HEALTH AND SAFETY AUTHORITY

Asbestos Containing Materials in Workplaces

Practical guidelines on Management and Abatement

Our vision:

A national culture where all commit to safe and healthy workplaces and the safe and sustainable management of chemicals

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Introduction

The aim of these *Guidelines* is to provide a broad spectrum of guidance aimed at the prevention of occupational illness from exposure to respirable asbestos fibre. These *Guidelines* provide practical advice to employers and those in control of workplaces on the necessary precautions to prevent exposure to asbestos fibres or, where this is not reasonably practicable, to reduce exposure to asbestos fibres.

These G*uidelines* are relevant to a wide range of people/dutyholders, including:

- Employers including landlords, in charge of a place of work.
- Clients as defined under the Safety, Health and Welfare at Work (Construction) Regulations 2006, procuring work in relation to asbestos.
- Designers, including Architects and Engineers
- Project supervisors, including the PSDP and PSCS.
- Asbestos surveyors, analysts and consultants
- Asbestos removal contractors and their employees
- Construction and demolition contractors
- Allied trades e.g. plumbing, electrical, mechanical, telecommunications engineers etc
- Maintenance operatives.
- Hazardous waste contractors
- Those who engage in asbestos removal in domestic dwellings
- Any other person who could be potentially exposed to asbestos fibres.

Each category of population mentioned above may be exposed to asbestos fibres in the course of their work or require others to undertake work where there is a risk of exposure to asbestos fibres.

With increasing knowledge and technical advances there will be on-going changes in effective practices and the equipment available to achieve the requirements of the Asbestos Regulations, These are not discussed in detail in the *Guidelines*. The *Guidelines* refers to publications issued by the UK Health and Safety Executive (HSE) which are likely to be subject to frequent and ongoing revision reflecting the changes in what is "accepted best practice". The HSE publications which are referred to are current at the time of publication, however, in view of the improvements that

continue to be made, care should be taken to ensure that any references, HSE (UK) or otherwise, which are quoted in these *Guidelines* are still current.

These *Guidelines* are not intended as a legal interpretation of the legislation. It is not compulsory to follow the *Guidelines* and you are free to take other action. But if you do follow these *Guidelines* you will normally be doing enough to comply with the law. Health and Safety Authority inspectors seek to secure compliance with the law and may refer to these *Guidelines* as illustrating good practice.

Glossary of terms

"Act" *means the Safety, Health and Welfare at Work Act 2005 (No. 10 of 2005);*

"Airborne asbestos" means any fibres of asbestos small enough to be made airborne. For the purposes of monitoring airborne asbestos fibres, only ***'respirable fibres'*** are counted;

"Asbestos" means the following fibrous silicates (referred to in Article 2 of the Directive and which are set out in Schedule 1 of the Asbestos Regulations)

(a) asbestos actinolite, CAS No 77S36-66-4(*);

(b) asbestos grunerite (amosite), CAS No 12172-73-5(*);

(c) asbestos anthophyllite, CAS No 77536-67-5(*);

(d) chrysotile, CAS No 12001-29-5;

(e) crocidolite, CAS No I2001-28-4(*); and

(f) asbestos tremolite, CAS No 77. 536-68-6(*),

**references to "CAS" followed by a numerical sequence are references to CAS Registry Numbers assigned to chemicals by the Chemical Abstracts Service, a division of the American Chemical Society;*

"Asbestos abatement' means a number of procedures available to control fibre release from **ACMs** in a building, including removal, encapsulation, repair, enclosure, encasement, and operations and maintenance programs such as environmental cleaning;

"Asbestos containing material (ACM)" means any material or thing that, as part of its design, contains asbestos;

"Asbestos-contaminated dust or debris (ACD) means dust or debris that has settled within a workplace and is (or assumed to be) contaminated with asbestos;

"Authority" means the Health and Safety Authority;

"Competent person" has the meaning assigned to it in the 2005 Act i.e.

(2) (a) For the purposes of the relevant statutory provisions, a person is deemed to be a competent person where, having regard to the task he or she is required to perform and taking account of the size or hazards (or both of them) of the undertaking or establishment in which he or she undertakes work, the person possesses sufficient training, experience and knowledge appropriate to the nature of the work to be undertaken.

b) Account shall be taken, as appropriate, for the purposes of paragraph (a) of the framework of qualifications referred to in the Qualifications (Education and Training) Act

1999.

"Directive" means Directive 2009/148/EC of the European Parliament and of the Council of 30 November 2009 on the protection of workers from the risks related to exposure to asbestos at work***;***

"Exposure limit value" for asbestos is a respirable fibre level of 0.1fibres/ml of air measured in a person's breathing zone and expressed as a time weighted average fibre concentration calculated over an eight-hour working day;

"Friable asbestos" means that an ACM is less resistant to mild abrasion or damage and is more likely to release inhalable fibres ;

"HEPA" means High Efficiency Particulate Arrestor with a collection efficiency of 99.95% for the most penetrating particle size. Filters with higher efficiency may be used.

"Non-friable asbestos" means material containing asbestos that is resistant to mild abrasion and damage and less likely to release inhalable fibres;

"Respirable asbestos" means an asbestos fibre that:

(a) is less than 3 microns (μm) wide

(b) more than 5 microns (μm) long, and

(c) has a length to width ratio of more than 3:1.

Abbreviations

AC: Asbestos cement

ACM: Asbestos Containing Material

ACOP: Approved Code of Practice

AIB: Asbestos insulating board

AMP: Asbestos Management Plan

ARCA: Asbestos Removal Contractors Association

DCU: Decontamination Unit

HSE : Health and Safety Executive (Great Britain)

INAB: Irish National Accreditation Board

NPU: Negative Pressure Unit

PCM: Phase Contrast Microscopy

PPE: Personal Protective Equipment

RPE: Respiratory Protective Equipment

TWA: Time Weighted Average

UKAS: United Kingdom Accredited Services

WHO: World Health Organisation

Section 1: What is Asbestos?

Asbestos is a term used for the fibrous forms of several naturally occurring minerals. All asbestos deposits originate from cystallisation of molten rock which, on cooling, produces the various types of fibrous forms. It is usually found as thin veins up to a few inches thick, between layers of the parent rock which may be non-fibrous or crystalline form.

Asbestos types

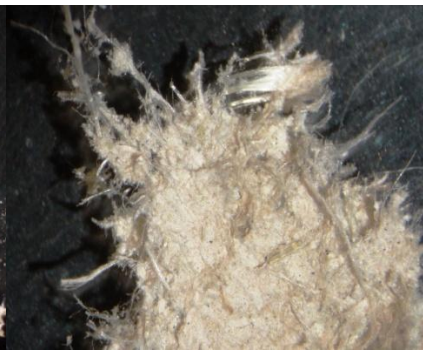
Two varieties of asbestos can be distinguished: **amphibole** and **serpentine**.

Amphiboles	Crocidolite	often referred to as '*blue* asbestos'
	Amosite	often referred to as '*brown* asbestos'
	Anthophyllite	
	Tremolite	
	Actinolite	
Serpentine	Chrysotile	often referred to as '*white* asbestos'

Although there are six regulated types of asbestos, Crocidolite, Amosite and Chrysotile were the main types of asbestos which have had any real commercial significance in Ireland. Chrysotile asbestos accounts for more than 90 per cent of asbestos applications.

Fig x - Crocidolite

Amosite



Chrysotile

Figure 1: Discolored Chrysotile (white asbestos) probably as a result of thermal degradation

The presence of asbestos fibres in finished products may not be obvious, and the different types of asbestos **cannot be distinguished by their visual appearance or colour**. Laboratory analysis is required to identify the type of asbestos and the methods are described in Section 8.

Physical/ chemical properties of asbestos

Asbestos fibres are minerals with exceptional physical and chemical properties. They do not burn, they are remarkably resistant to diverse chemical attacks depending on the asbestos type, and show a heightened mechanical tensile strength. They are a good thermal and electrical insulator. These properties have led to the development of the use of asbestos fibres in multiple forms, for manufacturing numerous widely consumed industrial products or in the construction of buildings.

Definition of an asbestos fibre

The characteristics of the fibres to be taken into account when measuring the concentration of airborne fibres by Phase Contrast Microscopy (PCM) are defined by a WHO reference method as set out in the Asbestos Regulations. Thus, this standardized method defines a fibre as any elongated solid particle, natural or artificial, with parallel sides, having a diameter below 3 µm, a length above 5 µm and a length-width ratio above 3. These fibres are frequently called **respirable fibres**.

Section 2: Asbestos in Buildings

ACMs have been widely used within the building and construction industry between 1860 and 1999. The majority of the buildings built between 1940 and 1985, during which time asbestos production peaked, would contain asbestos in some form.

Asbestos have been widely used in construction materials for a number of purposes including

- fireproofing
- thermal insulation
- electrical insulation
- sound insulation
- decorative plasters
- roofing products
- flooring products
- heat resistant materials
- gaskets

Figure 1 details some typical locations for the most common ACMs (Asbestos Building) and Appendix 1 contains photographic examples of some commonly found ACMs**.**

Summary of the different forms of ACMs

- **Sprayed asbestos (asbestos content up to 85 %)**

Sprayed asbestos was applied as heat- and soundproofing and as protection against fire and condensation on beams, connecting pieces and stays made of steel.

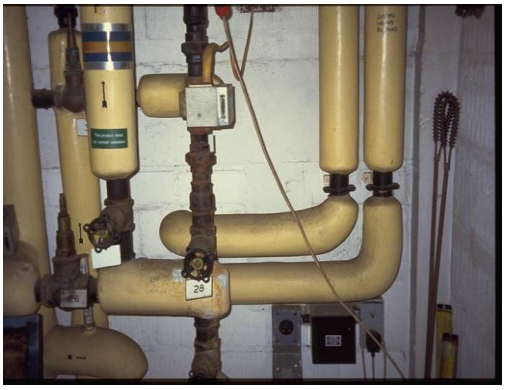
Up to 85% asbestos in hydrated asbestos cement. A mixture of asbestos types was used until 1974; crocidolite for thermal insulation of steam turbines until 1970; amosite for fire protection of structural steel, condensation protection and acoustic control; and chrysotile mixed with mineral wool and cement-type binder. Chrysotile was also used as a coating on top of other sprayed asbestos.

Applications ceased in mid 1970s. Extremely friable; high potential for fibre release unless sealed. Potential increases if disturbed during repair or maintenance and as materials age or disintegrate.

- **Loose asbestos lagging (asbestos content up to 100 %)**

Loose asbestos lagging was used as a filling material for heat- and soundproofing and as protection against fire for pipe ducts, loft insulation and insulation between floors.

- **Thermal Insulation/ Lagging (asbestos content up to 100 %)**



Thermal insulation was used to lag pipes, boilers and pressure vessels. It was either applied as a composite or in preformed pipe sections. Variable asbestos content and types of asbestos (white, blue and brown) were used.

The use of lagging was gradually discontinued between 1974 and 1980, and is very rare in buildings constructed after 1975. Potential for fibre release if not sealed. Potential increases if disturbed during repair or maintenance, and as material ages or is damaged. Dust may then accumulate. Abatement requires a specialist contractor..

- **Asbestos cloths, tapes and cords (asbestos content highly variable, from 3-90 %)**

in

and

after

Asbestos tapes and cords are found as heat and fireproof sealing material in fireproof doors and fireproof shutters, in smoke proof doors and gates, kilns, boilers and high-temperature installations, in flanges on heating pipes and ventilation ducts. Cords tapes were also used as filling materials in expansion joints. Cloths used as jointing and packing, gaskets, thermal insulation and lagging including fire-resistant blankets, mattresses and protective curtains, gloves, aprons, overalls, etc. Fibres may be released if abraded or frayed. Asbestos content usually 100%. Only chrysotile used 1970.

- **Asbestos board/ panels (asbestos content 5-50 %)**

Asbestos boards/ panels were used as fireproof coverings for beams, connecting pieces and stays made of steel or wood. Content 16-40% amosite or, until 1965, a mixture of amosite and crocidolite. Density of approximately 700 kilograms per cubic metre.

Widely used from the 1950s until middle 1970s. Manufacture ceased in 1980, and it is unlikely to be found in buildings after 1982.

Work on insulation board can give rise to high levels of dust, especially if broken, drilled or sawn. Requires a specialist contractor to remove the boards. Found in all types of industrial, commercial, public and private buildings. Particularly common in 1960s and 1970s system built housing. Used widely in ducts and for fire stopping, infill panels, partitions, ceiling tiles, roof under lays, wall lining, bath panels, external canopies and porch linings. Asbestos is also found in insulating board cores and linings of composite products used for acoustic attenuators, cladding infill panels, domestic boiler casings, partition and ceiling panels, oven linings and suspended floor systems. . "Asbestolux" and "Marinite" are examples of the trade names.

