-maintained, with lids and rims in good working order.

Drums or bins used to store or dispose of asbestos waste should:

- be placed in or near the asbestos work area before starting work

- be lined with heavy-duty polythene

- be clearly marked to indicate the presence of asbestos

- be wetted down while being filled to minimise the release of asbestos fibres into the air

- have rims sealed and outer surfaces cleaned before removal from the work area.

Store asbestos waste drums or bins in a secure location when not in use.

Use trolleys or drum lifters to move them manually once filled.

If a drum or bin is to be reused, pack and seal the existing asbestos waste to minimise the risk of residual contamination. Inspect each drum or bin after use to make sure it is free of asbestos residue.

12.4 Asbestos skips, vehicle trays, and similar containers

If asbestos waste is too large for bags, drums, or bins, use skips, vehicle trays, or similar containers. Make sure they are in good condition.

If using a skip, vehicle tray, or another similar container to dispose of asbestos waste, make sure to:

- locate the container as close as possible to the enclosure to reduce the risk of the spread of contamination and the potential for musculoskeletal injuries while carrying heavy bags or wrapped items

- keep the container well away from sensitive areas, such as in the middle of a school playground or near the entrance to a public building

- mark out the route to be taken from the enclosure to the container and make sure waste is only taken along this route. This route will need to be checked during the clearance process
- double wrap asbestos waste in heavy-duty plastic sheeting (or double bag the waste) before placing it in the container (see Section 12.1: Double bagging asbestos waste and Section 12.2: Polythene sheeting)
- carefully place bagged or wrapped items into the container. Do not throw items into the container
- seal the contents of the container completely with plastic sheeting when it is full and have a procedure to prevent the plastic sheeting from tearing when the container is emptied
- secure the contents of the container to prevent unauthorised access until the waste is disposed of (for example, using a lockable lid or placing the container in a secure area)

All drums and bins containing asbestos must be sealed and clearly marked to indicate the presence of asbestos before removal from the asbestos work area.

12.5 Removing asbestos waste from the asbestos removal area

Once waste has been removed from the asbestos work area, it needs to either be:

- placed in an appropriate container for secure storage and eventual disposal
- immediately removed from the site for transport to the disposal site.

12.6 Storing asbestos waste

Asbestos waste can only be stored under the following circumstances:

- on site in a locked skip or locked vehicle
- at a waste management facility.

12.7 Asbestos waste removal plan

The ARCP should include an asbestos waste removal plan. It should describe how to transport and dispose of asbestos waste, and detail:

- the name of the asbestos waste transporter
- how asbestos waste will be contained

- the quantity (amount and dimensions) of asbestos waste
- where the asbestos waste will be stored onsite before disposal
- how the asbestos waste will be transported
- approval requirements from the local council, such as permits and paperwork
- local council requirements, such as the quantity of asbestos and container dimensions
- the destination of the asbestos waste
- how correct disposal will be verified, such as through tip dockets.

12.8 Transporting asbestos waste

While asbestos is not considered hazardous waste under the New Zealand road rules, it is recommended that PCBUs transporting asbestos waste should, where relevant, follow the rules for transporting hazardous waste.

All loads must be made secure.

It is recommended that:

- drivers hold a dangerous goods licence
- high loads are placarded to help keep them secure
- waste vehicles have GPS tracking
- drivers have completed an asbestos awareness course
- there is an emergency response plan in place in case of a crash or incident including:
    - letting first responders know as soon as possible if there is a risk of spilled asbestos waste.
    - having an emergency plan for containing spilled asbestos waste

If a package or bag bursts during transit, the vehicle, container or skip it was being carried in will need to be cleaned out and visibly inspected before it can be reused. A vehicle may also require a disturbed air test.

Waste: Key points

Make sure that waste is properly bagged and/or wrapped with the appropriate approved markings.

Waste bags or packages should be removed through the baglock.

Position the skip, container or vehicle as close to the enclosure as possible.

Ensure that no sharp objects can burst bags or packages during transit.

Ensure that the skip, container or vehicle is kept locked.

All waste should be taken to a licensed or permitted waste management facility.

Asbestos waste can only be stored on site in a locked skip, container or vehicle or at a waste transfer station.

Make sure there are emergency procedures for clearing up any burst bags or packages.

13.0 Decontamination

Decontamination after leaving an enclosure or removal area helps control the spread of asbestos fibres.

Decontamination is necessary to make sure workers, their PPE, and RPE are free of asbestos fibers before leaving the enclosure or work area. It helps prevent the spread of asbestos outside the enclosure.

Nothing that is likely to be contaminated with asbestos should be removed from the asbestos removal area unless it:

- is decontaminated before being removed
- is sealed in a container that has been decontaminated on the exterior and clearly labelled to show it may contain asbestos.

Decontamination is also important for preventing others who come into contact with asbestos workers, equipment, or waste from getting secondary contamination. Family members can be exposed to asbestos if contaminated clothing is taken home.

There are three stages of decontamination (see Section 13.1: Three stages of decontamination). This section provides information on the second and third steps of decontamination:

- preliminary decontamination and
- final decontamination through a decontamination unit (DCU).

This section also covers set-up, cleaning, and maintenance requirements for DCUs.

For information on Stage 1 procedures, see Section 10: Controlled removal and repair techniques

13.1 Three stages of decontamination

Decontamination consists of three stages, as shown here.

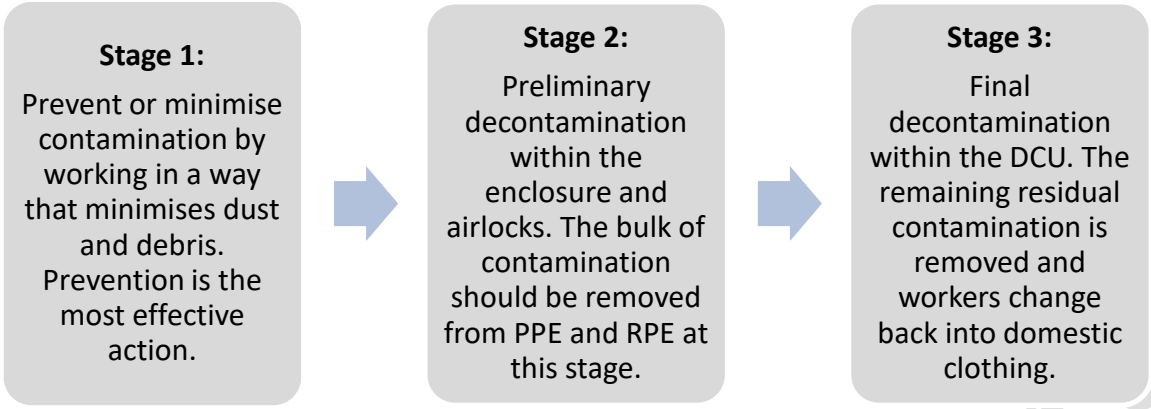


Figure 33: Three stages of decontamination

This three-stage structured approach to decontamination allows the process to be conducted systematically and consistently. Workers should follow the same series of steps every time they leave an enclosure.

Note: it is not acceptable to use airlocks as DCU facilities. They should be treated as two separate areas with two specific and different functions.

13.2 Preliminary decontamination (Stage 2)

Preliminary decontamination procedures will be different depending on whether the DCU is directly attached to the enclosure (non-transiting) or separate from the enclosure (transiting).

Where possible, non-transiting set ups should be used unless it is not reasonably practicable to do so, such as when there is limited space, restricted access, or multi-storey work.

Transiting set-ups increase the risk of spreading contamination along the transit route. The transit route will form part of the four-stage clearance test at the end of the job.

Note: Workers must keep their RPE on during preliminary decontamination.

Procedures for accessing a DCU directly connected to the enclosure (non-transiting)

In this set-up the DCU is connected to the enclosure through a short intervening space or tunnel and a one-stage airlock constructed of polythene sheeting (Figure 34).

The procedure relevant for this type of setup is described in Appendix 4.

Before entering this space (while still in the enclosure), the worker should make sure the bulk of contaminants are removed. They can then proceed to the one stage airlock to clean their RPE (while still wearing it) and footwear then go directly to the DCU for full decontamination.

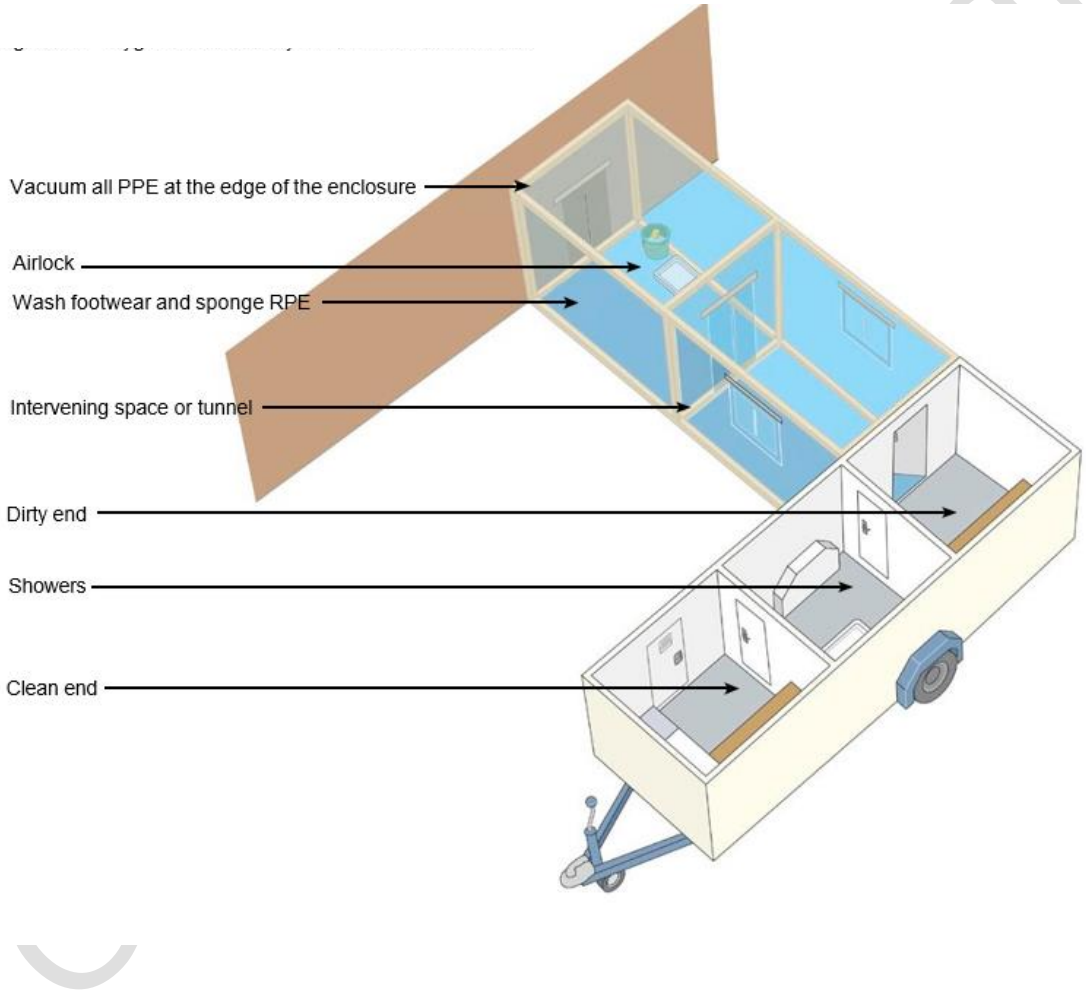


Figure 34: DCU directly attached to the enclosure

Procedures for accessing a DCU separate from the enclosure (transiting)

Where it is not possible to attach the DCU directly to the enclosure, take additional steps to make sure that asbestos fibres are not spread while the worker is walking to the DCU.

These steps involve the use of a three-stage airlock block (Figure 35) where the worker carries out preliminary decontamination before walking to the DCU for full decontamination.