- **Asbestos millboard, papers, cardboards, and gaskets (asbestos content 50-90 %)**

These were used in particular for heat insulation and as fire protection in electrical appliances, to wrap electrical wires, as asbestos cardboard under floor coverings and to manufacture filter materials. Gaskets were used as sealing for acids, oils and under conditions of high temperature and pressure. These gaskets are known as CAF (Chrysolite Asbestos Fibre) gaskets. Very close to 100% asbestos content. All types of asbestos have been used, but only chrysotile since 1965.

- **Asbestos containing textured coats and paints (asbestos content 3-5% asbestos)**

Textured coatings can be found on ceilings and walls. They normally contain up to 5% Chrysotile asbestos (white). Supply and application prohibited since 1988, but still widely in place, for example as "Artex" on walls and ceilings in both commercial and domestic buildings.

- **Asbestos-containing bitumen/ tar (asbestos content up to 20 %)**

Asbestos-containing bitumen and tar products were used in the manufacture of roofing felt, as a coating for flat roofs and guttering, as humidity insulating paint on the outer walls of cellars, as joint sealant and casting compound.

Tiles were laid using the thin-bed method with asbestos-containing tile adhesives. Furthermore asbestos was added to fireproofing coatings, antirust paint, adhesives and plaster-containing filler.

- **Asbestos-containing floor coverings (asbestos content 5-90 %)**

Thermoplastic Vinyl-asbestos tiles contain up to about 15 % asbestos (white asbestos). They were mostly laid on bitumen adhesives, which can also contain asbestos. These tiles were laid on a large scale in public buildings, schools etc, but also in private homes and offices.

Asbestos-paper backed PVC flooring are foam PVC goods (cut from a role). They are coated on the underside with a white or light grey asbestos cardboard only a millimetre thick that consists of up to 90 % asbestos (white asbestos).

- **Asbestos cement products (Asbestos content approx. 15 %)**

a

Asbestos cement is predominantly a mixture of cement and asbestos fibres which in a dry state has density greater than 1 tonne per cubic metre (1000 kg/m3). It is a light grey, hard material which generally contains approximately 10% asbestos fibre, but can occasionally contain more that 10% fibre, bound in a matrix of Portland cement or autoclaved calcium silicate

All three common types of asbestos have been used - crocidolite between 1950 and 1969, amosite between 1945 until at least 1976, but mainly chrysotile. Asbestos cement has been used as

  - **Profiled sheets:** Roofing, wall cladding and weather-boarding.

- **Semi-compressed flat sheet and partition board:** Partitioning in farm buildings and housing, shuttering in industrial buildings, decorative panels, bath panels, soffits, linings to walls and ceilings, portable buildings, propagation beds in horticulture, fire surrounds, and composite panels for fire protection.
- **Fully compressed flat sheet and partition board.** Used as semi-compressed products but where stronger materials are required.
- **Tiles and slates** (made from fully compressed flat sheet). Cladding, decking and promenade tiles, and roofing.
- **Pre-formed moulded products.** Cistern and tanks, drains, sewer pipes, rainwater goods, flue pipes, fencing, roofing components, cable troughs and conduits, ventilators and ducts, and window boxes.

It should be noted that cementatious asbestos-containing slates and corrugated sheets used on roofs of buildings prior to 1990 are likely to contain asbestos fibres.

However, since the early 1990s, such products have been gradually replaced or substituted by equivalent non-asbestos containing materials, i.e. on a voluntary basis prior to the formal ban on their use which came into force in the year 2000. There now exists substitute materials for asbestos-containing corrugated sheets and slates so that, when removing asbestos-containing roofing slates or corrugated sheets, these substitutes can be installed to fulfil the same function.

However, with regard to asbestos-containing pipes, it should be assumed that all such pipes contain asbestos fibres and so care must be taken when working with or removing these pipes.

Because of the wide use of Asbestos cement, considerable amounts still remain in place.

ACMs in domestic properties

Asbestos has been used in various domestic construction materials, applications and appliances between the 1950s and 1990s.

Exposure to workers and the dweller to asbestos fibre can occur during uncontrolled asbestos removal or disturbance.

ACMs can be found in domestic dwellings (non-exhaustive) as

- Thermal insulation to boilers, associated pipes and under floors and between attic joists as loose asbestos lagging.

- roofing materials- corrugated asbestos cement roofs to garages and sheds, roof tiles, felt & bitumen products, rainwater gutters and down pipes)
- Internal ceiling panels (house, garage or boiler room) – can be either asbestos cement or asbestos insulating board.
- Fire proofing – Asbestos insulating board to rear of electrical fuse boards, boiler room doors and as under stair panelling
- Ceiling applications – textured paints to ceilings and walls.
- Seals – Rope seals to ovens, stoves and CAF gaskets in boilers flues etc.
- Asbestos cement cowls and flue pipes.

Any abatement work involving friable ACMs such as asbestos insulating boards, lagging etc should be undertaken by a Specialist Asbestos Contractor. In particular, those who commission works in domestics properties should identify ACMs prior to refurbishment, demolition or upgrades e.g. energy efficiency projects. Work with friable ACMs in domestic dwelling undertaken by specialist contractors must comply with the relevant provisions of the Asbestos Regulations e.g. plan of work, notification to the Authority and a visual inspection with clearance air testing by an independent analyst.

For work with other lower risk ACMs in domestic dwellings, contractors should consult these G*uidelines* for safe working procedures and specific requirements.

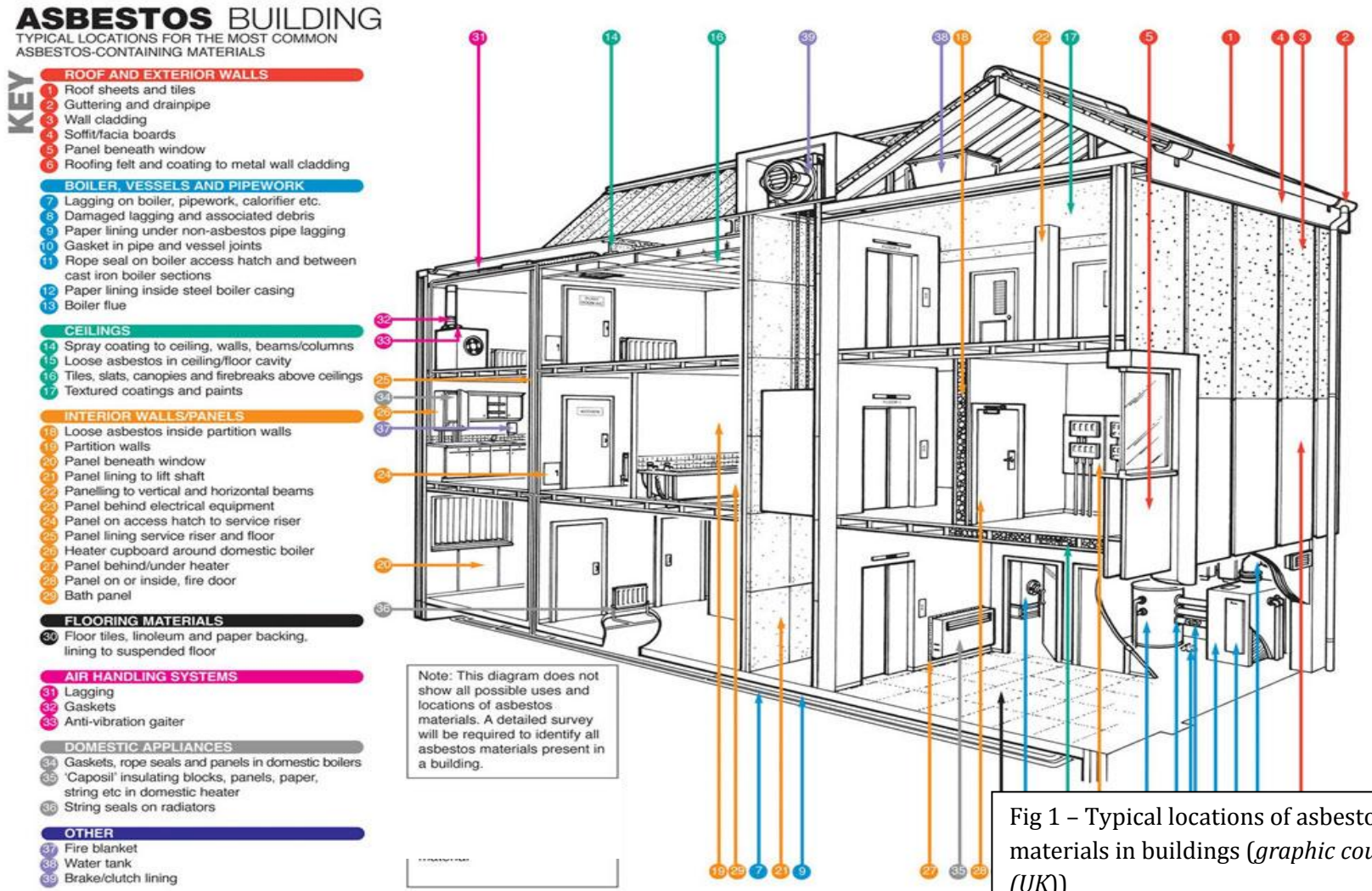


Fig 1 – Typical locations of asbestos containing materials in buildings (*graphic courtesy of HSE (UK)*)

Section 3: What are the Health Effects?

Asbestos is a Category 1 carcinogen and all six types can cause cancer. *Blue* and *Brown* asbestos are known to be more dangerous than *white* asbestos. There is no cure for asbestos related disease.

When ACMs are damaged or disturbed, asbestos fibres may be released into the air which if breathed in can cause serious, and often fatal, diseases. A person may develop one of the following three fatal diseases:

- **Asbestosis:** fibres penetrating deep into the lung can cause scarring of the tissue, which restricts breathing, leading to decreased lung volume and increased resistance in the airways.
- **Asbestos-related lung cancer (bronchial carcinoma):** a malignant tumour of the lungs' air passages. The tumour grows through surrounding tissue, invading and often obstructing air passages. **Smoking greatly increases the risk of developing asbestos related lung cancer.**
- **Mesothelioma:** a cancer of the cells that make up the lining around the outside of the lungs and inside of the ribs (pleura) or around the abdominal organs (peritoneum). By the time it is diagnosed it is almost always fatal.

The diseases can take many years (15-60) to develop, and there are no immediate changes in someone's health after breathing in asbestos.

There are also other asbestos related non-fatal conditions such as pleural plaques and pleural thickening, asbestos warts and corns.

There is now also adequate evidence that asbestos causes ovarian and laryngeal cancer. However, the asbestos-related risk is much higher for lung cancer and mesothelioma than for the other cancers.

The likelihood of developing an asbestos related disease depends on

- Asbestos type (blue, brown or white asbestos)
- Age at first exposure (likelihood increases if exposures start young)
- Dose or number of fibres inhaled
- Number of exposures and duration of each exposure
- Smoking - A smoker who inhales asbestos is 50 times more likely to develop lung cancer than a non-smoker who has not been exposed to asbestos.

A one-off short-term exposure is unlikely to be of concern but each time a person is exposed the risk slightly increases.

Section 4: Risk from asbestos and ACMs

Workers at risk from exposure to asbestos fibres

Persons at work who, whether intentionally, unwittingly or consciously disturb ACMs, can cause asbestos fibres to be released into the air which can be inhaled.

During any maintenance, refurbishment or demolition work, employees can potentially disturb ACMs and release asbestos fibres. Workers such as **painters, carpenters**, **plumbers**, **electricians**, **computer/air conditioning installers** etc. are all at risk of disturbing ACMs during the course of performing their own work activities and so could potentially be exposed to asbestos fibres.

Others workers at high risk are **maintenance workers**, **boiler operators**, **caretakers**, **general repair persons** etc, who during the course of their normal work and routine could unwittingly disturb ACMs if they do not know of their existence or that the materials they are working on or with contain asbestos fibres.

Any other category of workers e.g. **office, warehouse workers** etc who work in a building where ACMs have not been identified or proactively managed by those in control of the workplace are also potentially at risk of low level exposure to asbestos fibre.

Specialist asbestos contractors, **demolition contractors**, **hazardous waste management contractors**, **asbestos analysts** and **asbestos surveyors** are also at risk of exposure but this group of workers should have the experience, training and skills to mitigate and control any significant potential for exposure to asbestos fibre.

Exposure limit value

The exposure limit value for asbestos is the maximum concentration of asbestos fibres in the air at a place of work to which workers may be exposed when measured or calculated by reference to an eight-hour reference period (i.e. the duration when workers are normally at the workplace). The exposure limit value for all types of asbestos is 0.1 fibres per cubic centimetre of air (fibres per cm^3) (equivalent to 100,000 fibres per litre of air). This exposure limit value is not a 'safe threshold'. It is calculated that lung cancer mortality through forty-five years of exposure to 0.1 fibres per cm^3 would amount to five additional deaths per thousand exposed people. This is roughly equivalent to an occupational risk level of 4.10^{-3}.

Risk from ACMs

If ACMs are in good condition and left undisturbed, it is unlikely that airborne asbestos will be released into the air and the risk to health is extremely low. It is usually safer to leave it and review its condition over time. However, if the asbestos or ACM has deteriorated, has been disturbed, or if

asbestos-contaminated dust is present, the likelihood that airborne asbestos will be released into the air is increased.

If ACMs are disturbed or damaged, fibres can become easily airborne. ACMs that are hard and have a lower asbestos content e.g. undamaged asbestos cement products, are less likely to release fibres than those that are soft and have a high asbestos content e.g. laggings, sprayed coatings, and which are more easily damaged. Table 1 lists ACMs in approximate order of propensity to release fibres.

Table 1
Products listed in order of potential for fibre release (High to Low)

- Asbestos-contaminated dust (including dust left in place after past asbestos removal)
- Sprayed coatings, laggings and loose asbestos fill
- Insulating Boards
- Ropes, yarns and cloths
- Millboard paper, paper and paper products
- Asbestos cement products
- Asbestos bitumen roofing felts & damp proof courses; semi rigid asbestos bitumen products and asbestos bitumen coated metals
- Vinyl flooring backed with asbestos paper
- Unbacked vinyl & vinyl floor tiles
- Textured decorative coatings and paints containing asbestos
- Mastics sealants, putties and adhesives
- Asbestos- reinforced PVC and plastics

While all types of asbestos share the same hazards (e.g. the potential for lung cancer, asbestosis and mesothelioma) they have varying degrees of risk (the likelihood that death from one of the hazards will occur).

The relative risk from Crocidolite (*blue*) asbestos is some **500 times** greater than chrysotile (*white*) asbestos and the relative risk from Amosite (*brown*) asbestos is **100 times** greater than white asbestos . This means that the type/s of asbestos in the product is particularly significant when assessing risk.

Friable and Non-Friable ACMs

The ***Asbestos Register*** *(see section 8)* should provide information to determine if an ACM is friable or non-friable. Generally, friability means that an ACM is less resistant to mild abrasion or damage and is more likely to release inhalable fibres so the type of ACM, asbestos fibre type and condition

are critical to determine friability. Table 1 has been modified below (see Table 2) to provide general guidance on friable/ non-friable ACMs.

Table 2 Friable/ Non- friable ACMs	
• Asbestos containing dust (ACD) • Sprayed coatings, laggings and loose asbestos fill • Insulating Boards • Ropes, yarns and cloths • Millboard paper, paper and paper products • Vinyl flooring backed with asbestos paper • Compressed Asbestos Fibre (CAF) gaskets • Asbestos cement products in degraded state	**Friable ACMs**
• Asbestos cement products in non-degraded state • Asbestos bitumen roofing felts & damp proof courses; semi rigid asbestos bitumen products and asbestos bitumen coated metals • Unbacked vinyl & vinyl floor tiles • Textured decorative coatings and paints containing asbestos on plasterboard • Mastics sealants, putties and adhesives • Asbestos- reinforced PVC and plastics	**Non-friable ACMs**

Exposure levels associated with asbestos work

The exposure from disturbing an asbestos product depends on a number of factors such as product type, disturbance and environmental variables, such as the:

- Type of matrix in which the asbestos is present;
- Amount of asbestos and whether the asbestos is evenly dispersed throughout the matrix or is present as a layer on the surface;
- Type, rate, amount and area of disturbance inflicted on the asbestos containing material;
- Frequency which disturbance or work on the asbestos material is carried out;
- Controls applied to reduce airborne emissions;
- Local conditions and the use of personal protective equipment.

Clearly, the number of variables will mean that for each product, a range of exposures to airborne asbestos fibres will occur. Whilst accepting that there are many potential biases in any sampling

data, Table 3 provides mean exposures during work with various ACMs. It demonstrates potential releases of fibres for well controlled removal (wet) and poorly controlled removal (dry) of different types of asbestos materials. No account is taken of the protection offered by respiratory protective equipment (RPE).

Table 3 Assessment of average personal airborne concentration of regulated asbestos fibres during removal of ACMs

Product group	Controlled wet removal / good practice (f/cm^3)	Limited controls / dry removal (f/cm^3)
Spray and other insulation products	14.4	358
AIB (including millboards)	0.41	15
Asbestos cement	0.01	0.08
Fillers and reinforcements in a flexible matrix (incl. Textured Coatings)	0.02	0.08
Jointings (gaskets) and packing	0.05	0.2
Flooring	0.01	0.05
Moulded plastics & battery cases	0.001	0.01

Source HSL

As indicated in the table above, for sprays and lagging, the average fibre levels during poorly controlled dry removal are about 360 fibres per cm^3 and for asbestos insulating board (AIB) are about 15 fibres per cm^3 (some 3600 and 150 times the exposure limit value respectively).Even with controlled (wet) removal there is significant potential for release of fibres of around 140 times the exposure limit value for sprays and lagging and 40 times the exposure limit value for AIB.

The risk posed by asbestos cement products

Asbestos cement differs from Asbestos Insulation Board (AIB) in that it is denser and harder to the touch. It is not friable in a non-degraded state. As the fibres are tightly bound in the cement matrix they will only be released if the material is subject to significant disturbance, such as drilling, sawing or sanding. It should be noted that while this material is not friable in a non-degraded state, asbestos cement can be relatively brittle and so can be broken quite easily, for example, if dropped from a height, driven over by vehicles, or struck with tools or implements, and of course it is a fragile roof material which cannot withstand a person's weight.

Because the fibres in asbestos cement products are tightly bound in the material or matrix, they will only be released if the product is subject to mechanical damage (for example the use of abrasive tools or breakage) or as a result of weathering. This contrasts with other materials or products containing asbestos such as sprayed coatings and lagging which generally have a greater fibre content and, being loosely bound, release fibres relatively easily when damaged or disturbed. The

level of risk depends on the ease with which fibres are released and the type of asbestos present.

Asbestos cement products, such as roof sheets used externally, will weather slowly. The low rate of fibre release means that the risk of exposure is extremely low if the sheets are left undisturbed.

After several years of external use, asbestos cement may become covered in lichen, algae or moss. Although such growths rarely have a noticeable effect on the strength, durability or lifetime of asbestos cement, they may become visually unattractive (in some areas they can actually be regarded as mellow and pleasing, and are therefore encouraged). If these growths are removed without taking adequate precautions, this can result in fibre release and high exposures

Table 4 gives examples of typical exposures during work with asbestos cement. It should be noted, however, that while this Table lists a number of techniques or activities involving asbestos cement, it does not infer that these techniques or activities are necessarily acceptable, e.g. machine cutting without exhaust ventilation, dry brushing etc., but provides a list of activities which could be performed and so provides an indication of the level of fibres expected to be released. The values assist in illustrating which work practices produce or result in high exposures and also illustrate the importance of using specific work practices to ensure that exposures are kept to as low as is reasonably practicable. The values in this Table originate from measurements taken by the HSE (UK).

Table 4: Typical fibre concentrations for work with asbestos cement

Type of Activity	Typical Exposure Levels (fibres per cm^3)
Machine sawing with exhaust ventilation	**Up to 2**
Machine cutting without exhaust ventilation **- abrasive disc cutting** **- circular saw** **- jig saw**	 **15 - 25** **10 - 20** **2 - 10**
Hand sawing	**Up to 1**
Machine drilling	**Up to 1**
Removal of asbestos cement sheeting	**Up to 0.5**
Stacking of asbestos cement sheets	**Up to 0.5**
Remote demolition of asbestos cement	**Up to 0.1**

structures dry*		
Remote demolition of asbestos cement structures wet*	**Up to 0.01**	
Cleaning asbestos cement	**Roofing**	**Vertical cladding**
Dry brushing (wire)	**3**	**5 - 8**
Wet brushing (wire)	**1 - 3**	**1 – 2**
Power hosing		

Asbestos cement products, such as roof sheets etc., may sometimes be found in conjunction with other materials containing asbestos. For example, a warehouse may have an asbestos cement roof which has a sprayed asbestos coating (limpet) on the inner surface. The presence of such materials significantly alters the risk associated with work on the asbestos cement sheets. This is because sprayed coatings are loose friable materials which are easily disturbed, leading to very high exposures to asbestos fibres.

In these circumstances, more stringent precautions are required than for work on asbestos cement alone, and the work needs to be carried out by a specialist asbestos contractor. This scenario can be very dangerous if not identified prior to work commencing, i.e. it must be identified in an asbestos survey, which has been carried out by a competent person and assessed thoroughly through the performance of a risk assessment, which takes into account the presence of the sprayed asbestos.

Also of note, the majority of asbestos cement products contain only chrysotile asbestos fibres but some older products may contain the more hazardous crocidolite or amosite asbestos fibres.

Is it Board or Cement?

It is essential to be able to distinguish between asbestos cement and AIB . Asbestos cement is defined as a material which when in a dry state has a density greater than 1000 kg per cubic metre.

Where there is doubt employers should take the precaution by assuming the material is insulating board and take precautions accordingly e.g. specialist contractor, notification etc or arrange to conduct a **bulk density test** by contacting the Irish National Accreditation Board (INAB) for a list of suitable laboratories.

Section 5: The Law

As with any work activity the requirements of the Safety, Health and Welfare at Work Act, 2005 (No. 10 of 2005) and the Safety, Health and Welfare at Work (General Application) Regulations, 2007as amended (S.I. No. 299 of 2007 & S.I. No. 732 of 2007) apply and must be considered with respect to the protection of workers at the place of work.

In addition, as regards specific work activities involving working with materials containing asbestos, particular attention must be taken concerning the requirements and control measures as outlined in the following legislation:

- Chemicals (Asbestos Articles) Regulations 2011 S.I. 248 of 2011
- The Safety, Health and Welfare at Work (Exposure to Asbestos) (Amendment)Regulations, 2010 (S.I. No. 589 of 2010).
- The Safety, Health and Welfare at Work (Exposure to Asbestos) Regulations, 2006 (S.I. No. 386 of 2006).
- The Safety, Health and Welfare at Work (Construction) Regulations, 2006 (S.I. No. 504 of 2006).
- REACH Regulation
- Safety, Health and Welfare at Work (Chemical Agents) Regulations 2001 (S.I. No.619 of 2001)
- Safety Health and Welfare at Work (Carcinogens) Regulations 2001 (S.I. No. 078 of 2001)
- European Communities (Carriage of dangerous goods by road and use of transportable pressure equipment) Regulations 2011 (S.I. 349 of 2011)
- Air Pollution Act 1989

Chemicals (Asbestos Articles) Regulations 2011 (S.I. 248 of 2011)

The Chemicals (Asbestos Articles) Regulations 2011 S.I. 248 of 2011 (CAA regulations) came into operation on 31 May, 2011. They specify how the Health and Safety Authority may issue a certificate to exempt an asbestos-containing article, or category of such articles, from the prohibition on the placing on the market of an asbestos-containing article provided for by Article 67 and Annex XVII of the EU REACH Regulation 1907/2006.

The CAA Regulations govern the regime under which persons or bodies must apply to the Health and Safety Authority (HSA) for an 'asbestos article exemption certificate' before they may place permitted asbestos-containing articles on the market – whether for payment or free – and make it an offence to place such articles on the market in the absence of such an exemption certificate.

Once a certificate is issued, for either a category of articles or in respect of a particular applicant only, and subject to any conditions and time limits, as appropriate, then the articles concerned may be placed on the market. Otherwise, asbestos-containing articles may not be placed on the Irish market. Examples of such articles would include *second-hand acetylene cylinders, articles of historical value and classic/vintage cars.*

The CAA regulations allow placing on the market of asbestos-containing articles without a certificate in the case of the following articles:

a) asbestos articles transferred to specialists for asbestos removal and disposal;
b) asbestos articles transferred to specialists to render them safe and
c) asbestos articles that are sent as samples for analysis.

This is to allow for the continued removal of asbestos containing materials by specialist contractors. Point (c) is to allow articles to be tested for the suspected presence of asbestos e.g. for compliance with health and safety legislation or quality assurance purposes. The provisions of the 2006/2010 Asbestos Regulations will still apply to scenarios a) to c).

Further information on the CAA regulations can be found on the Business & Licensing section of the HSA website www.hsa.ie.