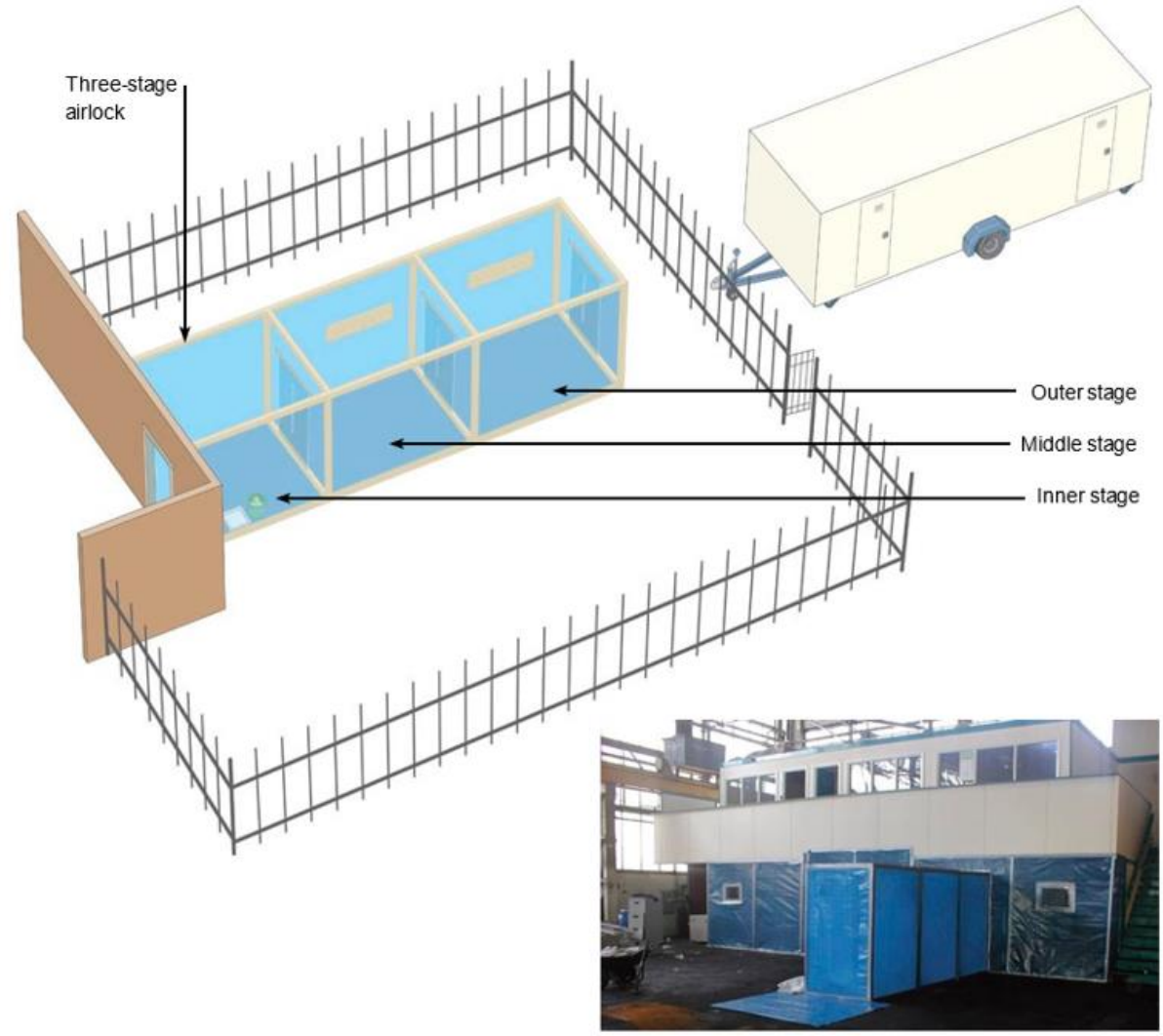


Figure 35: Example of a three-stage airlock

Procedures for using the three-stage airlock

The decontamination procedure relevant to this type of setup is also described in Appendix 4: Decontamination processes

In the first/inner, stage workers clean their shoes and wipe down RPE (while still wearing it).

In the middle stage workers remove used work coveralls (which are then disposed of as hazardous waste).

In the third/outer stage workers put on transit (blue coloured) coveralls and transit footwear or overshoes:

- used work footwear may be stored after use (in the middle stage) or covered with overshoes during transiting
- new (unused and clean) blue-coloured coveralls should be worn while transiting between the three-stage airlock and the DCU.

All transit routes should be marked out to make sure other workers or members of the public keep away from this route. The transit route will form part of the four-stage clearance test at the end of the job.

13.3 Set-up requirements for three-stage airlocks

Three-stage airlocks should be specially constructed and made of polythene sheeting. They should be attached to the enclosure and should comprise three compartments separated by weighted sheets to minimise the spread of dust between the compartments.

The three-stage airlock should be as big as possible to enable the workers to change and decontaminate. The absolute minimum dimensions for each compartment should be 1m x 1m x 2m.

The three stages should have certain facilities within them, as shown in this table.

Stage	Facilities
Outer stage	Facilities to store transit coveralls and footwear, such as hooks and/or shoe-holders.
Middle stage	Facilities to store coveralls and footwear worn in the enclosure, such as hooks and/or shoe-holders.
Inner stage	Footbath and brush, water bucket and sponge or wipes for RPE. (Type H vacuum cleaner is usually located at the edge of the enclosure).

Table 20: Three stages of a transit facility, or three-stage airlock

Remember: Do not use airlocks as DCU facilities. They should be treated as two separate areas with two specific and different functions.

13.4 Final decontamination in a DCU (Stage 3)

Stage 3 is where the remaining residual contamination is removed, workers shower and change back into domestic clothing. This final decontamination should be done using a purpose-built DCU that is divided into three zones.

For an example of a DCU layout, see Figure 36.

DCUs also allow workers to prepare for work before entering the enclosure (changing from their personal clothing into their PPE and RPE).

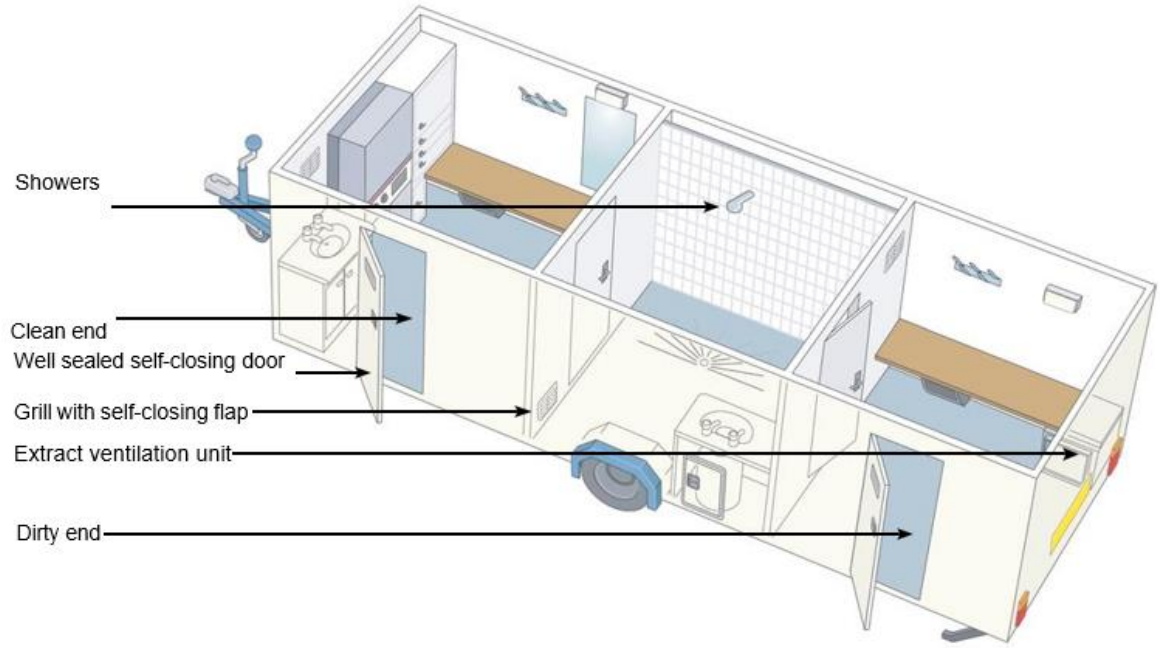


Figure 36: General layout of a DCU

Zone one - the dirty end

In the first stage, the dirty end, workers should take off all footwear, coveralls and underwear worn in the enclosure and place in storage or disposal bags. RPE should still be worn at this stage.

Zone two – the shower

Workers then move to the shower area (with RPE still on) and use a sponge to clean RPE without allowing water onto filter ports. Remove or cap used filters and place in waste bag for disposal if appropriate.

Once RPE has been cleaned workers can remove it and start showering:

- take thorough showers (a minimum of five minutes)
- thoroughly wash hair
- thoroughly scrub fingernails

After thorough decontamination in the shower cubicle, the next step is to use disposable towels for drying.

If choosing to dry in the shower cubicle, the worker will have to treat the towel used in the shower cubicle as contaminated and dispose of it as asbestos waste.

Zone three – the clean end

Having thoroughly showered, if the worker has not already dried themself in the shower zone (see Zone two – the shower), they should step into the clean end of the DCU and:

- using a fresh disposable towel, dry themselves completely
    - if the towel has never progressed beyond the clean end of the DCU, it can be treated as uncontaminated non-asbestos waste.
    - get dressed.

Figure 37: An example of a shower unit

13.5 Set-up requirements for DCUs

DCUs should be purpose-built and should only be used for the decontamination of asbestos workers. They need to meet the minimum design criteria and specifications set out in Appendix 3.

There are two main types of DCUs:

- Mobile DCUs (includes vehicle-based units)
- Modular DCUs

Using pop-up shower pods or makeshift set-ups is not recommended.

DCUs should be on site and functional from the very start of the job. They should be available during early activities such as:

- during pre-clean work
- while the enclosure is being built
- when scaffolding is being erected – especially if there is a risk of the scaffolding disturbing asbestos.

Note: Waste should never be taken through the DCU as it could lead to cross contamination within the unit. Waste (and equipment) should be removed from the enclosure through a separate baglock (see Section 8.6: Enclosure access).

Mobile units

A mobile unit is a caravan-style or re-locatable self-contained unit that can be towed to the site. This type of unit should be used in preference to modular units, as generally they are larger and provide more space and comfort for thorough decontamination.

Mobile units are usually available in several sizes to accommodate 2-8 people.

Note: Mobile DCUs should arrive on site clean. The unit should contain a copy of the clearance certificate from the most recent asbestos removal job. Attach the certificate in a visible place in the clean end.

Mobile units must remain on site for the duration of the work activity, including during clearance. Mobile units should not be taken away until after clearance has been issued.

Figure 38: Example of mobile facilities

Modular decontamination units

Modular DCUs are panel-based systems which enable construction of the facilities on site. Some modular units can be assembled in different configurations (for example, straight line or L-shape) or be extended to more than three compartments.

The air extraction unit, the water management system and the electrical/sockets system are usually positioned outside the DCU.

Modular units can often be directly attached to enclosures, avoiding the need for transiting.

There are potential disadvantages with modular units, particularly size, integrity, and the effectiveness of the water management systems. Modular units need to meet the design criteria described in Appendix 3.

Figure 39: Example of modular facilities

13.6 Connecting DCUs to services

All service connections must meet all relevant regulatory requirements and standards. This table shows what is required.

Electrical connections	Gas appliances	Water and wastewater
DCUs must comply with the Electricity (Safety) Regulations 2010 and the relevant standards depending on the type of connection: - DCUs connected by a plug and lead need an electrical warrant of fitness and must be renewed every four years - see AS/NZS 3001 - DCUs that use a detachable connection complying with IEC 60309 (round pin) with a minimum rating of 16 A (such as 'caravan type plugs), must comply with AS/NZS 3001 - DCUs connecting to a generator must comply with AS/NZS 3010 - DCUs with fixed connections must follow the wiring rules for electrical installations - AS/NZS 3000 - DCUs connected at construction sites must follow specific requirements related to construction site connections - AS/NZS 3012	The gas system needs to be checked regularly to make sure it is operating safely: - Gas pipework connections and boilers can be damaged during transportation so should be inspected daily and before the next use of the DCU. - Gas bottles (LPG bottles) must be regularly serviced and checked for any leaks each time they are refilled.	- Make sure the water and wastewater supplies are insulated against frost damage. - All piping should have flexible jointing to prevent rupture. - Wastewater needs to be filtered through a high efficiency filter (specification less than 5 microns). - Check there is sufficient water pressure and hot water for the duration of the job. - Filtered wastewater can be disposed of with normal wastewater.

Table 21: Requirements for service connections

For more information, see Section 13.10: Equipment testing

13.7 DCU signage

Notices should be posted at each entrance door, clearly indicating which is the clean end and which is the dirty end and prohibiting unauthorised entry (Figure 40). Drainage pipes and electrical connections should also be labelled.

Figure 40: Example of notice on DCU

DCUs should have self-closing doors and be lockable between sections so workers can prevent unauthorized entry by others especially while they are changing clothes and washing.

13.8 Inspection and cleaning of DCUs

DCUs should always be kept clean and deep cleaned at the end of each working day.

When cleaning DCUs:

- cleaners should wear protective clothing and RPE
- work from the clean end towards the dirty end
- waste bags from the shower and dirty end (properly cleaned, labelled and double bagged) should be removed through the dirty end
- water systems should be drained, traps in the shower and washbasin should be emptied and residues placed in a plastic bag for disposal as asbestos waste.

Any transit route and the area where the facility has been parked should be inspected and cleaned to make sure that there is no residual asbestos waste.

At the end of the asbestos job, the DCU should be thoroughly cleaned and subjected to a clearance test. A clearance certificate should be posted in the clean end of the unit before it is used for the next job.

Where the DCU is removed from site at the end of the working day for security reasons, it should be locked and treated as being contaminated. It should be returned as close to the previous location as possible.