The Safety, Health and Welfare at Work (Exposure to Asbestos) Regulations 2006 & 2010

The Safety, Health and Welfare at Work (Exposure to Asbestos) Regulations 2006, (S.I. No. 386 of 2006) as amended by The Safety, Health and Welfare at Work (Exposure to Asbestos) (Amendment) Regulations, 2010 (S.I. No. 589 of 2010) (hereinafter referred to the 'Asbestos Regulations')

The Asbestos Regulations:	Relevant Section in Guidelines
Apply to all places of work and all sectors of work where asbestos containing materials (ACMs) may be present, including premises, buildings, installations, power stations, farms, vehicles, ships, aircraft, factories, plant and equipment, including temporary or remote sites	**----**
Specifically refer to the six types of asbestos as set out in Schedule 1 of the regulations.	**Section 1**
Relate to all employees and non-employees who may be at risk from exposure while at work should exposure occur to any material or product containing asbestos fibres, that could be released and then inhaled by those employees.	**Section 4**
Require employer to prevent exposure to asbestos carry by carrying out a written risk assessment for any activity where an employee may be exposed to dust containing asbestos. This assessment should determine the nature and degree of exposure, type and condition of asbestos and identify the necessary measures to be taken. Consultation with employees must take place	**Section 6 & 7**
Provides for certain exemptions for lower risk asbestos work activities where exposure is low and sporadic. The exemptions relate to notification,	**Section 11**

health assessments and maintenance of health records.	
Set a single control level (exposure limit value) for all types or mixtures of asbestos types of 0.1 fibres per cm3. Exposure must be less than 0.1 fibres per cm3 as an 8-hour time-weighted average (TWA), by the use of respiratory protective equipment if exposure cannot be reduced sufficiently using other means	**Section 4**
Require employers to put in place preventative measures such as limiting number of personnel, designing work processes to avoid dust release, regularly cleaning and maintaining work areas, correctly packaging asbestos waste and collection, demarcate areas with warning signs and prevent unauthorised entry, use and supervision of suitable PPE/RPE, no smoking in work area. This also includes areas where exposure limit value will be foreseeably exceeded.	**Section 10, 11, 12, 14 & 17**
Require air monitoring (sampling) to be carried out where exposure limit value will be exceeded by an independent competent analyst. It must be representative of personal exposure by means of measurements or time weighted averages. Samples must be analysed in accordance with the PCM method or only fibres of specified dimensions may be counted	**Section 13 & Appendix 4**
Require employers, based on risk assessment, to notify asbestos work activities, including the plan of work, to the Health and Safety Authority 14 days in advance of the work starting.	**Section 6, 11, 12 & 16**
Requires employers to take all reasonable steps to identify asbestos containing materials prior to demolition, demolition, maintenance & repair	**Section 6**
Requires employers to implement controls where unforeseeable elevated fibre levels occur	**Section 12 & 13**
Requires an employer to draw up a suitable plan of work prior to any demolition, repair, maintenance or other work. Where the risk assessment indicates an asbestos work activity is notifiable, the Plan of Work must also be submitted with the notification to the Authority. ACMs must be removed as far as reasonably practicable before demolition techniques are applied except where this would cause a greater risk to employees	**Section 14**
Require an employer to obtain written verification following asbestos removal activities called a 'site clearance for reoccupation'. This can be done by an independent competent person where air monitoring is not required or an independent analyst when air monitoring is required A separate clearance certificate is also required for the Hygiene unit	**Section 11 & 13**
Requires an employer to provide evidence of ability to carry out asbestos work activities with particular requirements set out in Schedule 4 of the regulations	**Section 9, 10, 11, 12 & 15**
Every employer to ensure that adequate information, instruction and training is given to all employees who are, or are liable to be, exposed to asbestos, and those who supervise such employees. The self-employed should also have a similar level of knowledge and competence.	**Section 9**
Requires an employer based on risk assessment to use a responsible medical practitioner for the purposes of health assessments of employees at least	**Section 6, 11 & 15**

once in every three years. Records must be retained for 40 years after last exposure and provisions are made for making these available to the authority under certain circumstances.	
Requires the Health and Safety Authority to maintain an Asbestos and Mesothelioma register and medical doctors to inform the Authority of such cases.	**Section 15**
Requires employers based on risk assessment to maintain occupational exposure registers for employees. Records must be retained for 40 years after last exposure and provisions are made for making these available to the authority under certain circumstances	**Section 15**
Set out prohibitions in relation to asbestos spraying activities.	**---**

Safety, Health and Welfare at Work (Construction) Regulations 2006 (S.I. No. 504 of 2006).

These Regulations place duties on clients, project supervisors for the design process and construction stages of work, as well as on designers and contractors to ensure that the health and safety aspects of the work are taken into account, and then co-ordinated and managed effectively throughout all the stages of a construction project. This includes all stages in the lifecycle of a project, from conception, design and planning through to the execution of works on-site and subsequent construction, maintenance and repair, refurbishment, removal, demolition etc.

Under these Regulations a preliminary health and safety plan must be drawn up by the project supervisor for the design process (PSDP) on most construction projects. This plan must specify, among other items, any **particular risk** which exists at the premises, including the presence of asbestos-containing materials.

In the majority of situations work activities involving materials containing asbestos (including asbestos cement) are covered within the definition of 'construction work' and so the Construction Regulations apply to this type of work activity. If any doubt exists regarding the overall description or nature of the work, clarification should be sought and specific reference made to the definition in the Regulations, including its inferred interpretation. In particular, Schedule1 to the Regulations refers to work involving 'particular risk', i.e. involving materials containing asbestos.. The Regulations require that:

- When planning works, clients must appoint a PSDP and preferably provide information on ACMs as 'pre-construction' information or require the PSDP to arrange for the identity and information about the location, type and condition of ACMs on site.
- Designers should take account of this information in their designs and, based on risk assessment, should remove or reduce the need to work with asbestos cement where possible
- Project supervisors should ensure that information about asbestos, relevant to the work in

hand, is available to designers and contractors as appropriate
- The main contractor on-site should ensure that individual contractors are aware of the relevant information, and all workers should be briefed
- Anyone arranging for persons to undertake construction work should be reasonably satisfied that their appointees are competent to undertake the work safely and without risk to health
- Where work with ACMs is part of the construction work, employers should provide employees with sufficient information, training and instruction to ensure that they are aware of the risk and the control measures, safe practices and safe systems required to perform their work activities in a safe manner
- At the end of a project, a safety file, including relevant information about asbestos, should be prepared for the client.

It is important for those engaged in a PSDP role to ensure that they have appropriate insurance cover regarding the provision of instructions for asbestos removal or alternatively they should engage a competent asbestos consultant to assist in the compilation of the asbestos tender documentation.

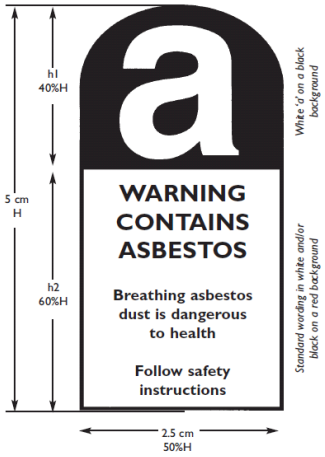
In the case of demolition projects, all ACMs must be removed in so far as is reasonable practicable, including lower risk materials such as textured coatings and asbestos cement unless the risks to the safety and health of workers exceed the risk from asbestos i.e. remote demolition may be appropriate where a building is structurally unsound.

The Construction Regulations are relevant for asbestos consultants and asbestos contractors who may take on the role of PSDP and PSCS respectively. Comprehensive guidance is available on the Authority's construction webpages at www.hsa.ie.

Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH) Regulation.

The placing on the market, the supply and use of asbestos fibres of all types and of products containing asbestos fibres is now prohibited under the **EU Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH) Regulation**.

The restriction on asbestos fibres and products containing these fibres that applies in Ireland is contained in Annex XVII of the REACH Regulation. The legislation prohibits the use, re-use, sale, supply, further adaptation etc. of materials containing asbestos fibres.



The special labelling requirement for asbestos fibres and products containing asbestos fibres being placed on the market (permitted under specific derogations) still apply.

The restriction conditions for asbestos fibres can be found in entry no. 6 of Annex XVII of the REACH Regulation, amended by Regulation (EC) No. 552/2009.

The Health and Safety Authority is the lead Competent and Enforcement Authority for REACH in Ireland. Enforcement of REACH is facilitated under the **Chemicals Acts 2008 and 2010**. Further information on the REACH regulation can found on the REACH webpages of the HSA website www.hsa.ie.

Safety, Health and Welfare at Work (Chemical Agents) Regulations 2001 (S.I. No.619 of 2001)

The Safety, Health and Welfare at Work (Chemical Agents) Regulations, 2001 apply to any workplace where hazardous chemical agents are used. The Regulations lay down requirements to:

- Carry out a risk assessment for hazardous chemical agents.
- Put prevention and control measures in place following the this risk assessment
- Make arrangements to deal with accidents, incidents and emergencies
- Provide information and training
- Make arrangements for consulting with their employees
- Provide appropriate health surveillance
- Keep exposure records

Safety Health and Welfare at Work (Carcinogens) Regulations 2001 (S.I. No. 078 of 2001)

The Safety, Health and Welfare at Work (Carcinogens) Regulations, 2001 (S.I. No. 078 of 2001) transpose several EU Directives relating to the prevention of exposure to carcinogens at work and place a responsibility on all employers in whose premises:

- A carcinogen
- A mutagen
- A carcinogenic process is used, to eliminate the risk of adverse health effects, namely cancer, due to exposure to these dangerous chemicals

Although the Regulations are referred to as the Carcinogen Regulations they refer to both Category 1 & 2 carcinogens and mutagens.

Regulation 7(1) (a) and (c) have particular relevance to guidance provided on 'short duration' work for maintenance and repairs provided in Section 11 of these Guidelines.

European Communities (Carriage of dangerous goods by road and use of transportable pressure equipment) Regulations 2011 (S.I. 349 of 2011)

This legislation provides the legal framework provide the legal framework under which all dangerous goods, including asbestos, may be transported by road.

Further guidance on this legislation and a guidance note on ADR Special Provision 168 is available on the ADR webpages at www.hsa.ie.

Air Pollution Act 1987

Local authorities are responsible for investigating any incidents of air and water pollution in their areas (e.g. incorrect disposal of asbestos) and can prosecute any infringements of the Air Pollution Act, 1987.

Section 6: Risk Assessment of ACMs

Purpose of Risk Assessment

Risk Assessment is a key requirement of the Act and the Asbestos Regulations. Employers, including the self-employed, must identify and assess all ACMs present on site before any maintenance, repair, demolition or refurbishment works commence and carry out a written risk assessment.

Examples would include:

- An employer using his/her own employees e.g. maintainance staff, to carry out work on his/her own premises
- An employer whose employees are contracted to work on a client's premises e.g. electrical contractor, plumbing contractor or asbestos removal contractor
- A self employed person working on a client site.

Risk assessment of ACMs also provides necessary information for:

- An employer or those in control of a workplace to manage ACMs and make decisions regarding the retention, remediation or removal of ACMs.
- A Client, PSDP, PSCS or designer under the Construction Regulations to make appropriate decisions regarding the presence of ACMs within the scope of a construction project
- An asbestos contractor to develop relevant plans of work for the abatement of ACMs.

Generally, a written risk assessment for ACMs would apply to buildings built before the year 2000. It involves obtaining good and reliable information on the presence or absence of asbestos-containing materials from the building owner or those in control of the workplace.

Responsibility of those in Control of Workplaces

Section 19 of the Act places a duty on those in control of places of work e.g. landlords, owners (as defined in section 15 of the Act) to carry out a written risk assessment to the extent that his or her duties may apply to persons other than his or her employees i.e. identify the hazards in the place of work under his or her control, assess the risks presented by those hazards and be in possession of a written assessment and make that written risk assessment available to any persons who may be exposed to the risk.

If no information is available, works must not commence until ACMs have been identifed. This is normally achieved through an asbestos survey (appropriate to the proposed works) which should be undertaken by a competent asbestos surveyor. Refer to Section 8 on Asbestos Surveys.

An asbestos survey will produce **a register of ACMs** (commonly known as the **Asbestos Register**) and should be provided in a format that is readily comprehensible. Employers must then assess the risks to health from any work that an employee may undertake which may expose him to asbestos and determine what precautions need to be taken to minimise the exposure.

A risk assessment standard for ACMs should be transparent, comparable and be possible to verify if it is to meet the requirement of objectivity.

Therefore, each ACM identified in a survey and described in an asbestos register will normally be assessed using the **Material Assessment** algorithm on four separate elements, as follows

1) the type of the asbestos material *e.g. lagging, board etc*
2) its condition *e.g. good condition, low, medium of high damage*
3) its surface treatment *e.g. composite materials, unsealed laggings*
4) type of asbestos identified *e.g. blue, brown, white etc*

Where an asbestos survey has been carried out, the assessment carried out by the competent surveyor will provide recommendations e.g. remove, repair, manage ACMs long term etc. These recommendations will normally be based on further parameters such as occupancy levels, potential for disturbance, maintenance and human exposure potential giving a **Priority Assessment** for management decisions (See Section 7 Managing ACMs).

Material and Priority Assessments are algorithms which each give rise to a numerical score. These two scores are added to give an **overall risk rating** for identified ACMs

Key Components of an Risk Assessment for Asbestos Abatement Activities

For those assessing the risks to asbestos removal operatives, maintenance or other workers, the information contained in the asbestos survey report and register will be invaluable in compiling their own assessments in order to prevent exposure to asbestos and to develop safe systems of work (**Plan of work**). Where possible, plan work to avoid disturbing identified ACMs. ACMs should only be worked on if absolutely necessary.

The key components of an **Asbestos Risk Assessment** for asbestos removal are as follows:

- Risk assessments must be prepared by a competent person who has the training, knowledge and experience of the type of work and control measures available.

- Identify the type of asbestos and condition of the asbestos or materials containing asbestos (Asbestos Survey information i.e. **material assessments**);
- Determine the nature and degree of exposure which may occur during the course of the work i.e. expected exposures and number of people affected (Use of published exposure levels for similar task, information from previous monitoring exercises). It is important that the written risk assessment takes account of all of the features of a particular site and the activities, and includes a sufficient basis for the estimate of possible exposure. The written risk assessment should consider exposure of all who could be affected (e.g. operatives, occupants, members of the public, other contractors etc);
- Set out and implement the steps to be taken to prevent exposure or reduce it to the lowest level that is reasonably practicable e.g. priority assessments, identify procedures for the selection, provision, use and decontamination of personal protective equipment (PPE), including respiratory protective equipment (RPE), waste disposal, emergency procedures, equipment, training etc;
- Consider the results of any air monitoring of exposure e.g. previous results from a similar activity. Note, if previous air monitoring data relating to a specific task is not available or not available in the form of documented 'typical exposure concentrations', then the written risk assessment must identify the need to conduct personal/static air monitoring to support the Plan of Work;
- Use guidance published by the HSA or other authorative sources including information from PPE suppliers, equipment suppliers etc;
- Record the significant findings of that risk assessment and retain every risk assessment in a permanent form;
- Consult with employees concerned or their representatives, or both, in respect of the risk assessment and
- Review risk assessment regularly and where there is reason to believe that 1) the assessment is incorrect 2) that the existing risk assessment written risk assessment is no longer valid and 3) there is a change of a material nature in the work activity.

Table 5 In summary, the risk assessment should cover the following points

• The type of work
• The type and quantity of asbestos involved and the results of analysis
• The details of expected exposures
  ○ Number of people involved
  ○ Whether the exposure limit value will be exceeded
  ○ Frequency and duration of exposure
  ○ Potential exposure of other persons
  ○ Air monitoring of similar previous works
• Methods of asbestos removal and steps to be taken to reduce exposure to lowest level as practicable e.g. dust suppression method
• Measure to prevent the spread of asbestos to the surrounding environment
• Provision, use and maintenance (including cleaning) of RPE & PPE
• Procedures for personal decontamination

- Procedures for dealing with emergencies
- Procedures for removal/ disposal of waste
- Thermal environment
- Other hazards

- Remember when developing the written risk assessment that asbestos fibres may not be the only hazard present. There are many others hazards which commonly occur during asbestos works , some of which have the potential to cause serious injury or death, for example:
    - Work at height e.g. scaffolds, roofs & roof spaces etc;
    - Working on fragile roofs;
    - Confined spaces;
    - Biological hazards e.g. weils disease, pigeon droppings (histoplasmosis, cryptococcosis, and psittacosis), mold spores, blood borne pathogens from needlestick injuries etc;
    - Presence other hazardous chemicals e.g. foam, sprays, chemical applications for encapsulating AC roofs, diesel fumes from generators etc;
    - Noise & Vibration ;
    - Thermal and
    - Manual handling e.g. lifting negative pressure units, specialist floor grinders etc

Further detailed guidance on construction and other additional hazards is available at www.hsa.ie.

It is not necessary to make a written risk assessment before the commencement of repetitive tasks and it is only when the work or work method varies that a new assessment must be produced.

The resulting **Plan of Work** (See Section 14) and **written risk assessment** must be available on site for those involved in doing the work.

Use of Assessment Algorithms

Material Assessments

As previous mentioned, the **condition** of each ACM identified at the workplace should be assessed using the **material assessment algorithm**.

The assessment will depend on four different parameters: Asbestos type, Product type, Extent of damage & Surface treatment. Each parameter is scored as high (3), medium (2), low (1) or very low (0). Presumed asbestos containing materials are scored as crocidolite (3) unless there is a reasonable argument that another type of asbestos was almost always used in that type of application.

The Material Assessment is set out below.

Sample variable	Score	Examples of scores
Product type (or debris from product)	1	Asbestos reinforced composites (plastic, resins, mastics, roofing felts, vinyl floor tiles, semi-rigid paints or decorative finishes, asbestos cement)
	2	Asbestos insulating board, mill boards, other low density insulation boards, asbestos textiles, gaskets, ropes and woven textiles, asbestos paper and felt.
	3	Thermal installation (i.e. pipe and boiler lagging), sprayed asbestos, loose asbestos, asbestos mattresses and packing.
Extent of damage / deterioration	0	Good condition; no visible damage
	1	Low damages: a few scratches or surfaces marks, broken edges of tiles etc.
	2	Medium damage: significant breakage of materials or several small areas where material has been damaged revealing loose asbestos fibres.
	3	High damage or delamination of materials, sprays and thermal insulation. Visible asbestos debris.
Surface treatment	0	Composite materials containing asbestos: reinforced plastics, resins, vinyl tiles.
	1	Enclosed sprays and lagging, asbestos insulating board (with exposed face painted or encapsulated) asbestos cement sheet etc.
	2	Unsealed asbestos insulating board, or encapsulated lagging and sprays
	3	Unsealed laggings and sprays.
Asbestos type	1	Chrysotile
	2	Amphibole asbestos excluding crocidolite
	3	Crocidolite
No asbestos	0	No asbestos in sample
Total score		

Priority Assessments

The Material Risk Assessment above identifies those materials most likely to release airborne fibre if disturbed. It does not necessarily follow that those materials with the highest scores will be the materials that should be given priority for remedial action. Management priority must be determined by carrying out a Risk Assessment that will take into account the following **Priority Assessment Factors**:

Assessment factor	Score	Examples of score variables
Normal occupant activity Main type of activity in area		
	0	Rare disturbance activity (i.e. little used store room)
	1	Low disturbance (i.e. office type activity)
	2	Periodic disturbance (i.e. industrial or vehicular activity which may contact ACM's

	3	High levels of disturbance (i.e. fire doors with asbestos insulating board sheet in constant use)
Secondary activities of area	As above	As above
Likelihood of disturbance		
Location	0	Outdoors
	1	Large room or well ventilated areas
	2	Room up to 100m^2
	3	Confined spaces
Accessibility	0	Usually inaccessible or unlikely to be disturbed
	1	Occasionally likely to be disturbed
	2	Easily disturbed
	3	Routinely disturbed
Extent / amount	0	Small amounts of items (i.e. strings, gaskets)
	1	≤ 10m^2 or ≤ 10 m pipe run
	2	≥ 10m^2 to ≤ 50 m2 or > 10m to ≤ 50 m pipe run
	3	≥ 50m^2 or > 50 m pipe run
Human exposure potential		
Number of occupants	0	None
	1	1 to 3
	2	4 to 10
	3	> 10
Frequency of use of area	0	Infrequent
	1	Monthly
	2	Weekly
	3	Daily
Average time area is in use	0	< 1 hour
	1	> 1 to < 3
	2	> 3 to < 6
	3	> 6 hours
Maintenance activity		
	0	Minor disturbance (i.e. possibility of contact when gaining access)
	1	Low disturbance (i.e. changing lights bulbs in asbestos insulating board ceiling
	2	Medium disturbance (i.e. lifting one or two asbestos insulating board ceiling tiles to access a valve)
	3	High levels of disturbance (i.e. removing a number of asbestos insulating board ceiling tiles to replace a valve or for re-cabling
	0	ACM unlikely to be disturbed for maintenance
	1	≤ 1 per year
	2	> per year
	3	> per month
		Source: HSG 227

As with the material assessment each parameter is scored high (3), medium (2) low (1) or very low (0)

The Risk Assessment must be carried out with detailed knowledge of all the above. The Surveyor may have some of the information, but the Client is responsible for ensuring the Assessment is carried out using the information obtained during the Survey, together with their detailed knowledge of activities carried out in the premises. The preferred method is to carry out the Assessments jointly i.e. Asbestos Surveyor and Site Manager or well informed delegate.

The results of the Risk Assessments will be used to determine the order of prioritisation of remedial actions including repair, sealing and removal, and the ongoing management of all remaining ACMs within the premises. The total risk will be assessed by the combined risk scores from both the Material Risk and the Priority Assessments

The scores will be split into categories, each category indicating the level of prioritisation for remedial action.

Category	Overall Risk score (combined risk & materials assessment scores)	Level of Risk	Action
Category A	18+	High Risk	Immediate Action
Category B Risk	13-17	Medium Risk	Near Term Action
Category C Risk	9-12	Low Risk	Regular Inspection
Category D	8 or below	Very Low Risk	Annual Inspection
			Source: HSG 227

The scoring system above makes the assessment process transparent so that people can see how priorities were decided.

Asbestos Cement Roof Algorithm

Significant removal of asbestos cement roofs takes place in Ireland. The following algorithm can be used for the assessment of asbestos cement roofing materials.

Assessment parameter	Score	Example of score variables
A – State of conservation	1	The visible layer of fibres are almost completely incorporated in the cement matrix
	2	They are enclosed only partially
	3	They are easily removed by tweezers
B- Presence of cracks	1	Absent
	2	Rare
	3	Numerous
C –Type of asbestos	1	Only Chrysotile
	4	Amphibole or Amphibole/Chrysotile mix
D - Friability	1	The corners or the edges of the sheets break with a sharp sound using pinchers
	2	The corners or edges of the sheets break easily with a dull sound
E- Surface release	1	Particles are not released from the surface when rubbed with a latex glove
	2	Particles are released from the surface when rubbed with a latex glove
F - Accessibility	1	The roof is not accessible
	2	The roof has potential rights of passage
	3	The roof is easily accessible
G – Support Structure	1	The roof rests on a load bearing loft
	2	The roof rests on beams
H – Distance from windows	1	The roof is far from windows
	4	The roof is overlooked or adjoined by windows or terraces
I – Frequency of access	1	Roof never accessed
	2	Roof occasionally accessed
	3	Roof frequently accessed
J - Age	2	<15 years
	3	From 15 to 30 years
	4	Greater than 30 years
Total (multiply each chosen score)		
		Source: Campopiano et al 2009 (modified)

Asbestos cement roofs scored **higher than 55 should be classed as high risk** with a significant potential to release fibres and removal is recommended. Roofs scored **between 27 and 54 should be classed as medium risk** and encapsulation should be considered. Those roofs scored between 10 and 26 should be considered low risk and managed as they are.

The Asbestos Regulations (Reg 5(b)) provide for certain exemptions (from notification, medical surveillance and retaining health records) where removal without deterioration of non-degraded materials in which the asbestos fibres are firmly linked in a matrix e.g. asbestos cement products.

In order to assist employers determine their obligations when considering removal of asbestos cement roofing materials, removal of roofs with a **score of more than 55** using the asbestos cement algorithm must be carried out by a competent contractor who must:

- Notify the Health and Safety Authority in accordance with Regulation 11
- Provide medical surveillance for relevant employees in accordance with Regulation 20 and schedule 5.
- Retain health records for relevant employees; and
- Comply with all other relevant provisions of the Asbestos Regulations e.g. plans of work, training, etc

Section 7: Managing Asbestos Containing Materials

Asbestos Management Plans

Exposure to asbestos fibres must be, so far as is reasonably practicable, prevented. It is important to remember that as long as ACMs are not damaged or disturbed and remain in good condition; the risk of exposure from release of fibres is minimal and should not present any threat to the health of those occupying a building. Such materials, in good condition, do not necessarily require removal but should be assessed regularly and managed to ensure that their condition does not deteriorate.

The Regulations require that no work e.g. replacement of light fittings to major refurbishment/demolition, be undertaken which may expose employees to asbestos and to carry out a risk assessment to determine the presence of asbestos in the workplace. Therefore, an essential step in the process of managing the exposure to asbestos in workplaces is to establish an **Asbestos Management Plan (AMP)** which aims to record the presence of ACMs and the manner in which exposure to asbestos fibres is managed, both during normal occupation and when work which may disturb ACMs is planned. This should be referenced or included in the workplace Safety Statement.

It's good practice for large and small workplaces

The steps and approach to managing risks from ACMs, described in this section, can be tailored to apply to small workplaces (e.g. dry cleaning shop with an asbestos insulating board ceiling) to a large portfolio of buildings with multiple occurrences of ACMs. Essentially, those in control of a workplace must a) identify ACMs b) Assess the risks c) Identify and implement control measures d) have arrangements for incidents/emergencies and e) review plan periodically

The AMP should be prepared with full consultation, involvement and information sharing between all parties responsible for the workplace and be communicated to all employees or self employed persons, including contractors and maintenance workers, who use the premises as a workplace.

Any decision reached that there are no ACMs present in a workplace must be capable of being justified by adequate evidence. It is considered reasonable to assume that any building built after the year 2000 is unlikely to contain ACMs. However, where there is a large portfolio of buildings, prioritisation should be given to the identification of ACMs in older buildings e.g. 1950-1985 or where imminent works are envisaged.

An AMP sets out how asbestos or ACM that is identified at the workplace will be managed, for example, what, when and how it is going to be done.