13.9 Maintenance of DCUs

The DCU should be maintained in good working order and according to any manufacturer's instructions.

If there are any problems with the shower, heating, or extraction facilities, the unit should not be used until the problem is fixed.

This table shows a suggested daily and weekly checklist for supervisors.

Checklist for DCUs	
Before DCU use	Do a visual check of all electrical equipment and confirm: - it is compatible with the electrical power sources - the earth fault loop impedance test is complete - the voltage and plug pins are compatible - the earth bonding works correctly (for modular DCUs installed on site).
Daily (before each shift)	Daily operational checks should be carried out by a suitably trained supervisor to confirm: - water, gas, and electricity supplies are working and sufficient - the shower has good pressure and the right temperature - the heating system works - the NPU works (check the pressure gauge or warning device to make sure the HEPA filter is not saturated - battery chargers work - there are enough waste bags, towels (one in the shower and one in the clean end), filters, and PPE - the unit, transit routes, and facilities are clean - the vacuum cleaner works, and there are enough sponges and water baths in any transit airlock - airlocks are intact

Checklist for DCUs	
	- there are no environmental issues affecting the DCU, such as frozen pipes - RCDs work
Weekly	Visual check of electrical equipment for damage, wear, overheating etc.

Table 22: Daily and weekly checklist for DCUs

13.10 Equipment testing

Equipment should be examined and tested by an appropriate competent person and records kept.

This table shows things that should be checked, by who, and how often.

Equipment	Checking requirements	Who should check and how often
Air extraction system	- DOP or sodium chloride tests on the HEPA filter - Volumetric flow rates	- Qualified technician/competent person - Every six months
Gas appliances	- Service and maintain in accordance with the manufacturer's recommendations	- Qualified gas technician - As required for the appliance warrant of fitness
Electrical systems	- Look for evidence of breakages, wear, or deterioration - Look for signs of overheating - Check for missing parts (such as screws or covers) - Make sure switchgear is accessible (not obstructed) - Check for loose fittings - Make sure there is no access to live conductive parts - Check the equipment is working properly - lighting, heating, shower unit, RDCs (using test	- A competent person should do these routine checks every week and a formal, documented check every month. - The competent person doing the checks does not need to be an electrician, but they should be trained in what to look for and be trusted to do the job properly. - *Test the RCDs that provide automatic disconnection on the distribution circuits every day.

Equipment	Checking requirements	Who should check and how often
	button*), sockets, and switchgear (where reasonable).	

Table 23: DCU equipment that should be checked, by who, and how often.

Record-keeping of equipment tests and checks

Records should be kept of site inspections as well as equipment tests and checks. Records should be kept for five years and copies of the most recent checks should be available for inspection on site.

13.11 Training in decontamination procedures

Workers should receive practical training on decontamination procedures so they can decontaminate properly. Training should involve practicing how to decontaminate in a simulated environment.

It is particularly important for workers to recognise the need for primary decontamination during transit procedures.

For more information, see Section 4.0 Training and instruction

13.12 Monitoring of the decontamination process

Supervisors should monitor and regularly check that workers are consistently following decontamination procedures. For example:

- Make sure that workers do not develop poor practices or become complacent
- Make sure that no inappropriate items are taken into the DCU (such as filled waste bags, drink bottles)
- Check that decontamination is carried out regardless of the time spent inside the enclosure

Where workers are found not following the decontamination procedures, consider retraining for those workers.

13.13 Emergency procedures for DCU failure

Have a plan for what to do if there is a loss of services to the DCU. Plans should be developed for alternative basic decontamination procedures to use other facilities on site or by organising the services of another DCU.

These alternative arrangements should be clearly documented, and workers and supervisors should be aware of what actions to take.

14.0 Tools and equipment

Select the appropriate tools and equipment to minimise airborne asbestos fibres.

It is important to select the correct tools and equipment for any work on asbestos material.

Some tools and equipment are prohibited for use on asbestos material because they increase the chances of asbestos fibres becoming airborne.

Certain tools and equipment that generate dust can be used under strict controls. These are called controlled tools and equipment.

14.1 Prohibited tools and equipment

The following equipment must not be used on asbestos or ACM, and a PCBU must not direct or allow a worker to use it.

High-pressure water spray

This means water pressurised by positive displacement pumps that have an output capability of more than 350 kPa. High pressure water spray can only be used in the following situations:

- for fire-fighting or fire prevention purposes
- water jetting to clear or prevent blockages in wastewater or water pipe networks
- specific instances of the use of a relevant method for managing risk associated with asbestos that is approved.

Compressed air

Using compressed air on asbestos material is prohibited because it significantly increases the risk of asbestos fibres becoming airborne.

14.2 Controlled tools and equipment

Tools and other equipment that release asbestos fibres, including power tools, brushes and brooms, may be used only if used in control conditions. For example:

- the equipment is enclosed while being used (such as being used within an enclosure with mechanical ventilation operating)

- the equipment is designed to capture or suppress airborne asbestos and is used in accordance with its design
- the equipment is used in a way that is designed to capture or suppress airborne asbestos safely
- or a combination of the above.

Use manually-operated (non-powered) hand tools wherever possible. If this is not possible, use low-speed, battery-powered tools that can be used with wet methods for dust control.

Fit battery-powered tools with local exhaust ventilation (LEV) dust control hoods wherever possible. If LEV cannot be attached and other dust control methods are unsuitable, the asbestos worker should use shadow vacuuming techniques (Section 10.4: Controlled wetting by injection).

When using power tools with dust suppression or extraction, air monitoring should be carried out to ensure the controls in place are effective in reducing the release of fibres.

For more information, see Section 9.0: Air monitoring

14.3 Equipment inspection and maintenance

Inspect all equipment used for removing asbestos:

- before work involving asbestos starts
- after any repairs
- at least once every seven days when it is continually used.

PCBUs should keep records with details of these inspections, the state of the equipment and any repairs made.

Never take anything that could have asbestos on it out of the work area - not even during the job. Tools must be either:

- decontaminated after finishing work involving asbestos. The PCBU must not allow anything to leave the enclosure if it is likely to be contaminated.
- sealed in a container. Before removing the container, decontaminate the outside and label it to show it contains asbestos.

14.4 Industrial vacuum cleaners

Vacuum cleaners used for hazardous dusts, such as asbestos, must be fit for purpose to make sure the dust is safely captured and contained.

Domestic or standard commercial vacuums are **not** suitable for this purpose, regardless of the filter used.

Industrial vacuums rated for use with hazardous dusts are classified as L, M, or H, which refer to the hazard rating: light, medium, or high hazard.

Asbestos is classified as a high-risk material, so only H-class industrial vacuums should be used with for work involving asbestos material (including asbestos-contaminated dust).

High-efficiency particulate air (HEPA) **does not** mean H-class.

14.5 Vacuum cleaner filters

Filters used in vacuum cleaners for hazardous dusts must:

- be designed to fit the specific model of the vacuum cleaner being used
- achieve the same or higher filtration efficiency that the vacuum cleaner is rated for.

Class H vacuum cleaners used for asbestos work should not be used on wet materials or surfaces unless designed for that type of work.

For more information on selecting the right industrial vacuum or filter or maintaining a vacuum, see WorkSafe's webpage: Industrial vacuums and portable extractors for hazardous dust

14.6 Maintaining vacuum cleaners

When vacuum cleaners have been used with asbestos, removal and disposal of the contents must be performed by a competent person. Vacuum cleaners should be maintained according to the manufacturer's guidance.

Competent person

A competent person is someone who has the appropriate skills, training, knowledge, and experience to perform the task or role.

The competent person should:

- wear personal protective equipment (PPE), including appropriate respiratory protective equipment (RPE) - which has been fit-tested
- seal or cordon off an appropriate area to prevent unnecessary dust exposure to others or carry out the operation in an enclosure
- make sure the dust bag has been removed and disposed of first
- use a damp cloth to clean the dust off the outside of the vacuum, and any inside parts that are accessible
- dispose of dust and containment bags and contaminated damp cloths as asbestos waste in tightly sealed and labelled bags or containers
- only dispose of asbestos waste at authorised asbestos disposal sites.

For a more thorough clean, use another industrial vacuum cleaner. Only use this method if the other vacuum cleaner is rated at the same class, or higher.

Dry brushing or using compressed air should never be used to clean vacuums. These methods cause the hazardous dust to spread and become airborne. Compressed air can also damage the filters, making them ineffective.

14.7 Transporting vacuum cleaners

Vacuum cleaners used for asbestos work must be treated as asbestos waste during transportation. This means double bagging the vacuum cleaners and any hoses and attachments in suitable asbestos waste bags, clearly identified as containing asbestos.

For more information, see Section 12.0: Containment and disposal of asbestos waste

15.0 Personal protective equipment (PPE)

PPE is essential to help minimise the risk of exposure to asbestos fibres. PPE should also be considered when minimising risks from other workplace hazards.

Personal protective equipment (PPE) helps keep workers safe on the job. It should be the last line of defence after all other reasonable actions to eliminate or minimise risks to workers' health and safety have been taken.

PCBUs must eliminate the risk of airborne asbestos fibres so far as is reasonably practicable. Otherwise, PCBUs must minimise exposure so far as is reasonably practicable. Where the risk of exposure remains PCBUs must provide suitable PPE (including RPE) to workers and make sure they use it.

RPE should be worn at all times when working with asbestos, even if it is only suspected to be present.

Wearing PPE and RPE should not be the only control measure used to reduce the risk of exposure to asbestos fibres. Other control measures should be used as well.

PPE must be suitable for the type of work involved and the hazards the workers face. The PCBU should base their PPE/RPE selection and use on a thorough risk assessment.

If the removal work involves other hazardous substances, the PCBU should take these risks into consideration when conducting the risk assessment.

When other hazardous substances are involved, the PCBU should refer to safety data sheets (SDS) for information on the appropriate PPE to use and any other precautions to take.

Note: The manufacturer, importer or seller of a hazardous substance must supply a New Zealand-specific SDS on request. For more information see: Safety data sheets | WorkSafe

15.1 Who provides PPE

The PCBU directing the work must provide PPE unless it was provided by another PCBU.

Potentially there may be more than one PCBU with a duty to provide the PPE. If this is the case, the PCBUs need to consult with each other to make sure suitable arrangements are made.

The PCBU must pay for the cost of PPE (unless a worker chooses to provide their own). If a worker does choose to provide their own, the PCBU must still make sure it meets the requirements for working with asbestos and decontamination.

Workers can change their mind at any time and choose that the PCBU provide it instead. Workers must give the PCBU reasonable notice of this change.

The PCBU must make sure that PPE is:

- suitable for work with asbestos
- a suitable size and fit, reasonably comfortable
- is compatible with other PPE used
- supported by training so workers know how to wear, use, and store it properly
- maintained, repaired, or replaced so it continues to minimise the risk
- kept clean, hygienic and in good working order.

Provide secure storage for reusable PPE.

When wearing PPE workers must:

- wear PPE in accordance with any information, training, or reasonable instruction by the PCBU
- tell the PCBU about any damage, defects, or if any equipment needs cleaning or decontaminating
- comply with instructions from the PCBU, such as for cleaning and storing PPE.

15.2 Types of PPE

PPE helps to minimise exposure to harmful asbestos fibres. It includes protective clothing such as disposable coveralls with a hood, gloves, appropriate footwear, and shoe coverings.

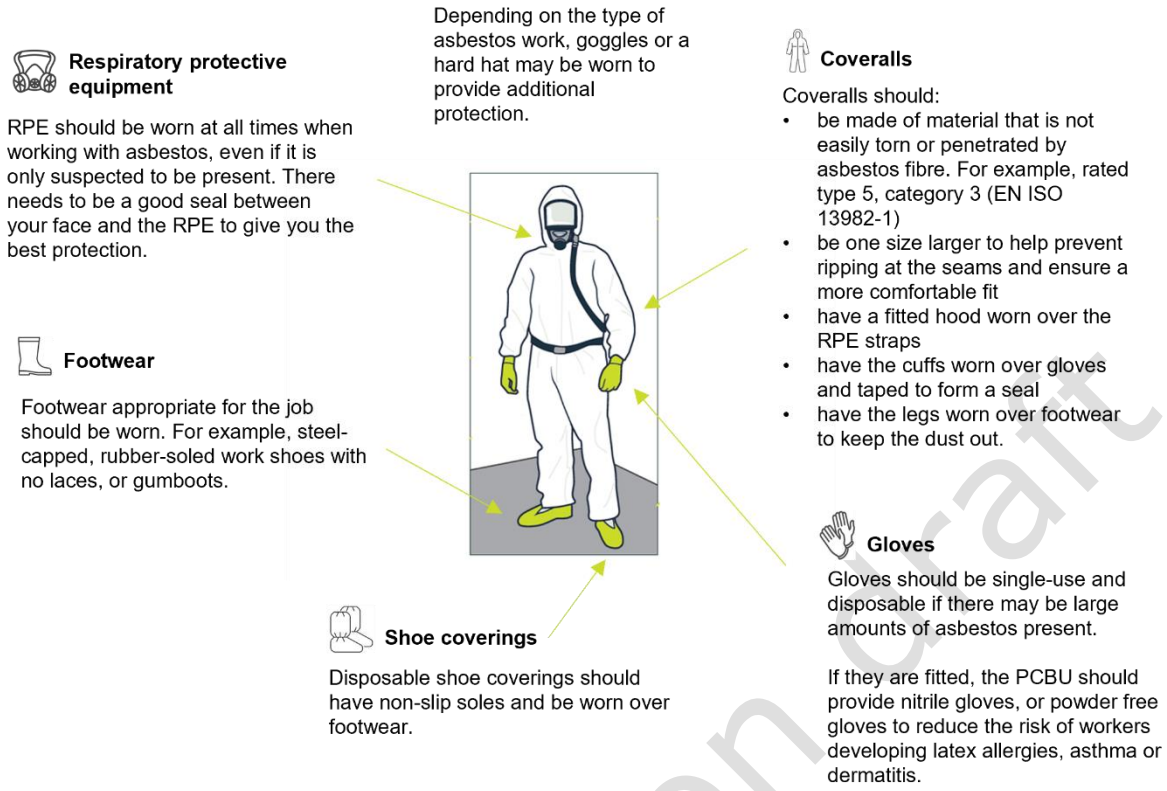


Figure 41: Example of PPE worn when carrying out asbestos removal work

P2 (valved or unvalved) masks are not recommended.