An AMP must include:

a) the identification of asbestos and ACM, for example, a reference or link to the asbestos register for the workplace, and the locations of signs and labels
b) decisions, and reasons for the decisions, about the management of asbestos at the workplace, for example, safe work procedures and control measures
c) procedures for detailing accidents, incidents or emergencies of asbestos at the workplace, and
d) workers carrying out work involving asbestos, for example, consultation, information and training responsibilities.

Other information that can be included in the asbestos management plan is:

a) an outline of how asbestos risks will be controlled including consideration of appropriate control measures
b) timetable for managing risks of exposure, for example, priorities and dates for any reviews, circumstances and activities that could affect the timing of action
c) identification of each person with responsibilities under the asbestos management plan, and the person's responsibilities
d) procedures, including a timetable for reviewing and if necessary, revising the asbestos management plan and asbestos register, and
e) air monitoring procedures at the workplace, if required.

The person with management or control of the workplace must ensure the asbestos management plan is reviewed and if necessary revised when:

- there is a review of the asbestos register or a control measure
- asbestos is removed from or disturbed, sealed or enclosed at the workplace
- the plan is no longer adequate for managing asbestos or ACM at the workplace

The person with management or control of the workplace must ensure the asbestos management plan is readily accessible to:

- an employee who intends to carry out work at the workplace
- other employees
- safety representatives
- those appointed under the Construction Regulations
- an employer who intends to carry out work at the workplace, and

- Emergency services i.e. Fire Authorities

The asbestos management plan should be kept at the workplace to ensure it is accessible.

Identifying measures to ensure risks from ACMs are controlled

Once an asbestos survey has been carried out by a competent person, you should know, as far as is reasonably practicable, the location, type and condition of ACMs. Some of the asbestos may be:

- Damaged,
- Have deteriorated or degenerated with time,
- Be liable to be damaged as a result of its location,
- In good condition.
- Situated in areas due for maintenance, refurbishment or demolition.

Based on this information, you need to make a decision on what remedial action is required and on how to manage the ACMs, i.e. can it be left in place or should it be removed (see Decision flow chart below).

There is a difference in the risk presented by ACMs located inside, compared with outside, a building. Inside the building, the ACMs may be at greater risk of accidental damage or disturbance, and any fibres released may be close to the occupants, or accumulate on flat surfaces, pipes etc. and be disturbed later. Such matters need to be taken into account when making a decision on how to deal with the material.

ACMs which are in good condition and are not likely to be disturbed, can be left where they are (indicating their location and marking them as asbestos-containing materials) but they will need to be managed.

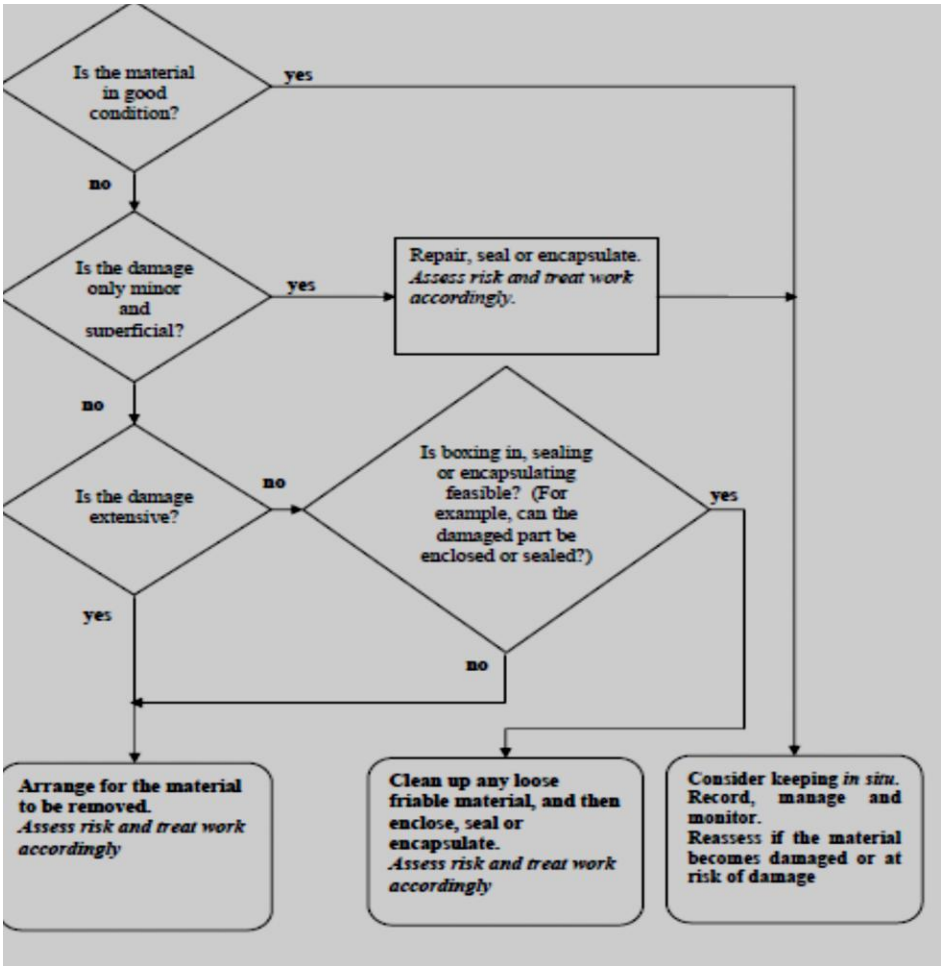
If ACMs are only slightly damaged, they can be repaired and sealed, the material left where it is and managed. However, ultimately the assessment of the material by the surveyor will determine whether any surface needs to be sealed, labelled and managed.

Sealing involves the application of a coating (polymeric, bituminous or cement-based paint), the type of which will depend on the nature of the material, the level of damage and protection. The risk assessment (performed by a competent person) will determine if sealing is the best and most appropriate option and will also determine who should do the sealing activity i.e. dependent on

risk. The coating should adhere firmly to the surface of the ACM.

Where it is possible that some damage may reoccur, instead of removing the ACM it can be enclosed or encased. This involves repairing any minor damage and then covering the ACM with a non-asbestos material, forming a physical barrier. However, resistance to the spread of fire must be maintained. The enclosed area between the covering and the ACM should be sealed, and adequate cavity fire barriers constructed. This action must be performed only on the basis of a risk assessment having been completed. In addition, any enclosed ACM should be indicated on the plans of the building to ensure that, should future work activities be planned, they can be carried out safely with the knowledge that ACMs are present.

You need to consider removing ACMs if they are in poor condition, or likely to be damaged or disturbed as a result of building maintenance, refurbishment or demolition works, because of normal work activities within an area, or if there are plans to change work activities in the area which may subsequently damage or disturb the existing ACMs.



Appropriate **Labelling** or **Signs** should be used to avoid inadvertent damage or injury/death (e.g. fall through an asbestos cement roof)

Figure 1: Standard wording.

Figure 2: Wording for highlighting specific ACMs in situ.

Labelling in public areas can give rise to unnecessary alarm, therefore, alternatives to asbestos labels can be considered e.g. designating such locations as 'controlled areas' and introducing a **Permit to Work** or other similar control scheme to avoid inadvertent damage by maintenance staff or contractors.

Management of contractors is critical to an effective asbestos management plan. A **Permit to Work** system should be introduced or modified to ensure known ACMs are brought to the attention of contractors and are not inadvertently disturbed by the proposed works.

Arrangements must also be made to **carry out inspections at regular intervals** to ensure that the condition of the ACM does not deteriorate, and/or that there has not been an increase in the potential risk to persons of exposure to asbestos fibres due to, for example, a change of use of an area. A record of all such inspections should be maintained and signed off by a competent person.

The time period between monitoring will vary depending upon the type of ACM, its location and the activities in the area concerned, but would not be expected to be more than 12 months in most cases. ACMs in locations where there is a lot of activity will need more frequent monitoring. The

surveyor may make recommendations in this respect.

Decisions about what to do in order to manage the risk from each area of ACMs in the premises must be recorded in the asbestos management plan, and any records/ drawings must be kept up to date. For example, if a decision is made to remove ACMs, once this is done the management plan and any relevant drawings/ records must be updated.

Arrangements to manage accidents, incidents and emergencies

Employers should have emergency procedures in place for any accident, incident or emergency relating to asbestos; for example, accidental disturbance of ACMs during building work, unless the amount of asbestos in the premises is so small that any risk would be minimal. These procedures should be contained in the asbestos management plan, and include the steps to be taken to minimise the risks of exposure to asbestos and measures in place to carry out emergency repairs.

In any circumstance where there is an accidental uncontrolled release of asbestos into the workplace, the cause of the uncontrolled release should be identified and adequate control regained as soon as possible.

Any persons in the affected area must leave immediately. All tools and materials should be left in the potentially contaminated area. The area should be sealed to prevent further access and to prevent the spread of asbestos fibre to other areas. Where persons have been contaminated with visible dust or debris then arrangements should be made to decontaminate those affected. Any clothing or personal protective equipment should be decontaminated or disposed of as contaminated waste.

Appropriate arrangements must be in place to ensure that the extent of the contamination is assessed by a competent person and the area that may have been contaminated by asbestos fibres is thoroughly cleaned of visible debris or dust. This work should only be carried out by operatives or contractors who have been trained and are competent to carry out the work, and who have the appropriate equipment. In the case of a significant disturbance of asbestos insulation or asbestos insulation board, this will almost certainly require the use of a specialist asbestos contractor.

Air sampling should also be carried out, where it is necessary, to ensure that the remedial measures taken have been effective in reducing the potential for exposure to asbestos fibres.

If an employee has been potentially exposed to asbestos fibres in an incident, a note that the exposure has occurred should be added to the employee's personal record. A copy of the note must be given to the employee with instructions that it should be kept indefinitely. It is also recommended that they consult their GP to have a note of their possible exposure made on their personal medical record, which should include date(s), duration, type of fibre and likely exposure

levels (if known).

Monitoring and reviewing the asbestos management plan

The management plan should be reviewed at least every 6 months to ensure that the management processes remain effective and the arrangements are being properly implemented.

Any changes in the arrangements or circumstances affecting the management of exposure to asbestos, such as new staff having responsibility for implementing the arrangements, or the deterioration or removal of ACMs, must be recorded and the asbestos register updated accordingly.

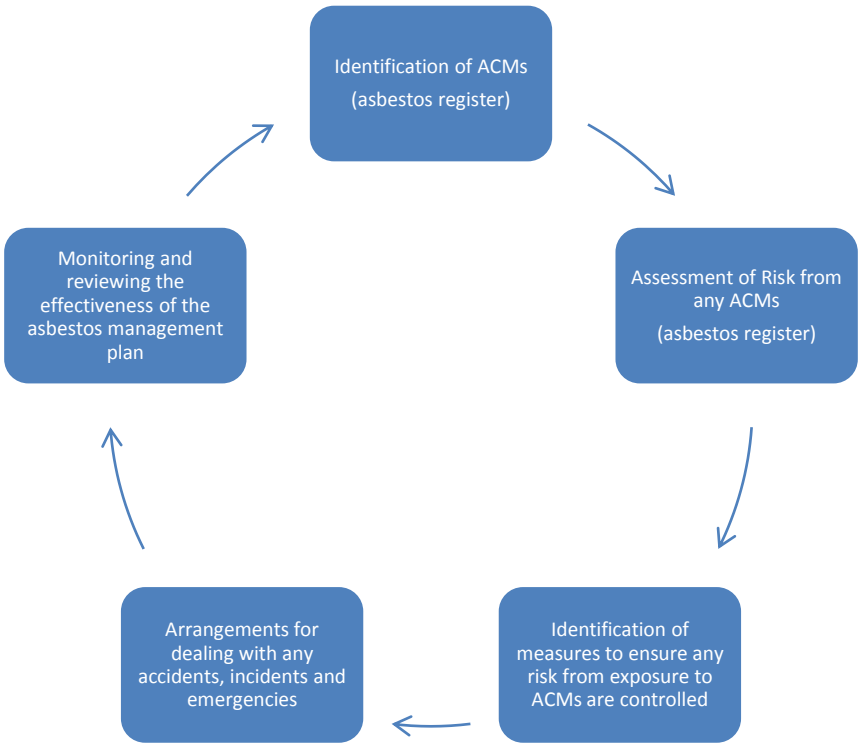


Figure 2 - The Asbestos Management Process

Section 8: Asbestos Surveys

Choosing the correct asbestos survey type

Asbestos surveys can be classified into two types:

1. **Management Survey**
   The purpose of the **management survey** is to manage asbestos-containing materials (ACM) during the **normal occupation and use of premises**.

   A **Management Survey** aims to ensure that:
   - nobody is harmed by the continuing presence of ACM in the premises or equipment;
   - that the ACM remain in good condition; and
   - that nobody disturbs it accidentally

   The Survey must locate ACM that could be damaged or disturbed by normal activities, by foreseeable maintenance, or by installing new equipment. It involves minor intrusion and minor asbestos disturbance to make a **Materials Assessment**. This shows the ability of ACM, if disturbed, to release fibres into the air. It guides the client, eg in prioritising any remedial work using **Priority Assessments** and **Risk Assessment Ratings** **(See Section 6 – Risk Assessment of ACMs)**

2. **Refurbishment/ Demolition Survey (RD Survey)**

   An RD survey is required where the premises, or part of it, need upgrading, refurbishment or demolition. The survey does not need a record of the condition of asbestos-containing materials (ACM).

   A Refurbishment / demolition survey aims to ensure that:

   - nobody will be harmed by work on ACM in the premises or equipment;
   - such work will be done by the right contractor in the right way

Type 1, Type 2 & Type 3 Asbestos Surveys are no longer referred to.

Selecting a Competent Surveyor & Quality Assurance

Competent surveyors:

1. Have survey knowledge, and know the risks in surveying
2. Have training and experience, and recognise their limitations
3. Use an in-house documented quality management system

4. Show independence, impartiality and integrity i.e. undertaking not involved in abatement of ACMs identified in the Survey.
5. Do their work in accordance with industry best practice guidance, e.g. these Guidelines, HSE (UK) technical guidance document HSG 264 Asbestos: The Survey Guide

Pre-survey Requirements for Clients and Surveyors

The quality and completeness of a **Management** or **RD survey** depends on the success of the planning phase (or **contract review**) between Client and surveying organisation.

The **contract review** should involve in most cases a pre-site meeting to:

- Confirm the exact scope of the survey (e.g. RD, management survey or a mixture of both types)
- Possible limitations
- Access requirements and accompanying personnel
- Schedule of the site works
- Report format and deadlines
- Obtain existing building information and site plans
- Site safety matters
- Protocols on discovering ACMs in poor condition e.g. air monitoring.
- Sampling protocols

Clients should pay particular attention to the proposed time allocated for site inspection and should make reasonable enquires as to its appropriateness. Clients must also allow sufficient time for surveys to be conducted, and resulting analysis and report production to be completed by the Surveying Organisation.

Surveyor Plans of Work (Method Statements)

Following the Contract review and prior to site works, the Surveyor should be in a position to provide a detailed Plan of Work (Method Statement) including Site-Specific Risk Assessments (see below) to the Client.

Site Safety Matters & Risk Assessments

Surveys by their nature involve other hazards in addition to asbestos. These must be identified and assessed by the Surveyor/ Competent Person with the assistance of the Client and in accordance with other relevant Health and Safety Legislation.

Surveyor should always have the following PPE:

- Hard hats (bump caps)
- Safety boots, shoes
- High visibility jackets
- Hearing protection

- Goggles/ Safety Glasses
- Gloves
- Tight fitting respirator (with P3 filter) and associated Face Fit Test Certificate

The common hazards (non exhaustive) are provided below

- Unsafe structures e.g. derelict buildings
- Working at heights e.g. in particular on asbestos cement roofs
- Enclosed or confined spaces e.g. underground service ducts, tank rooms
- Electrical hazards e.g. access to electrical installations must be provided by qualified competent persons
- Chemical Hazards
- Microbiological Hazards e.g. Weils disease, Legionnaires disease
- Noise
- Lone working e.g. on isolated sites
- Heat stress
- Entry to contaminated areas e.g. must not spread asbestos contamination
- Safe access to ceiling spaces

Management Surveys – Key points

This is the standard asbestos survey that should be carried out for the continued management of asbestos in premises. The purpose of the survey is to locate, as far as reasonably practicable, the presence and extent of any suspect ACMs in the building and assess their condition. The survey will primarily involve sampling and analysis to confirm the presence or absence of ACMs. This is the most common approach that has been used for surveys.

However a management asbestos survey can also involve presuming the presence or absence of asbestos. An Asbestos management survey can be completed using a combination of sampling ACMs and presuming ACMs or, indeed, just presuming. Any materials presumed to contain asbestos must also be assessed (ie material assessment).

Management surveys can involve a combination of sampling to confirm asbestos is present or presuming asbestos to be present. Any area not accessed should be presumed to contain asbestos. By presuming the presence of asbestos, the need for sampling and analysis can be deferred until a later time (eg prior to any work being carried out). However this approach has implications for the management arrangements. The duty holder bears potential additional costs of management for some non-ACMs. Any work carried out on "presumed" materials would need to involve appropriate contractors and work methods in compliance with the Asbestos Regulations 2006 irrespective if the material was actually an ACM or not. Alternatively, prior to any work starting, sampling and analysis can be undertaken to confirm or refute the presence of asbestos.

The results will determine the work methods and contractors to be used. The "presumption" approach has the disadvantages that it is less rigorous, it can lead to constant delays before work

can start and that it is more difficult to control. It may be suitable in some instances eg "small" or simple premises.

When sampling is carried out as part of a management survey, samples from each type of suspect ACM should be collected and analysed. If the material sampled is found to contain asbestos, other similar materials used in the same way in the building can be strongly presumed to contain asbestos. Less homogeneous materials (eg different surfaces/coating, evidence of repair etc) will require a greater number of samples.

The sample number should be sufficient for the surveyor to make an assessment of whether asbestos is or is not present. Sampling may take place simultaneously with the survey, or as in the case of some larger surveys, can be carried out later as a separate exercise.

All areas should be accessed and inspected as far as in reasonably practicable. This includes under carpets, above false ceilings, and inside risers, service ducts, lift shafts etc. It may also involve some minor intrusive work such as accessing behind fascia and panels, other surfaces or superficial material. The extent of intrusion will depend on the degree of disturbance that is or will be necessary for foreseeable maintenance activities. This should include installation of new equipment/cabling.

Asbestos Surveyors should come prepared to access such areas (ie with the correct kit/equipment etc). Any areas not accessed must be presumed to contain asbestos. The areas not accessed and presumed to contain asbestos must be clearly stated in the survey report and will have to be managed on this basis ie maintenance or other disturbance work should not be carried out in these areas until further checks are made.

Refurbishment/ Demolition Surveys – Key points

This type of asbestos survey is used to locate and describe, all ACMs in the area where the refurbishment work will take place or in the whole building if demolition is planned. The survey will involve **destructive inspection**, as necessary, to gain access to all locations, including those that may be difficult to reach.

Refurbishment work may vary from relatively small scale to large projects. Small scale work may occur in different parts of a building at different times over several years. A full sampling programme is undertaken to identify possible ACMs and estimates of the volume and surface area of ACMs made. The survey

is primarily designed to identify ACMs so that they can be removed in preparation for refurbishment or demolition.

There is a specific requirement in the Asbestos Regulations for all ACMs to be removed as far as reasonably practicable prior to major refurbishment or final demolition.

Removal of ACMs would also be appropriate in other refurbishment situations eg "more minor" which involve structural or layout changes to buildings (eg removal of partitions, walls). Where the "construction" work attracts the requirements of the Construction Regulations eg major refurbishment or demolition), the survey information can be used to assist in the tendering process for the removal of ACMs from the building prior to the work starting.

The asbestos survey report should be supplied by the client to designers and contractors who may be bidding for the work so that the asbestos risks can be addressed. In this type of survey where the asbestos is identified in order for it to be removed (rather than to "manage" it), the survey does not assess the condition of the asbestos, other than to note areas of damage or where additional asbestos debris may be expected to be present.

Refurbishment and demolition surveys are intended to locate all the asbestos within a building as far as reasonably practicable. It is therefore a disruptive and intrusive survey which may need to penetrate all parts of the building structure. By its definition, aggressive inspection techniques will be needed to lift carpets and tiles, break through walls, ceilings, cladding and partitions.

Controls should be in place to prevent the spread of debris which may include asbestos. Because of the nature of the investigations to be carried out, refurbishment and demolition surveys should only be conducted in unoccupied areas to minimise any risks to members of the public or employees on the premises. Ideally the building should not be in service and all furniture and furnishings removed.

For minor refurbishment this would only apply to the room involved or even part of the room where the work is small and the room large. In these situations, there should be effective isolation of the survey area (eg full floor to ceiling partition), and furniture and furnishings should be removed as far as possible or protected using sheeting. The "surveyed" area must be shown to be fit for reoccupation before personnel reoccupy. This will require a thorough visual inspection and, if appropriate (eg where there has been significant destruction), reassurance air sampling with disturbance. Under no circumstances should staff remain in rooms or areas of buildings when intrusive sampling is performed.

There may be some circumstances where the building(s) is still "occupied" at the time a "demolition" survey is carried out. For example a demolition survey maybe conducted in order to establish the economic future or viability of a building(s). The survey results would determine the outcome. In such situations, the "survey" will need extremely careful managing with personnel and

equipment/furnishings being decanted and protected while the survey progresses through the building. Again there should be effective isolation of the survey areas and the "surveyed" area must be shown to be fit for reoccupation before personnel reoccupy.

Asbestos Survey Reports

The final surveyor's report to the Client must be clear, unambiguous and readily accessible to those who need to use it. **Caveats** should be limited, fully justifiable, agreed with client and documented in the report in a separate section.

Each asbestos survey report should contain as a minimum:

A) Introduction covering the scope of work
- Commissioning of survey (contract reference)
- Purpose – Management, demolition or refurbishment
- Type of survey (management or refurbishment)
- Compliance with Irish Guidance and HSG 264 Asbestos: The Survey Guide

B) An executive summary of the survey
- Bullet points on scope, date and main findings
- Overall recommendations and conclusions
- Further actions

C) General site and survey information
- Scope of buildings surveyed clearly identified
- Brief description of premises, age, structure etc including photograph
- When carried out, by whom, accompanied by whom
- Sampling at the time or survey or later

D) Survey procedures
- Inspection basis, and access to which areas
- Reasons for no access
- Means of identifying areas not accessible
- Any building elements not included/ excluded from survey
- Sampling protocols and frequency
- Any air monitoring carried out – static/ personal air tests
- Confirm all waste disposed of as asbestos waste

E) Survey results
- List of materials found/sampled/ confirmed/ extent
- Building number/ room number/location etc

F) Assessment of risk
- Material Risk Assessments

- Priority Risk Assessments
- Risk Assessment Ratings

G) Conclusions and actions

- Management Actions
- Remedial Actions

H) Asbestos survey bulk sample analysis results

- Can be included in an appendix (if sub-contracted, by whom)

I) Survey plans and drawings

- Can be included as an appendix showing presence/extent of ACMs and sampling points

J) Photographs

- Representative photographs should be included in the Survey report

Asbestos Registers

The asbestos register should be structured so that the information is clear, unambiguous, easily disseminated and protected from unauthorised changes. Paper of electronic records may be appropriate, and the register can be used as a source of information to assist asbestos management regimes.

Example of an Asbestos Register

Client	J. Bloggs Ltd	Date Surveyed	12th June 2012
Site	J. Bloggs Ltd, Chrysotile Road		

Floor	Room ID Description	Material	Building element	Sample comments	Condition	Location	Exposed Population	Accessibility	Encapsulation/ sealant	Quantity	Analysis result	Priority rating
Gr	G01- Board Room	Bitumen product	Ceiling	Bitumen patches to ceiling above susp ceiling	Fair- scratched/ marked surface	Internal	Office Area	Low – above suspd ceiling	Sealed - reinforced	<1m²	Chrysotile	**C**
Comment & recommendation		Low risk – Periodic inspection - Manage – in situ - Label										
Gr	G02 – Boiler room	Insulation	Wall	Insulation residue to wall	V.poor, severely damaged	Internal	Unoccupied - serviced	Easily	None	<2m²	Amosite	**A**
Comment & recommendation		High risk - Immediate Action - Remove under controlled conditions using specialist asbestos contractor										
Gr	G02 – Boiler room	CAF gaskets	pipework	CAF gaskets to flanges	Fair- scratched/ marked surface	Internal	Unoccupied - serviced	Difficult	None	<2m²	Chrysotile	**C**
Comment & recommendation		Low risk - Immediate Action - Periodic inspection - Manage – in situ - Label										
1st	F01 – Lift lobby	Insulating Board	Ceiling	AIB ceiling tiles	Fair- scratched/ marked surface	Internal	Thoroughfare	Moderate - stepladder	None	8m²	Amosite	**B**
Comment & recommendation		Medium risk –Near term action – Encapsulate, periodic inspection, Label and manage in situ										

etc

Sampling suspect ACMs (bulk sampling)

Appendix 5 provides guidance on procedures for sampling materials suspected of containing asbestos. Bulk sampling should be carried out by a competent person in accordance with in-house documented procedures based on appropriate industry recognised standards e.g. *HSE (UK) HSG 248: Asbestos: The Analyst Guide*. Relevant training would include the British Occupational Hygiene Society P402 proficiency module Buildings Surveys & Bulk Sampling in Asbestos

Analysis of suspect ACMs using Polarised Light Microscopy

Analysis of bulk samples should be carried out in accordance with Appendix 2 of the HSE (UK) technical guidance document *HSG 248 Asbestos: The analyst guide for sampling, analysis and clearance procedures.*

The analytical method involves initial examination by eye of a suspect material, followed by detailed examination under a low power stereo microscope. Fibres observed in the course of these examinations are categorised tentatively on the basis of morphology and certain physical properties. Each fibre type recognised is mounted in a suitable refractive index (RI) liquid. The fibres are then positively identified as one of the six regulated fibres on the basis of the their detailed optical properties using polarised light microscopy (PLM)

Quality assurance is critical to ensure that results are both accurate and reproducible. The key requirements of an effective QA programme for bulk analysis include:

- A routine QA programme to assess the quality of results produced.
- Written protocols describing the procedures of each step.
- Limits on maximum samples analysed in one day as set out in HSG 248 are adhered to or reanalysis by another analyst is conducted for 20% of excess samples.
- Analyst/ laboratory satisfactorily participates in the AIMs scheme (see below).
- Microscopes and ancillary equipment are maintained in good order and alignment checks carried out before each use.
- Routine checks on refractive index fluids and associated records.