PPE helps to prevent asbestos fibres becoming stuck on the body, clothing, and shoes. Once fibres are on clothes and shoes, they are very hard to clean off and can easily spread to other areas. Reduce that risk by removing PPE and disposing of it, or decontaminating it, when leaving the asbestos work area. Never wear asbestos-contaminated clothing home.

Colour-coding coveralls

Colour coding coveralls can help workers and managers/supervisors keep aware of what level of contamination or exposure risk they are working at. For example:

- red/orange overall can be used for removing/stripping
- blue can be used for transit and waste
- white for assessors and on licensed removal and preliminary work.

15.3 Safe removal of PPE

Removal of contaminated PPE should be carried out using strict control measures.

For information on proper decontamination procedures, see Section 13.0: Decontamination after asbestos removal work

15.4 Disposing of contaminated PPE

Place contaminated PPE, as well as wipes used for decontamination, into a heavy-duty 200um polythene plastic bags or double wrap them in polythene sheets for disposal. The bag should be tied securely with a goose-neck tie and be clearly labelled as containing asbestos.

If a vacuum cleaner has been used to vacuum down clothing, the vacuum cleaner bag is also considered asbestos waste, and will need to be decontaminated and quarantined.

Figure 42: Waste bag labelled and fastened with a goose-neck tie

Asbestos waste can only be disposed of at authorised disposal sites. Check with the relevant local authority where these are, and the requirements they have.

For more information on asbestos waste disposal, see Section 12.0: Containment and disposal of asbestos waste

15.5 Storing reusable PPE

After each use, reusable PPE must be stored correctly:

- reusable PPE must be stored in a sealed container until it is reused
- RPE must be stored in airtight, sealed containers
- reusable footwear such as gumboots should be stored upside down after wiping down the outside surface with disposable wipes
- when using sealed containers, the outside of the containers must be wiped down and the container labelled as containing asbestos (for example, there may be asbestos fibres still trapped in the capped filter of a respirator).

Note: Never store used, disposable PPE. This must be disposed of as asbestos waste.

Workers should never take asbestos-contaminated PPE home.

15.6 PPE for other people at the removal site

PCBUs must make sure other people at the site, such as visitors, wear PPE if their health and safety may be affected.

Other people, such as visitors, are likely to require instruction or training on how to wear PPE correctly. This should be provided by either:

- the PCBU responsible for providing PPE and making sure visitors use it, or
- the licensed asbestos assessor.

Other people visiting the work area must follow the reasonable instructions of the PCBU who has control of the work area regarding wearing or using PPE.

15.7 Training in correct PPE use

Workers must receive training from the PCBU on the correct use of PPE and RPE.

Workers must use and wear PPE in accordance with any information, training or reasonable instruction given.

This training should be completed **before** work with asbestos commences and on regular occasions afterwards.

Training in the use of PPE should include:

- correct use, including safe removal
- inspection, care, and maintenance
- repair and replacement

- emergency procedures
- correct storage.

15.8 Respiratory protection equipment (RPE)

In this section, we describe air-line respirators, selecting the right RPE, disposing of single-use RPE, and maintenance of reusable RPE.

For information on selecting, fit testing, fit checking, and monitoring RPE, see WorkSafe's webpage: Respiratory protection for working with or near asbestos

Air-line respirators

Air-line respirators are used when removing friable asbestos. The air-line should include a belt-mounted back-up filter when in use. If the air supply system fails, workers must leave the asbestos removal area using normal decontamination procedures. The back-up filter will provide enough protection during this process.

If too many workers are using air-line respirators inside an enclosure, the lines might get tangled. If this happens, the licensed asbestos removalist should provide manifolds to prevent tangling and help workers move around.

The compressor must be able to supply enough air for all the air lines in use, and its intake should draw in clean, uncontaminated air. The air must be filtered before it reaches the respirator.

Figure 43: Full-face, positive-pressure demand air-line respirator

Selecting the right type of RPE

When selecting RPE, refer to the latest versions of:

- AS/NZS 1715 Selection, use and maintenance of respiratory protective devices and
- AS/NZS 1716 Respiratory protective devices or

- SA/SNZ TS ISO 16975 Respiratory protective devices – Selection, use and maintenance

The PCBU or asbestos removal supervisor(s) should decide the level of respiratory protection required for the asbestos work.

Selecting suitable RPE depends on:

- what type of asbestos work will be conducted
- the probable maximum concentrations of asbestos fibres expected (Appendix 2: Asbestos levels associated with asbestos activities)
- the wearer's personal characteristics that may affect the RPE's facial fit (for example, facial hair and glasses).

Workers should always wear RPE if respirable asbestos fibres are above trace levels.

Disposing of single-use RPE

The PCBU must make sure the RPE is sealed in a container that is decontaminated and labelled to show it contains asbestos. It must then be disposed of as asbestos waste once the work is finished.

Maintenance of reusable RPE

If reusing RPE, the PCBU must make sure it is either:

- decontaminated, or
- sealed in a decontaminated container marked to show it contains asbestos.

The RPE should be cleaned, disinfected (if needed), and stored safely away from asbestos-contaminated areas.

How long a particulate filter can be used for asbestos work depends on breathing resistance and filter damage. Workers should replace filters if they are damaged or if breathing resistance increases. Damaged filters should be replaced before resistance rises, following the manufacturer's instructions.

Some filter brands may not be usable after exposure to conditions like a decontamination shower. The PCBU should check with the supplier about the filter's effectiveness after such exposure.

16.0 Health monitoring

Health monitoring looks at whether a worker's health is being harmed because of what they are being exposed to while working.

Health monitoring can be used to detect if workers are experiencing health effects from potential exposures.

Asbestos-related diseases take years to appear, but doctors can run tests to monitor the health of people who work with asbestos. However, do not use these tests to assess asbestos control measures. Use asbestos air monitoring, especially personal air monitoring, to check if control measures are working.

Working in hazardous conditions can adversely affect workers' health – in both the short (acute) and long term (chronic). This includes when the work involves substances that are harmful to people's health (substances hazardous to health).

16.1 Who does health monitoring apply to?

Workers must get health monitoring if they are at risk of asbestos exposure when doing any of the following:

- Class A licensed asbestos removal work
- Class B licensed asbestos removal work that lasts more than four weeks in any 12-month period
- licensed asbestos assessor work
- any other ongoing asbestos-related work or unlicensed asbestos removal where there is a risk of airborne asbestos exposure.

Self-employed PCBUs should monitor their own health to comply with the Act.

16.2 Who is responsible for making sure health monitoring is conducted?

The duty to provide health monitoring is a shared duty between relevant PCBUs.

For asbestos removal work, the asbestos removalist (PCBU) usually has the most influence and control to provide health monitoring for its removal workers.

It is recommended that PCBUs monitor their worker participation rates in health monitoring at regular periods, to determine that they are fulfilling their duty to provide it.

16.3 Informing workers about health monitoring

The PCBU must tell its workers about any asbestos-related health monitoring requirements before they start any work that may expose them to asbestos.

The PCBUs must give those workers the following information:

- that the PCBU has a duty to carry out health monitoring
- what health hazard triggered the requirements for the health monitoring (in this case, asbestos)
- what the health monitoring will consist of and how it will be done
- the information that has to be given to the occupational health practitioner
- that the PCBU has a duty to obtain a health monitoring report from the occupational health practitioner
- that the PCBU has a duty to notify other relevant PCBUs
- how health monitoring reports will be kept, stored, and shared, including keeping confidentiality
- the reasons for health monitoring:
    - to help the PCBU reduce the risk of exposure to health hazards in the workplace
    - to enable the PCBU and other PCBUs in the workplace to take remedial action within the workplace to manage the health risk
    - to help with treating and protecting workers who are or were exposed to health hazards
    - to inform WorkSafe if test results indicate a worker may have a disease, illness or injury as a result of carrying out the work that triggered the requirement for health monitoring. This will help WorkSafe fulfil its functions under the Act.

16.4 Components of health monitoring

Health monitoring must include specific checks to monitor the health of workers at risk of asbestos exposure, unless a medical practitioner recommends otherwise. This is a called a ‘full asbestos medical’.

This table shows the checks needed to monitor a worker’s health in these situations.

Health monitoring requirement	Details
Physical examination	This should focus on the respiratory system and include a lung function test (FEV1 and FVC). **Note:** A chest x-ray (PA and lateral) is **no longer needed** unless recommended by a specialist.
Worker's history	Demographic, medical, and occupational history
Exposure records	Personal exposure to asbestos, including: - relevant risk assessment reports - air monitoring results - personal exposure monitoring results. Investigation reports if the airborne contamination standard for asbestos was exceeded

Table 24: Components of a full asbestos medical for health monitoring

16.5 When health monitoring occurs

Health monitoring for workers doing licensed asbestos removal work must start within four weeks of the worker starting the work.

A full asbestos medical should be done every two years from when asbestos work starts, no matter when the worker started work with their current PCBU.

This table shows the health monitoring calendar to use for licensed asbestos removal workers.

Years after starting employment with the PCBU	Procedure
1	Full asbestos medical
3	Full asbestos medical
5	Full asbestos medical
7	Full asbestos medical
9	Full asbestos medical

Years after starting employment with the PCBU	Procedure
11	Full asbestos medical
Every two years thereafter	Full asbestos medical

Table 25: Health monitoring calendar for licensed asbestos removal workers

16.6 The people who carry out health monitoring

An occupational health practitioner with experience in health monitoring must conduct or supervise the health monitoring.

16.7 Paying for health monitoring

The PCBU must cover all health monitoring costs for their workers. If multiple PCBUs are responsible for a worker's health monitoring, they can agree that one PCBU will organise it. However, all PCBUs must share the costs equally unless they decide on a different arrangement.

16.8 Information for the occupational health practitioner

The PCBU who commissions health monitoring must give the following information to the occupational health practitioner:

- the PCBU's name and address
- each worker's name and date of birth
- a description of the type of work the workers are doing that triggered the need for health monitoring
- if the workers have started the work involving asbestos, and how long have they been doing it.

16.9 Health monitoring report

The PCBU who arranges health monitoring must take all reasonable steps to get a report from the occupational health practitioner as soon as possible after the monitoring is complete.

The health monitoring report must include:

- the workers name and date of birth
- the name of the occupational health practitioner
- the name and address of the PCBU who commissioned the health monitoring
- the date the health monitoring took place
- any test results that indicate whether the worker was exposed to a health hazard
- any advice if test results suggest the worker may have a disease, illness, or injury from the work that required health monitoring
- any recommendation for action, including whether the worker can continue the work that required health monitoring.

16.10 Who is entitled to the health monitoring report?

The PCBU who arranges health monitoring must give a copy of the report to the relevant people as soon as possible, after receiving it from the occupational health practitioner.

This table shows who to send the report to.

Need	Details
Who gets the health monitoring report	- The worker - All PCBUs responsible for the worker's health monitoring - People with a duty to provide health monitoring for that worker.
When to give the report to the worker	Workers must get a copy of their health monitoring report as soon as possible after the PCBU receives it.
Worker's entitlement	As soon as possible after receiving it.
Who gets a copy if certain conditions apply	WorkSafe must get the report if it includes: - test results showing the worker may have a disease, injury, or illness from working with asbestos - recommended actions, including whether the worker can keep working with asbestos.

Table 26: Recipients of the health monitoring report

PCBUs may use relevant anonymised information from health monitoring results to monitor worker harm rates as part of standard health and safety performance reporting.

16.11 Health monitoring records

The PCBU must keep each workers' health monitoring reports confidential for at least 40 years.

When a worker leaves the business or the PCBU stops trading, the worker must get a copy of their health monitoring records.

The PCBU must not disclose health monitoring records to anyone without the workers written consent. However, the PCBU is exempted from this requirement if:

- the PCBU is required to give a copy of the health monitoring records to a relevant PCBU (such as in a principal-contractor relationship)
- the PCBU is required to give a copy of the health monitoring records to WorkSafe or another Regulator.

For more information, see WorkSafe's webpage: Exposure monitoring and health monitoring – guidance for businesses

17.0 Exposure monitoring

Carry out exposure monitoring to assess health risks, check if controls are effective, and decide when to review or change them.

PCBUs that undertake asbestos removal must make sure that appropriate exposure monitoring is in place while the workers carrying out removal work.

The Health and Safety at Work (General Risk and Workplace Management) Regulations provide general requirements for exposure monitoring.

Exposure monitoring can be used to:

- identify, assess and confirm health risks
- identify where new control measures are needed
- monitor how well current control measures are performing, and
- identify when control measures need to be reviewed, updated or removed.

The type of monitoring that may be needed depends on the kind of work being done. A suitably qualified and experienced health and safety professional (such as an occupational hygienist) can advise on what type of monitoring is appropriate. Exposure monitoring may involve workers wearing personal air monitors.

In addition to measuring asbestos exposure. Exposure monitoring can be done to help assess the risk of other health hazards common in asbestos worksites, such as noise, hand arm vibration, heat stress, biological hazards, or exposure to harmful solvents.

Asbestos exposure monitoring can be set up by assessors as part of the air monitoring inside the enclosure if the assessor is suitably qualified, and trained in personal, exposure monitoring.

Any results from personal air monitoring will need to be analysed by a suitably qualified occupational hygienist. Only a suitably qualified occupational hygienist can do an exposure assessment.

For more information, see WorkSafe's webpage: Exposure monitoring and health monitoring – guidance for businesses

Glossary

TERM	DEFINITION
Accredited laboratory	A laboratory that is accredited by either: - International Accreditation New Zealand (IANZ) - Another accreditation regime recognised by WorkSafe, such as National Association of Testing Authorities (NATA). A laboratory may also be approved by WorkSafe to test samples for the presence of asbestos or asbestos-containing material (ACM) for up to 12 months while obtaining accreditation.
Air monitoring	Measuring airborne asbestos fibres by sampling and analysing them.
Airborne contamination standard for asbestos	The average concentration of 0.1 respirable asbestos fibres per millilitre of air over any eight-hour period.
Asbestos	A naturally occurring fibrous silicate mineral (rock-forming mineral), from the serpentine or amphibole groups. There are two groups of asbestos, and six common types: - actinolite asbestos - anthophyllite asbestos - chrysotile asbestos (white) - crocidolite asbestos (blue) - grunerite (or amosite) (brown) - tremolite asbestos - a mix of one or more minerals from this list.
Asbestos assessors	Asbestos assessors are authorised by WorkSafe to assess if asbestos removal work has been completed to the required standard and that the area where asbestos removal took place is safe for reoccupation.

TERM	DEFINITION
	Only an **independent** licensed asbestos assessor can carry out regulated activities for Class A removal work. This includes: - air monitoring - clearance inspection - issuing clearance certificates. An independent licensed asbestos assessor may also carry out other activities as part of contractual obligations. For example, review a work plan made by an asbestos removalist prior to removal work to make sure it is safe and suitable before work starts.
Asbestos Management Plan (AMP)	A document that sets out where any identified asbestos material is present and how it will be managed including: - what to do if there is an incident or emergency involving asbestos or ACM at work - the roles and responsibilities of workers who do asbestos-related work, and details on their training and health checks.
Asbestos identification and management process	A framework that can be followed which sets out how to manage asbestos material in a building or workplace. Its steps include how to: - identify asbestos material in your building or workplace - prioritise and manage the risks of asbestos - keep up-to-date records of your asbestos management approach.
Asbestos management survey	An assessment of a building or workplace undertaken by an asbestos surveyor to: - identify and record the location, amount, and type of asbestos material readily accessible during normal occupancy of the building (including maintenance) - inspect and record information about the condition of asbestos material present - confirm whether material suspected to be asbestos material is asbestos material.

TERM	DEFINITION
Asbestos refurbishment or demolition survey	An assessment of a building undertaken by an asbestos surveyor when a building or workplace (or part of it) is going to be refurbished or demolished. The purpose of a refurbishment or demolition survey is to locate all the asbestos material in a building or workplace (or part of it) before refurbishment or demolition work starts.
Asbestos register	A document that lists all identified or presumed asbestos in a building or workplace.
Asbestos Regulations	The Health and Safety at Work (Asbestos) Regulations 2016.
Asbestos Removal Control Plan (ARCP)	A document prepared by a licensed asbestos removalist that includes information about: - how the asbestos removal will be carried out (including the method, tools, equipment, and PPE that will be used) - the asbestos material that will be removed (including its location, type, and condition) - the asbestos removal area for the work and any air monitoring points - how asbestos waste will be transported and disposed of.
Asbestos removal licence	A Class A or Class B asbestos removal licence.
Asbestos removal work	Work involving the removal of asbestos, asbestos-contaminated soil, or asbestos-containing material.
Asbestos removalist	A PCBU that carries out asbestos removal work.
Asbestos surveyor	A PCBU that carries out asbestos survey work.
Asbestos waste	Asbestos material, asbestos-contaminated soil, or asbestos-containing material that has been removed. Asbestos waste also includes items used when working with or around asbestos material (for example, plastic sheeting and disposable PPE) that needs to be disposed of.

TERM	DEFINITION
Asbestos-Containing Material (ACM)	Any material or thing that, as part of its design, contains asbestos.

Asbestos-Contaminated Dust or Debris (ACD)	ACD is dust or debris that has settled within a workplace, and it is, or assumed to be, contaminated with asbestos. Examples of ACD include:
	- dust or debris that was accidentally dislodged from a wall or ceiling following a collision
	- dust or debris that has accumulated over time. For example:
	  - in an ACM pipeline or conduit
	  - surrounding an ACM cement flue
	  - in an electrical switchboard with an ACM electrical mounting board or conduit box
	  - on a horizontal surface covered by an ACM roof in the guttering from an ACM roof.

Asbestos-contaminated soil	Soil that is contaminated with asbestos material or ACM.
Asbestos-related work	Work involving asbestos other than asbestos removal work.
Business or undertaking	The usual meanings are: - business: an activity usually carried out with the intention of making a profit or gain - undertaking: an activity that is non-commercial in nature (for example, certain activities of a local authority or a not-for-profit group).
Certified (training)	A certificate obtained from a training provider for undergoing training for either Class A or Class B licensed asbestos removal work.
Class A asbestos removal licence	A licence that authorises the holder to carry out Class A asbestos removal work for any type or quantity of asbestos or ACM, including: - any amount of friable asbestos or ACM

TERM	DEFINITION
	- any amount of ACD - any amount of non-friable asbestos or ACM.
Class A asbestos removal work	Asbestos removal work for which a Class A asbestos removal licence is required for friable asbestos.
Class B asbestos removal licence	A licence that authorises the holder to carry out Class B asbestos removal work for: - any amount of non-friable asbestos or ACM - ACD associated with removing any amount of non-friable asbestos or ACM.
Class B asbestos removal work	Asbestos removal work for which a Class B asbestos removal licence is required for non-friable asbestos.
Clearance inspection	An inspection of an asbestos removal area after asbestos removal work has been completed to verify that the area is safe for normal use.
Clearance certificate	A formal document issued after asbestos removal, confirming that the area is safe for reoccupation.
Competent person	A competent person means a person who has the knowledge, experience, skills, and qualifications to carry out a particular task under these regulations, including any knowledge, experience, skills, and qualifications prescribed in a safe work instrument.
Control measure	A way of eliminating or minimising risks to health and safety.
Demolition	Demolishing or dismantling a structure, or part of a structure, or equipment that is loadbearing or otherwise related to the physical integrity of the structure. It excludes: - dismantling formwork, falsework, or other temporary structures used for support, access, or safety during construction - removing power, lights, or phone poles.

TERM	DEFINITION
Double-bagging	A method of sealing asbestos waste in two heavy-duty plastic bags to prevent contamination during disposal.
Duty	A legal obligation to act responsibly according to the law.
Duty holder	A person who has a duty under HSWA. There are four types of duty holders – PCBUs, officers, workers, and other persons at workplaces.
Eliminate	To remove the sources of harm (for example, equipment, substances, or work processes).
Emergency	An uncontrolled event that has caused, or could cause: - loss of life - injury - serious property damage. It can include declarations of civil defence emergencies, fires, or other significant incidents. It does not include delays unless these are the result from one of the above situations.
Enclosure	A sealed physical barrier used during asbestos removal to prevent fibre release into the surrounding environment.
Exposure monitoring	Exposure monitoring measures and evaluates what a worker is being exposed to while they are at work.
Friable	In a powder form, or can be crumbled, pulverised, or reduced to a powder by hand pressure when dry.
Good Practice Guidelines (GPG)	Describes current 'good practice' to help duty holders understand and apply their duties under HSWA.
GRWM Regulations	Health and Safety at Work (General Risk and Workplace Management) Regulations 2016.
Hazard	A potential source of harm. It could include an object, situation, or behaviour.

TERM	DEFINITION
Hazardous substance	A substance, or product containing a substance, that is known or suspected to cause harm to health, including substances: - classified as having toxic or corrosive properties under the Hazardous Substances and New Organisms Act 1996 - for which a prescribed exposure standard exists - specified in a safe work instrument as requiring health monitoring.
Health monitoring	Monitoring a person to identify any changes in their health status because of exposure to certain health hazards arising from the conduct of the business or undertaking. Health monitoring is a way to check if the health of workers is being harmed from exposure to hazards while carrying out work. It aims to detect early signs of ill-health or disease.
Homogeneous materials	Material that is like in colour and texture, and uniform in nature.
HSWA	Health and Safety at Work Act 2015. The key work health and safety legislation in New Zealand. HSWA applies to all work and workplaces unless specifically excluded. You can find the full text of the Act on the New Zealand Legislation website.
IANZ	International Accreditation New Zealand.
Licensed asbestos assessor	A competent person licensed by WorkSafe to carry out clearance inspections for Class A asbestos removal work and Class A air monitoring.
Licensed asbestos removal work	Removal work for which a Class A or Class B asbestos removal licence is required.
Licensed asbestos removalist	A PCBU that holds a Class A or Class B asbestos removal licence.

TERM	DEFINITION
Minimise	To take steps that protect the health and safety of people by reducing the likelihood of an event occurring, reducing the level of harm to people if it does occur, or both.
NATA	National Association of Testing Authorities.
Negative Pressure Unit (NPU)	Equipment that maintains negative air pressure in an enclosure to prevent the spread of airborne asbestos fibres.
Non-friable asbestos	In relation to asbestos or ACM, means not friable, and for this definition, asbestos and ACM include material containing asbestos fibres reinforced with a bonding compound.
Other persons at the workplace	Includes workplace visitors and casual volunteers (who are not volunteer workers). These people have their own health and safety duties to take reasonable care to keep themselves safe and to not harm others at a workplace.
Overlapping duties	When a PCBU shares duties with other PCBUs. When two or more PCBUs are working together at the same location or through a contracting chain, they must work together to fulfil their duties of care and manage risks. Where those duties overlap, the PCBUs must consult, cooperate and coordinate with each other to meet their health and safety responsibilities to workers and others.
PCBU	Person conducting a business or undertaking. In most cases a PCBU will be a business entity, such as a company. However, an individual carrying out business as a sole trader or self-employed person is also a PCBU. A PCBU does not include workers or officers of a PCBU, volunteer associations with no employees, or home occupiers that employ or engage a tradesperson to carry out residential work.
Plant	Includes: - any machinery, vehicle, vessel, aircraft, equipment (including personal protective equipment), appliance, container, implement, or tool

TERM	DEFINITION
	- any component of any of those things - anything fitted or connected to any of those things.
Policy clarification	Aims to 'clear things up' – by clarifying WorkSafe's approach on a specific issue.
Position	Outlines how WorkSafe interprets key concepts in law.
PPE	Personal protective equipment. Anything used or worn by a person (including clothing) to minimise risks to the person's health and safety. This may include, but is not limited to: - respiratory protective equipment - protective helmets - protective eyewear - protective boots - protective gloves - hearing protection - high-vis clothing - sunhats - sunscreen and lip protection - safety harness systems.
Primary duty of care	A PCBU must make sure, so far as is reasonably practicable, the health and safety of workers, and that other persons are not put at risk by its work. This is called the 'primary duty of care'.
Readily accessible	The document can be accessed without difficulty in hard copy, electronic form, or any other form.
Reasonably practicable	What is, or was, reasonably able to be done to ensure health and safety, taking into account and weighing up relevant matters including:

TERM	DEFINITION

	- the likelihood of the risk concerned occurring or workers being exposed to the hazard
	- the degree of harm that might result
	- what the person concerned knows, or ought reasonably to know, about:
	  - the hazard or risk
	  - ways of eliminating or minimising the risk.
	- the availability and suitability of ways to eliminate or minimise the risk
	- after assessing the extent of the risk and the available ways of eliminating or minimising the risk, the cost associated with available ways of eliminating or minimising the risk, including whether the cost is grossly disproportionate to the risk.
	
	For more information, see WorkSafe's fact sheet: Reasonably practicable

Refurbishment	Carrying out work in a building or structure with an emphasis on changing or upgrading it.
Risk	Risks arise from people being exposed to a hazard (a source of harm).
Safe work instrument (SWI)	A type of subordinate instrument (sometimes called tertiary legislation) under HSWA. SWIs can be used for almost any purpose, however, they only have legal effect where specifically referred to in relevant regulations. SWIs can be used to: - prescribe detailed or technical matters or standards that change relatively frequently and will often be industry-specific - set additional or modified control measures for hazardous substances approved or reassessed by the Environmental Protection Authority - provide an alternative means of complying with regulations

TERM	DEFINITION
	- support the effective operation of the health and safety regulatory framework, for instance by setting exposure monitoring standards or stipulating requirements for training, competence, or safety management systems.
Safety data sheet (SDS)	Describes the properties and uses of a substance, that is, its identity, chemical and physical properties, health hazard information, precautions for use, and safe handling information.
Sample analysis	Methods used to identify and quantify asbestos in materials or soils.
Shadow vacuuming	Holding a vacuum cleaner nozzle close to the task being performed and sucking the dust and debris away as it is created. In work involving asbestos, this should be using an H-Type vacuum that has been recently DOP tested, otherwise there is a risk of mobilising asbestos fibres and creating a contamination scenario.
Surface testing	Planned and controlled disturbance of enclosure surfaces immediately prior to clearance air monitoring
Trace level	An average concentration of less than 0.01 respirable asbestos fibres per millilitre of air.
WEPR Regulations	Health and Safety at Work (Worker Engagement, Participation, and Representation) Regulations 2016.
Worker	An individual who carries out work in any capacity for a PCBU. A worker may be: - an employee - a contractor or subcontractor - an employee of a contractor or subcontractor - an employee of a labour hire company - an outworker (including a homeworker) - an apprentice or a trainee, a person gaining work experience or on a work trial

TERM	DEFINITION
	- a volunteer worker. Workers can be at any level (for example, managers are workers too). A PCBU is also a worker if the PCBU is an individual who carries out work in that business or undertaking.
Workplace	Any place where a worker goes or is likely to be while at work, or where work is being carried out or is customarily carried out. Most duties under HSWA relate to the conduct of work. However, some duties are linked to workplaces.
WorkSafe/WorkSafe New Zealand	The government agency that is the primary work health and safety regulator. Other government agencies can be designated to carry out certain health and safety functions, for example, Maritime New Zealand and the Civil Aviation Authority. Previous work health and safety regulators include OSH, Department of Labour, and MBIE.

Appendix 1: Asbestos removal control plan template

(this template will be reformatted in the final version)

APPENDIX H: ASBESTOS REMOVAL CONTROL PLAN TEMPLATE

This Appendix is a template of an asbestos removal control plan. It is designed to incorporate the elements of the Asbestos Regulations.

It has two parts:

> complete part A when planning the asbestos removal work

> complete part B after the asbestos has been removed and clearance has been obtained.

PART A: TO BE COMPLETED BEFORE REMOVAL STARTS

Prepared by: Date: DD / MM / YEAR

Asbestos removal licence holder (PCBU name):

Licence number:

Asbestos removal licence holder's contact details:

For ACM removal at (address):

On behalf of PCBU who commissioned asbestos removal (client):

IDENTIFICATION

Have asbestos records been reviewed?	☐ Yes	☐ No

Complete the following table for the asbestos or ACM identified for removal:

LOCATION	DESCRIPTION OF ASBESTOS OR ACM	TYPE OF ASBESTOS OR ACM (REFER TO RECORDS)[22]	ESTIMATED VOLUME OR AREA	CONDITION (TICK)		DESCRIBE CONDITION:
				Friable	Non-friable	
Staff kitchen	Vinyl tiles with mastic backing	White (chrysotile)	2 m^2	☐	☐	10% chipped around the edges
				☐	☐	
				☐	☐	
				☐	☐	
				☐	☐	
				☐	☐	
				☐	☐	
				☐	☐	
				☐	☐	
				☐	☐	
				☐	☐	
				☐	☐	
				☐	☐	

[22] Choose from one or a combination of the following: Actinolite, Amosite (brown asbestos), Anthophyllite, Chrysotile (white asbestos), Crocidolite (blue asbestos), Tremolite, Not identified.

INFORMING PARTIES AND PEOPLE

The following people or parties will be informed about the upcoming asbestos removal and intended start date (keep consultation records):

Person who commissioned removal (client)	Humphrey Bogare, Store Manager	The Purple Shack of Sales Ltd	1 Troy Boulevard Wellington	04 555 1234
Client's workers & representatives	Bort Renault, site delegate, worker	The Union for Workers at the Purple Shack of Sales Inc	c/- 1 Troy Boulevard Wellington	025 852 963

People or parties who must be informed (where relevant) are:

- person who commissioned the removal (client)
- client's workers and/or representatives
- PCBU with management or control of the workplace
- PCBU's workers and/or representatives
- home owner
- home occupant
- neighbouring properties.

SUPERVISORS

Person or people who will supervise asbestos removal is/are:

Their direct contact number(s) is/are:

WORKERS

List the workers who will be working at the site, and, in the case of multiple supervisors, who they will be supervised by (attach extra pages if necessary):

TIMING OF REMOVAL WORK

Planned start date: DD / MM / YEAR Intended completion date: DD / MM / YEAR

Date of planned notification to WorkSafe: DD / MM / YEAR

EMERGENCY PLANNING

Trained first aider(s) on site:

NAME

List of emergency contact details attached to plan: Yes No

All site workers are trained in emergency response: Yes No

Emergency response equipment is indicated on the site plan: Yes No

The following have been identified as potential emergency situations (attach further details if needed:

CONTROLS TO MANAGE THE EMERGENCY

SITE PLAN

Define the area or draw a site map indicating the areas. Include:

- asbestos removal area
- asbestos work site (including where enclosure is located)
- entrances and exits
- waste storage
- decontamination area(s)
- emergency equipment
- signage
- barriers or means to prevent unauthorised access
- monitoring points
- other information as needed.

CONTROL OF NON-ASBESTOS HAZARDS

The following risks have been identified during the planning stages of the asbestos or ACM removal: (provide additional pages if necessary)

	CONTROLS TO MANAGE THE RISKS

PERSONAL PROTECTIVE EQUIPMENT (PPE AND RPE)

The following PPE and RPE will be supplied and worn at all times throughout the asbestos removal process:		
Workers have received appropriate training for PPE and RPE use:	☐ Yes	☐ No
Workers have received information about the health risks of licensed asbestos removal work and health monitoring requirements:	☐ Yes	☐ No

REMOVAL

REMOVAL METHOD

Detail the planned methodology for removing the asbestos or ACM. This must comply with the Health and Safety at Work (Asbestos) Regulations 2016 and should comply with WorkSafe's *Approved Code of Practice: Management and Removal of Asbestos*. (Provide additional pages as necessary.)

TOOLS AND EQUIPMENT

Warning: high-speed abrasive power or pneumatic tools such as angle grinders, sanders, saws and high-speed drills must not be used when removing asbestos or ACM.

The following tools and equipment will be used when removing asbestos or ACM:

Hand tools (list):
Powered equipment (list):
Saturation equipment (list):

VACUUM CLEANER(S)

Make:

Model: Last test date: DD / MM / YEAR

Make:

Model: Last test date: DD / MM / YEAR

EQUIPMENT MAINTENANCE

All tools and equipment used in removing asbestos or ACM are inspected before all removal work: Yes No

All tools and equipment used in removing asbestos or ACM are inspected and cleaned following all removal work: Yes No

All tools and equipment used in removing asbestos or ACM are inspected and cleaned at least once every seven days when in continuous use: Yes No

ENCLOSURE

Complete enclosure of the work area will be required: Yes No

Enclosed area is displayed on site map/the location is described: Yes No

The enclosure will be constructed as follows: provide an overview of the size, shape and construction method to be used for the enclosure. (Provide additional pages as necessary.)

The following NPUs will be used in conjunction with the enclosure:

Make: Model: Rating:

Make: Model: Rating:

Other details:

Smoke testing should be conducted prior to use and at the following intervals to confirm the integrity of the enclosure. Keep records of these tests.

Frequency of testing:

Person(s) responsible for conducting and recording the tests:

DECONTAMINATION FACILITIES

Describe the decontamination facilities that will be interconnected or used with the enclosure (include decontamination of tools, plant or equipment, reusable PPE, people, removal area, contained waste):

OTHER CONTROL MEASURES

The following additional controls will be put in place to contain asbestos within the designated asbestos work area:

MANAGEMENT AND DISPOSAL OF ASBESTOS WASTE

ON-SITE CONTAINMENT OF REMOVED ACM

Removed (waste) asbestos or ACM will be held on-site for more than one working day:		Yes	No

Person responsible for safe asbestos waste storage on site:

If yes, detail how the ACM will be stored, including the type of storage containers to be used and the dedicated location for stored waste within the removal area:

Asbestos waste will be stored in a labelled, sealed container before removing it from the site:		Yes	No
All asbestos waste will be stored in the designated location for asbestos waste:		Yes	No
Used, disposable PPE and RPE will be stored in a labelled, sealed container before removing it from the site:		Yes	No
Used, reusable clothing will be stored in a labelled, sealed and decontaminated container before transporting it to a laundry equipped to launder asbestos-contaminated clothing, OR:	N/A	Yes	No
stored in a labelled, sealed and decontaminated container before re-use in an asbestos work area:	N/A	Yes	No

AIR MONITORING AND CLEARANCE

AIR MONITORING PROGRAMME

If NO air monitoring will be required, provide reasons:

Details of the licensed asbestos assessor or competent person engaged to plan and conduct air monitoring and clearance:

Name:

Assessor licence number (if applicable):

Contact details:

The following air monitoring will be conducted:

Before removal: number and frequency of testing:

During removal (control monitoring): number and frequency of testing:

Monitoring points identified on site map: Yes No

Air monitoring proposal attached to this control plan: Yes No

DECLARATION AND SIGN-OFF

I declare the information contained in Part A of this plan is accurate to the best of my knowledge

Signed by: Date: DD / MM / YEAR

Upon completion of this section, provide a copy of the plan and related documents to:

PCBU who commissioned the removal: Yes No

Other (state): Yes No

The plan should be made available to the PCBU with management or control of the workplace, workers and their representatives, and home occupants (as applicable).

Appendix 2: Asbestos levels associated with asbestos activities

Respirable dust testing gives some indication about dust levels normally found in common industrial situations.

They may be useful for helping to determine RPE requirements for upcoming asbestos work.

The figures in the following tables are for guidance only and are expressed as respirable fibres per millilitre of air (fibres/ml).

Because the airborne fibre level cannot be accurately assessed in each case, and differences in operation may lead to higher levels than stated, always assess the level of required RPE on the high side or worst-case scenario.

ASBESTOS REMOVAL WORK

PRODUCT GROUP	CONTROLLED WET REMOVAL/GOOD PRACTICE (f/ml)	LIMITED CONTROLS/ DRY REMOVAL (f/ml)
Controlled wet stripping of lagging and sprayed coatings using manual tools	Up to 1	1-100 (lagging) Up to 1,000 (coatings)
Moulded plastics and battery cases	0.001	0.01
Jointings (gaskets) and packing	0.05	0.2
Asbestos cement sheeting	Up to 0.5	No information
Flooring	0.01	0.05
Fillers and reinforcements in a flexible matrix (incl. textured coatings)	0.02	0.08
Spray and other insulation products	14.4	358
Asbestos insulating board, including millboard	Up to 3	5-20

ASBESTOS-RELATED WORK

PRODUCT GROUP	TYPICAL (f/ml)	EXTREMES LIKELY (f/ml)
Cleaning asbestos cement vertical cladding	1-2 (wet wire brushing)	5-8 (dry wire brushing)
Cleaning asbestos cement roofing	1-3 (wet wire brushing)	3 (dry wire brushing)
Stacking asbestos cement sheets	Up to 0.5	No information
Machine sawing with LEV	Up to 2	No information
Abrasive disc cutting without LEV	15-25	No information
Circular saw cutting without LEV	10-20	No information

ASBESTOS-RELATED WORK

PRODUCT GROUP	TYPICAL (f/ml)	EXTREMES LIKELY (f/ml)
Drilling asbestos insulating board with shadow vacuuming or LEV	Up to 1	No information
Drilling asbestos insulating board overhead without LEV	5-10	No information
Drilling vertical columns without LEV	2-5	No information
Using a jigsaw on asbestos insulating board	2-10 (with LEV)	5-20 (without LEV)
Hand sawing asbestos insulating board	5-10	No information
Ambient air below sprayed insulation	Usually 0.1	0.2-1
Changing filter bags	10	No information
Dry sweeping	0-2	No information
Handling talc (may contain minor tremolite)	Up to 2	No information
Handling/quarrying serpentine (with minor chrysotile)	Up to 2	Possibly up to 100 if conditions are very dusty
Cutting ACM, etc dry with power tools	0-2	Up to 20
Cutting ACM, etc wet with power tools	Up to 1	Up to 10
Construction work (outside)	Up to 1	Up to 10
Cutting ACM with hand tools	Up to 1	1
Cutting, finishing, radius grinding, etc	Normally 1	No information
Handling friction materials (pads, etc)	Up to 0.5	No information
Cutting gaskets	Up to 2	No information
Cutting greenstone (associated with tremolite)	Up to 2	No information

Appendix 3: Design criteria for asbestos decontamination units (DCUs)

The criteria listed here apply to mobile and modular units, unless otherwise stated. Mobile units offer more space to decontaminate properly. A modular unit should only be used where space does not permit the use of a mobile unit and where its use removes the need for transit procedures.

Design and general construction

DCUs units should:

- be weatherproof or only be used inside a weatherproof building
- be able to be made level on uneven ground
- be robust enough not to distort when moved (racks are available for the storage of modular unit panels)
- have fixings that are not easily damaged in transport or use or dismantling
- be roadworthy
- be of adequate size. Modular units should have minimum internal dimensions for each compartment of 1m x 1m x 2m (height). Modular units should only be used by a maximum of two people at any one time. Mobile units are expected to be larger than modular units
- have self-closing doors which should separate the three compartments (clean, shower, and dirty)
- have outward opening doors on the external access to the clean and dirty ends (self-closing at dirty end)
- have internal surfaces that are waterproof. Ledges and grooves should be avoided. The installation of windows should be avoided, but any windows provided should be non-opening, unbreakable, and fitted flush with the inner wall. Units should be capable of being cleaned on site so that a clearance certificate can be issued showing the next user that the unit has been cleaned
- be capable of being locked when not in use
- have enough water storage for thorough washing

Heating and lighting

- Heating should be provided, and heating appliances should be easy to clean.

- Units designed to be used inside buildings should be fitted with electrical water heating systems to avoid the need to vent combustion gases from gas appliances to the open air.
- Where gas appliances are fitted, they should meet relevant New Zealand standards and be installed by a competent, qualified gas fitter
- LPG cylinders should be stored and transported in an external ventilated cupboard or rack that can be readily secured.
- Only room-sealed balanced flue-type gas heating appliances should be used.
- There should be adequate lighting for workers to see what they are doing and if they have sufficiently decontaminated themselves.
- Light fittings and other electrical appliances should be easy to clean and double insulated or permanently wired into the circuit and switched.

Services

- All electrical equipment must meet relevant electrical standards
- Connections to the water supply should have flexible joints. The supply should be protected against frost.
- Water filtration: wastewater should be filtered through a high efficiency filter (specification less than 5 microns).
- Hot water systems should be designed to avoid 'dead-legs' where legionella bacteria could grow.

Ventilation

DCUs should never be directly attached to the enclosure without the airlock because contaminated air may be drawn in from the enclosure into the dirty end of the DCU.

The intervening space is there to provide an air gap between the enclosure and the DCU and it must be fitted with a vent to the open air. The vent openings should be constructed in a similar manner to the enclosure's access openings (the slits with weighted flaps - Figure 34) but should be smaller so they cannot be used for entry or exit.

- The unit should be ventilated. Air should be drawn in at the clean end, pass through the shower and be discharged at the dirty end (the NPU should be in the dirty end). A minimum of 30 air changes per hour should be achieved in the dirty end.
- Grilles should be a minimum of 15cm x 30cm and pressure/gravity-operated flaps a minimum of 20cm x 23cm.

- External vents should be located as near to a central position as possible or have two symmetrical intakes. They should be provided with dust caps for transit.
- Air should be discharged through a HEPA filter (H Class) and through a pre-filter.
- The extraction point should be placed low down in the dirty end (or placed externally on modular units), but leaving enough room to clean beneath it, and positioned so that cleaning water does not damage it.
- A visible or audible warning device (such as a pressure gauge or warning light) should alert users to failure of the NPU.

Facilities within compartments

Shower compartment

Showers should have:

- a curtain rail (but no shower curtain) for workers to hang their RPE battery pack while showering.
- regulated water pressure so that pressure does not drop when pumping water out of the unit or while using the wash-hand basin at the same time as one of the showers.
- a thermostat
- a shower rose
- a shower tray
- an outlet to the drain
- a holder for soap or shower gel (shower gel helps to prevent the wastewater filter getting blocked)
- shampoo and nail brush.

The clean end

The clean end needs to have the most space available for storage and dressing and undressing. Units can be designed to add on an extra unit or suitable changing area at this point to extend the facilities.

The clean end should have:

- hooks for hanging up clothing
- a locker for each worker to store valuables
- battery-charging facilities (unless provided separately with a modular unit)
- a mirror

- fixed seating.

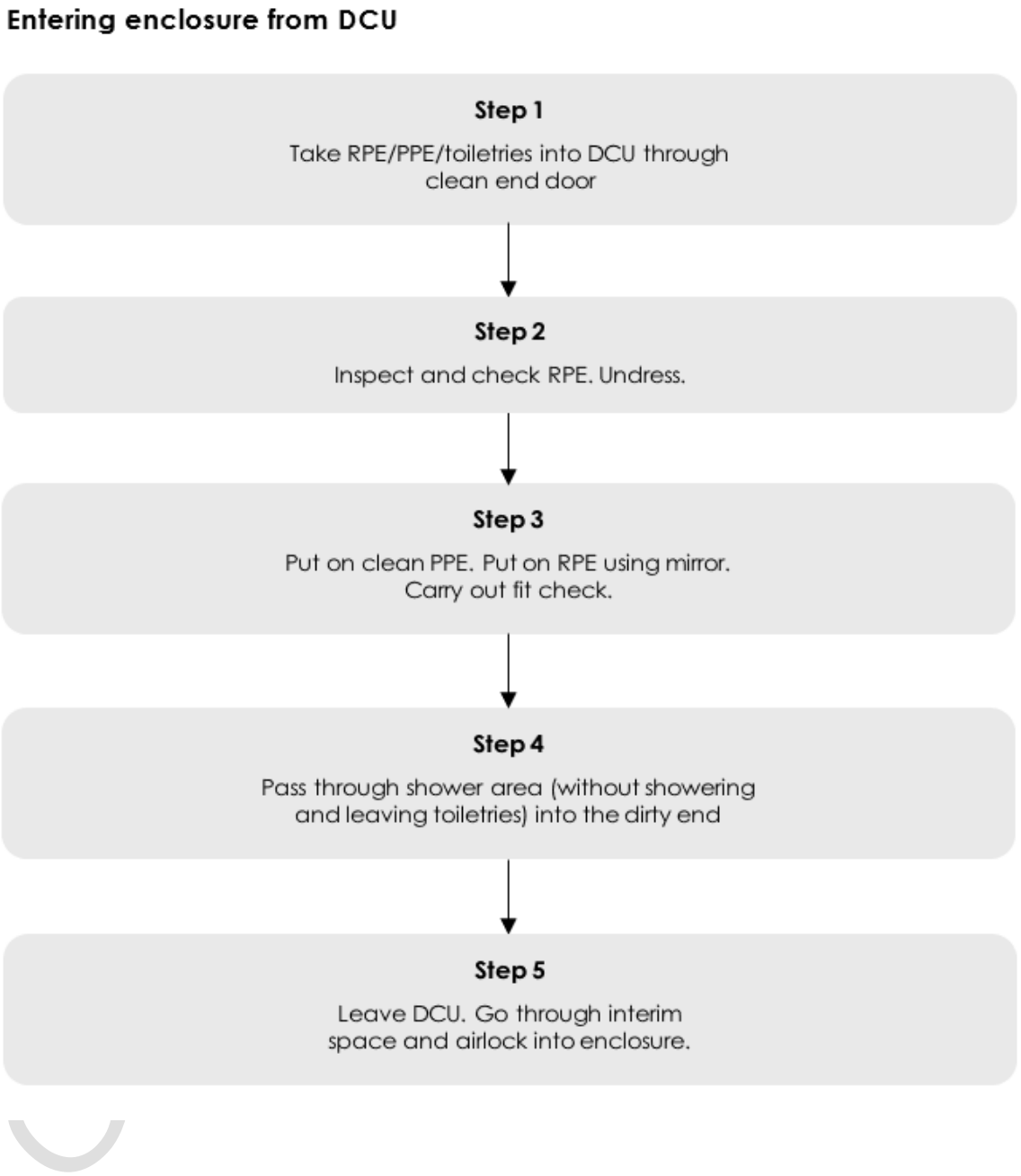
The dirty end

The dirty end should have:

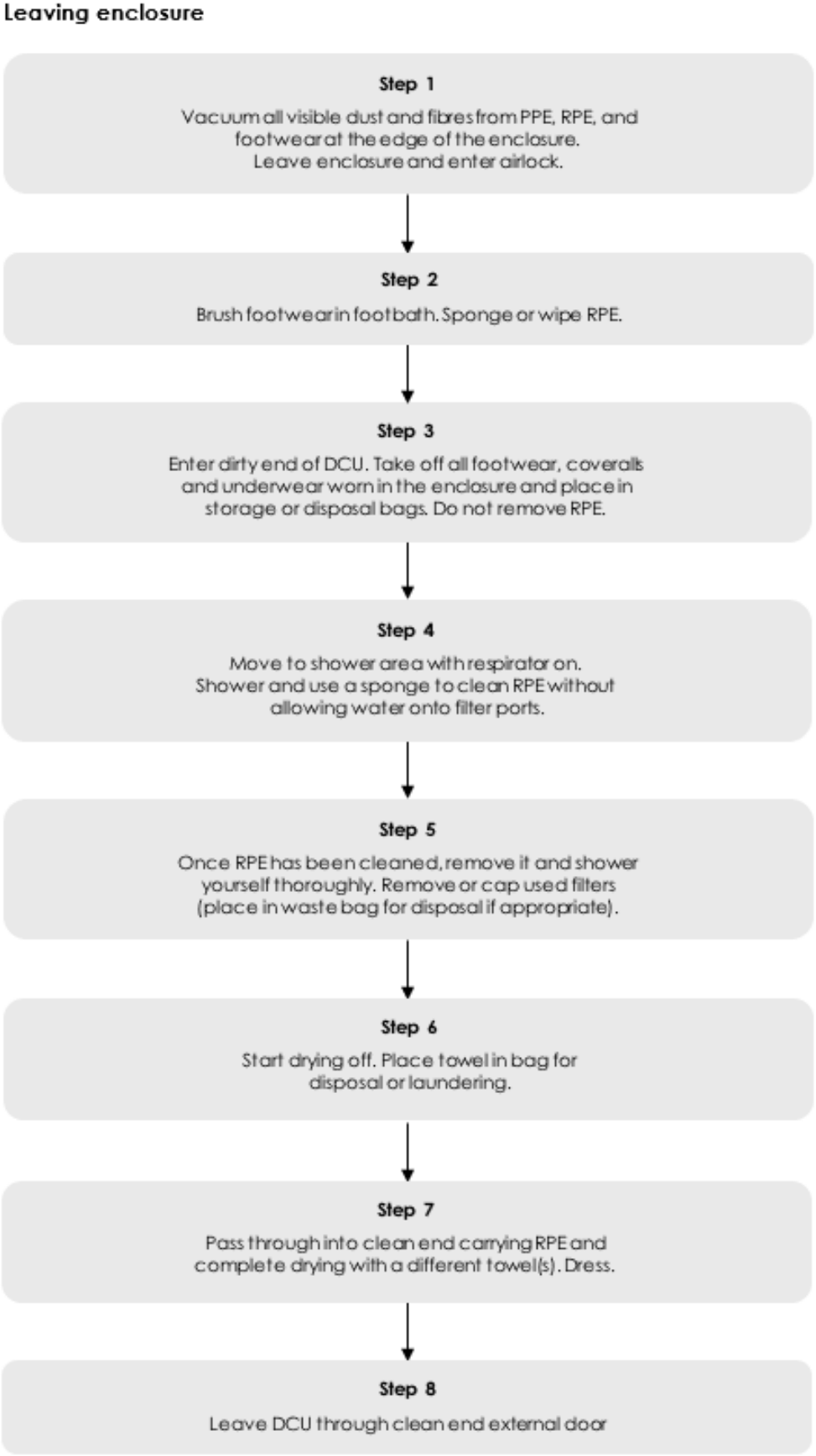
- hooks for workers to hang RPE belts on while removing work or transit clothing
- hooks to hang up work or transit clothing
- sufficient space will hold bagged waste filters
- fixed bench-type seating
- a wash-hand basin with plug and drainage point should for washing dirty hands.

Appendix 4: Decontamination processes

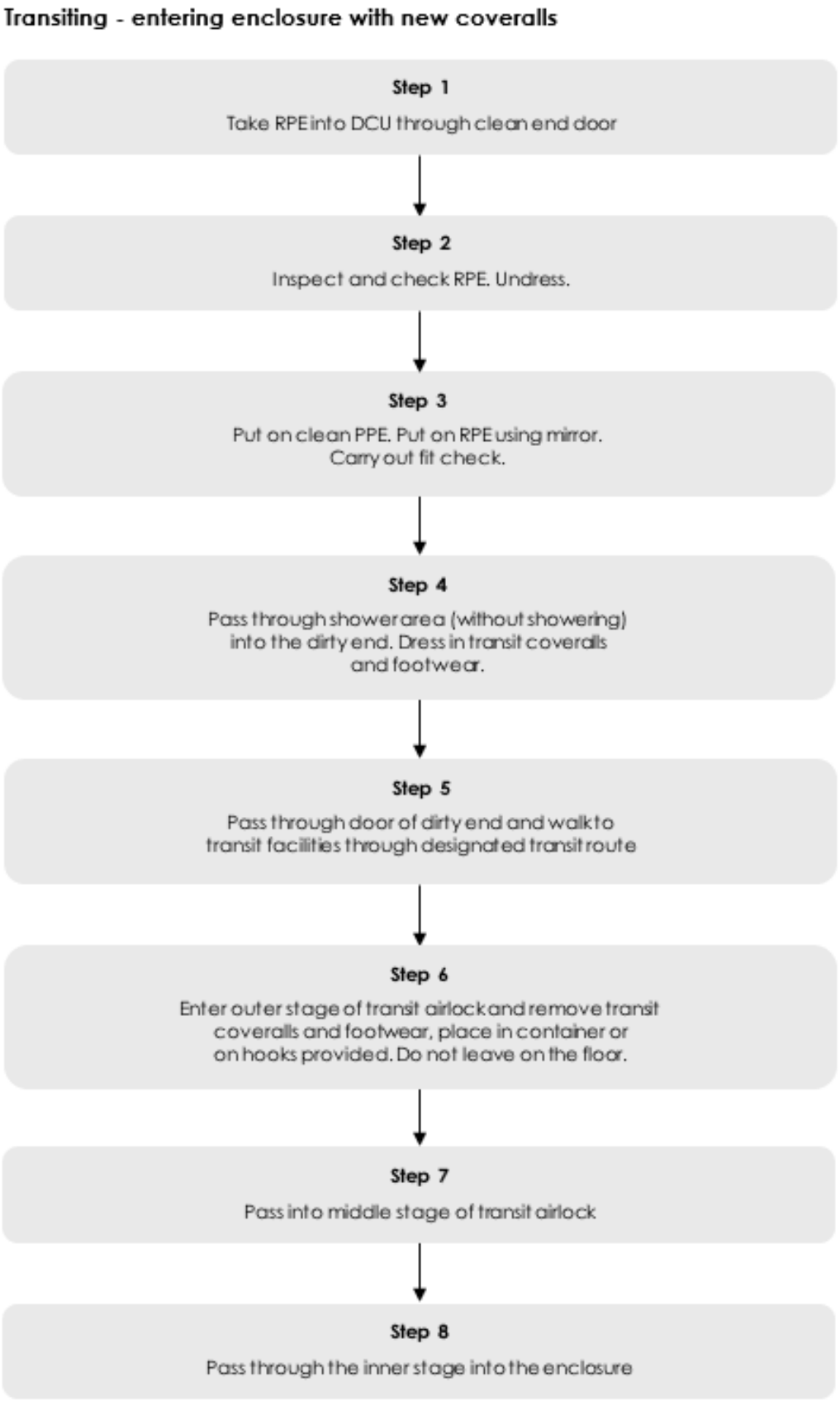
Decontamination process: DCU attached to enclosure: Entering enclosure



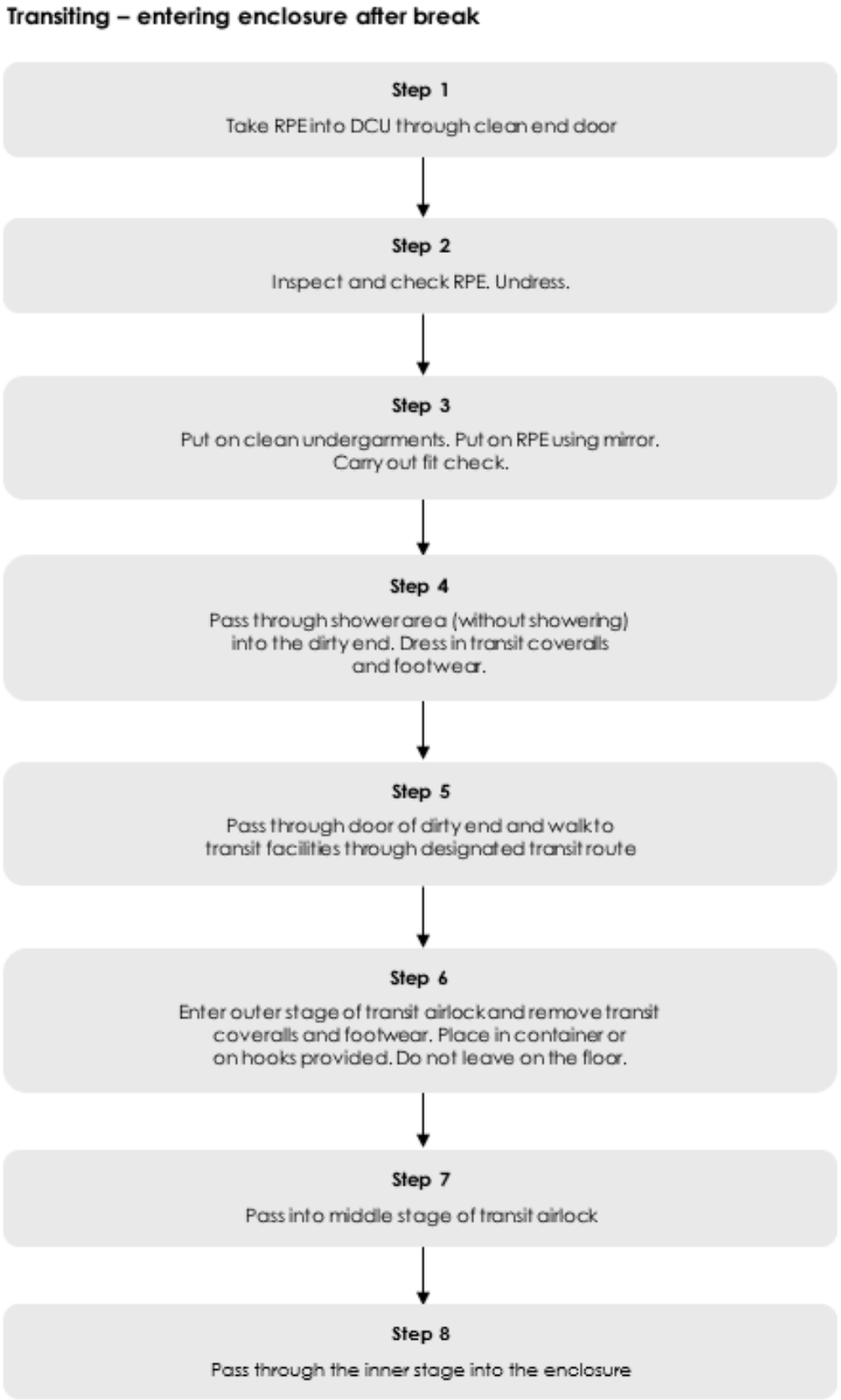
Decontamination process: DCU attached to enclosure: Leaving enclosure



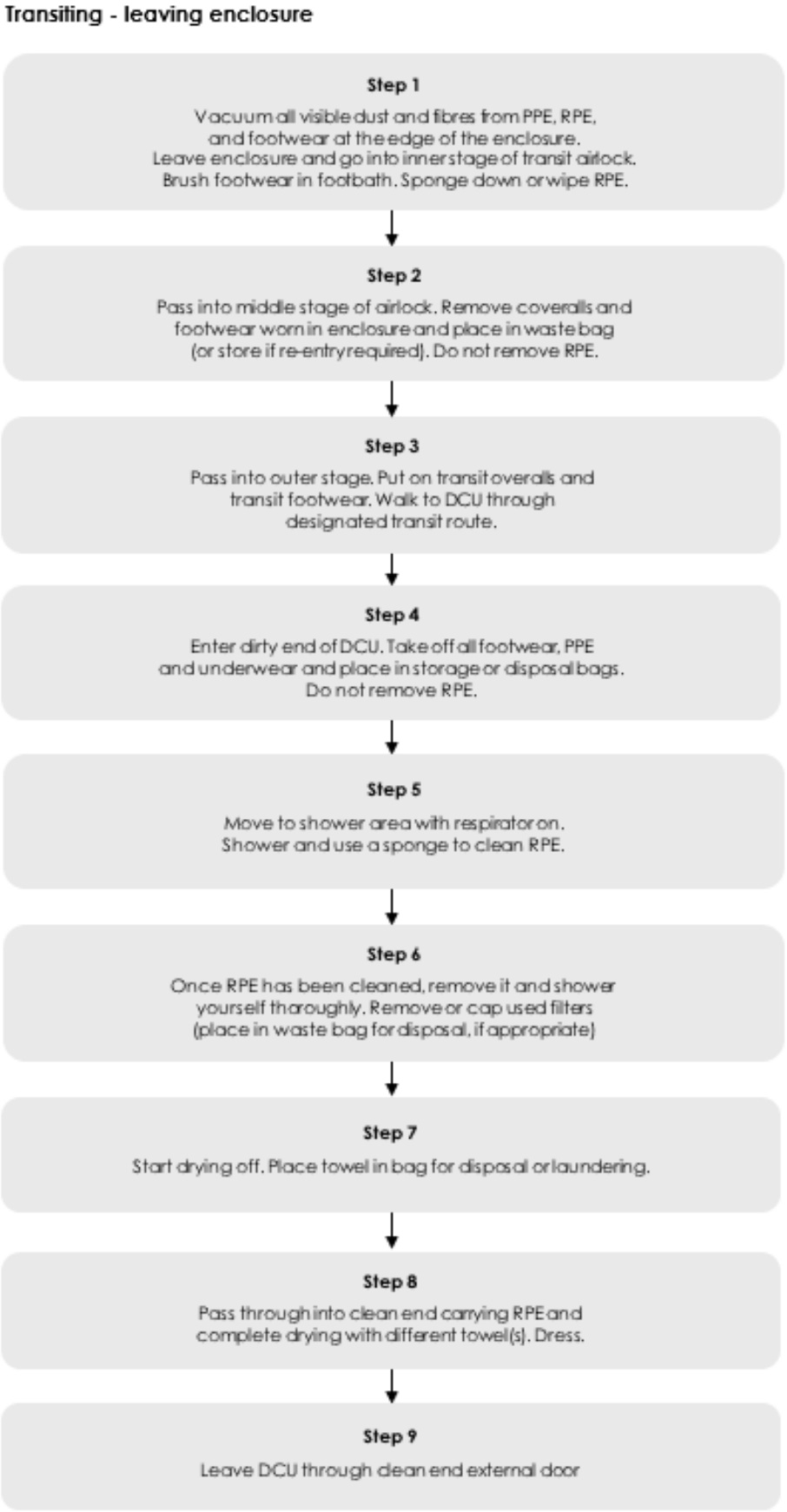
Decontamination process: Transiting procedure: Entering enclosure with new work coveralls



Decontamination process: Transiting procedure: Entering enclosure after break



Decontamination process: Transiting procedure: Leaving enclosure



Appendix 5: Asbestos removal area handover form

Asbestos removal area handover form The licensed removalist's visual inspection form - must be given to the assessor before the four-stage clearance starts. The licensed removalist must keep a copy.	
Objective: Supervisor to carry out the thorough visual inspection of enclosure/work area to confirm the readiness for clearance inspection. Areas to be clean from visible debris and dust.	
Site address	
Size of enclosure? (see ARCP) (L×W × H (metres))	
Has a new NPU pre-filter been installed?	Yes/No - if no, explain
Have all ACM removal locations been checked and confirmed free of asbestos?	Yes/No – if no, explain
Have all floor surfaces, walls, and items been inspected and confirmed visually clean?	Yes/No - if no, explain
Have all ledges, sills, high surfaces, and voids been inspected and confirmed visually clean?	Yes/No - if no, explain
Have ACM removal locations been checked and confirmed visually clean?	Yes/No - if no, explain
Have all rooms been checked and confirmed visually clean?	Yes/No - if no, explain
Have all cables, wiring, and items staying in enclosure during the four-stage clearance been checked and confirmed visually clean?	Yes/No - if no, explain

How long did the supervisor's visual inspection take?	
Start time	
Finish time	
Total time (hours/minutes)	
I confirm that I have carried out a thorough visual inspection of the enclosure or work area, and can confirm that the area is visually clean and ready to be made available to the assessor for the independent four-stage clearance	Supervisor's signature
	Date
	Time
Hand form to assessor before the four-stage clearance begins	Analyst's signature
	Date
	Time