Training is of fundamental importance for this analytical method. Function specific proficiency training for this method is provided by the British Occupational Hygiene Society (BOHS). A relevant proficiency module is the **P401 - Identification of Asbestos in Bulk Samples (PLM)** and this module is recognised by the Irish National Accreditation Board for those organisations with accreditation to ISO17025 for this method.

Notwithstanding an individual analyst or organisation's accreditation status, the Authority require satisfactory participation in internationally recognised proficiency schemes such as the **Asbestos in Materials Scheme (AIMs)** for bulk material analysis, administered by the UK Health and Safety Laboratory, which demonstrates independent verification of analytical competence and a commitment to continually improve performance.

Section 9: Training, Instruction and information

The Safety, Health and Welfare at Work Act 2005 (No. 10 of 2005) imposes specific duties on employers to provide adequate information, instruction, training and supervision to their employees, so far as is reasonably practicable, to ensure their safety, health and welfare at work.

The Asbestos Regulations require employers to provide appropriate training and adequate information (Regulation 17) to employees who are liable to be exposed to asbestos – containing dust. The regulations specify particular information that must be covered during training.

The extent and level of the training required will depend on the nature and degree of the employee's exposure to asbestos-containing dust. Appropriate training should enable employees to have the relevant skills and knowledge to enable them to work safely. This section outlines the minimum topics that should be covered during training courses.

All training should be presented in a style, manner and form that are readily understood by trainees. The training must be in a language that the trainees know and understand. Account should be taken of trainees who first language is not English.

Training should be carried out by a competent person. The trainer should have the necessary skills, knowledge and experience to be a trainer. The trainer should have adequate personal practical experience in the asbestos sector, theoretical knowledge of all relevant aspects of the work and the ability to deliver effective training courses.

Frequency of training.

Training should be provided:

- on recruitment,
- in the event of a transfer of an employee or a change of task assigned to an employee,
- on the introduction of new work equipment, systems of work or changes in existing work equipment or systems of work
- on the introduction of new technology.

Regular refresher training should be carried out to reinforce procedures and safe systems of work and also to remind employees of the risks they face when working with asbestos. Information and training updates, covering for example, new working techniques, changes to legislation, should be given at regular intervals and should not wait for refresher training.

Refresher training should be given every year for Specialist Asbestos Contractors or more often as necessary.

Basic Asbestos Awareness Training

Basic asbestos safety awareness training must be provided to all employees who are or are likely to be exposed to asbestos-containing dust e.g. disturb the fabric of a building. As the aim of this training is to impart knowledge, this training will usually be theory based. The use of teaching aids such as photographs, diagrams and videos is strongly recommended.

The training should cover:

- The properties of asbestos and its effects on health, including the synergistic effect of smoking.
- The types of materials or products that may contain asbestos and where they are likely to occur.
- The potential risks to health from exposure to dust arising from asbestos or asbestos containing materials.
- The operations which could result in asbestos exposure.
- How the condition of the material or products affects the ease of release of fibres.
- What to do if materials suspected of containing asbestos are encountered.
- The relevant legislation and regulations.

A basic safety awareness course will be a minimum of one day duration with a maximum of 12 trainees per course.

Lower Risk Asbestos Work

In addition to the basic asbestos awareness training which should be provided to all operatives whose work could forseeably expose them to asbestos whilst carrying out their normal day-to-day work, persons who will intentionally disturb low risk ACMs, such as asbestos cement and textured coatings, should receive additional training, specific to the risks associated with low risk asbestos work.

Workers likely to fall within this category include roofers and demolition operatives removing asbestos cement roof sheets, maintenance workers etc.

The training should cover the points mentioned in the asbestos awareness training section and:

- the operations that could result in asbestos exposure;
- the importance of effective control measures to prevent or minimise exposure to airborne asbestos and to prevent spread of asbestos contamination;
- safe working practices that minimise exposure, including control techniques,
- personal protective equipment, risk assessments and written instructions (plan of work);
- the role of respiratory protective equipment, selection of the appropriate type of respiratory protective equipment, and its proper use;
- the proper care and maintenance of personal protective equipment and respiratory protective equipment;
- procedures for personal decontamination;

- emergency procedures, to cover situations such as: accidental damage to asbestos containing materials, or personal injury or illness while engaged on the asbestos work;
- waste disposal, suitable containment (e.g. bagging or wrapping) all waste to prevent spread of contamination, labelling, and placing in a secure skip or container on site; and
- Transport by an authorised asbestos-waste disposal contractor to an approved (or licensed) site.

For operatives and supervisors, the training must include practical work to ensure that they become familiar with examples of materials and accustomed to proper use and maintenance of equipment and techniques.

For supervisors and employers, the training should also cover legal responsibilities and monitoring of the work.

For those workers, for whom the requirement on medical surveillance cannot be waived, their training should cover:

- Medical examination requirements, including the purpose and importance of medical examination and the need to have certificates showing that medical examination has been completed; and
- the information and advice that workers may be given after a medical examination.

The **duration** of this type of training will be dependent on the practical tasks and others hazards (e.g. roof work) involved.

Specialist Asbestos Contractors

Specialised training is required for workers involved in work with ACMs which is notifiable such as asbestos insulation, asbestos insulation board and asbestos coatings. The training of asbestos removal workers must include practical sessions (approximately 50% of the course content) so that trainees learn how to use and maintain equipment that affects safety e.g. enclosures, personal protective equipment, respiratory protective equipment, decontamination facilities, dust suppression equipment and controlled removal equipment. Practical training should not be carried out in active working areas that may be contaminated with asbestos.

The training should be appropriate for the role for which the person is being trained (for example operative or supervisor) and the nature of the work being trained for and the type of training being provided, i.e., initial training or refresher training. It should allow employees to acquire the necessary knowledge and skills as regards prevention and safety when working with asbestos and asbestos containing materials.

The core syllabus of the training given to all employees should cover the following topics in appropriate detail and in a manner which is capable of being easily understood by the trainees (especially non-nationals):

The topics are outlined below:

- the effects of asbestos on health should cover the relationship between exposure and risk of disease to show the importance of preventing or minimising exposure; and
- the types of products that may contain asbestos, should include more detail on the nature of the products in regard to how that may affect their removal.

Safe working practices would include:

- good planning of the work including good site layout (positioning of equipment such as the airlocks, decontamination unit, shortest, safe route for carrying waste to a secure skip);
- a suitable and sufficient risk assessment covering all aspects of the work and a plan of work detailing the job;
- the preparation of a site prior to erecting an enclosure; including pre-cleaning if required;
- practice in construction of an enclosure, extra protection of the floor and any weak spots;
- ensuring all parts of the enclosure structure can be sufficiently cleaned i.e. no dust/debris traps;
- waste locks, airlocks, viewing panels (and closed circuit TV where needed), negative pressure units including ease of changing pre-filters, leads to power supplies outside the enclosures to allow fuses etc to be changed;
- maintenance of an enclosure in good order, (effectiveness of the ventilation system – negative pressure unit, integrity of the enclosure, regular inspections, etc); including the importance of smoke testing prior to commencement of work; and
- practical methods of removing asbestos with minimal release of dust, including dust suppression techniques such as wet stripping, prompt bagging of material to prevent spread (on feet, equipment or clothing).

For supervisors:

- how to monitor the effectiveness of techniques;
- cleaning of the enclosure, air locks and hygiene facilities; fine cleaning (working from top to bottom);
- effective communication (including between, inside and outside of enclosure);

- re-cleaning in the event of an enclosure failing to pass clearance tests;
- procedures for cleaning up and dismantling the enclosure;
- use of respiratory personal protective equipment would be extended to include: positive pressure respiratory protective equipment and/or air fed respiratory protection;
- cleaning / maintaining respiratory equipment;
- the importance of face fit testing and factors that can affect or change the face-fit, how to inspect, test, and wear the respirator, and how to clean and maintain it;
- different types of respiratory protective equipment, and their advantages and limitations;
- emergency procedures in the eventuality of the supply (power or compressed air) to a respirator failing in a working situation;
- the possible restrictions (e.g. on visibility) and difficulties in using respiratory protective equipment;
- correct use and maintenance of equipment associated with asbestos removal works; and
- other potential hazards, e.g. asbestos removal at high temperatures, working at heights, erection and use of access equipment for high surfaces;

Training for emergency procedures would cover procedures for:

- aiding someone injured or taken ill in an asbestos enclosure;
- emergency (e.g. fire) evacuation;
- failures of electrical power or equipment (negative pressure, respirators etc);
- leakage detected outside enclosure; and
- loss of water supply to the hygiene unit.

Training for personal decontamination would include:

- the use of airlocks, entry to / egress from the enclosure and to the decontamination unit, where the decontamination unit may be either directly linked to the enclosure or separate;
- changing personal protective equipment, showering and disposal of overalls;
- maintenance of a decontamination unit in good order; and
- personal decontamination in the eventuality of accident or evacuation.

***Waste disposal*:**

- Procedures for bagging and wrapping waste;
- secure containment (e.g. wrapping and /or bagging);
- labelling;
- safe transit via bag lock and designated route from enclosure to secure storage;
- transport of waste from site by an authorised asbestos-waste contractor to an approved waste disposal site; and
- evidence of traceability of waste from site to disposal (e.g. consignment notes).

For those workers, for whom the requirement on medical surveillance cannot be waived, their training should cover:

- Medical examination requirements, including the purpose and importance of medical examination and the need to have certificates showing that medical examination has been completed; and
- the information and advice that workers may be given after a medical examination.

For the supervisors and employers, the training should also cover:

- good planning;
- inspections and testing of equipment (e.g. decontamination unit, enclosure, suppression equipment etc) and how to recognise faults;
- auditing the work in progress;
- monitoring the effectiveness of fibre control techniques;
- reviewing competence and training needs;
- record keeping; and
- the need to closely supervise new operatives.

As well as the practical supervision, the supervisors' and employers training should cover

- producing a risk assessment (for exposure of operatives and others) and a plan of work;
- relevant legislation and Regulations; and
- their roles and responsibilities.

For all the personnel involved in asbestos removal work, their training should provide an understanding of the air sampling and clearance testing that will be undertaken during and after the asbestos removal work.

Providing information and training is not a once off exercise but should be provided at regular intervals e.g. need for refresher training to be assessed annually. Information and training should be reviewed and updated whenever significant changes are made to the type of work carried out or to the work methods used.

Employers must keep records of training given to individual employees and these must be available to an Inspector on request. The records will confirm that employees have received all necessary training and information at the appropriate time. Training records will also provide evidence for compliance with Section 10 of the Safety, Health and Welfare at Work Act 2005 (No.10 of 2005)

Detailed guidance on training for employees, supervisors and others working with asbestos containing materials is set out in the HSE (UK) publication HSG247 *'Asbestos: The licensed contractors' guide*'.

Section 10: Personal Protective Equipment

Personal protective equipment (PPE), including respiratory protective equipment (RPE) are the last line of defense against exposure to asbestos fibres, and exposure to asbestos should be prevented or reduced to as low as is reasonably practicable by engineering controls before RPE is employed. Once it is established that exposure is liable to exceed the control limit of 0.1 f per cm^3, despite the precautions taken, RPE must be provided and worn. This will normally include all notifible asbestos work.

Respiratory Protective Equipment (RPE)

Various types of RPE are available and it is essential that the RPE selected matches the type of work to be done, including the working environment, the wearer, other PPE in use and the exposure concentrations (expected or measured). In practice, asbestos workers are most likely to wear a limited range of PPE. A Filtering Facepiece (FF) Particulate filter No.3 (P3) mask may be used for various tasks such as site pre-clean, site set-up, enclosure dismantling, waste handling outside the enclosure and DCU cleaning, whilst a TM3 power-assisted respirator with full face mask and P3 filter(s) is generally required for entry into a live enclosure. Air-fed equipment may be used in some circumstances in place of power-assisted full-face masks.

	*Example of ½ mask and full face respirator here*

To obtain adequate performance during use, the selected RPE must be suited to the individual and worn correctly every time. An essential aspect of the performance of RPE, with a tight fitting full face mask, is the need for a good contact between the face seal of the mask and the operative's skin.

A good fit can only be achieved if the operative is clean shaven in the areas of contact and the mask is of a suitable size and shape to fit the wearer. For workers who normally wear glasses, either contact lenses, or a full-face mask which permits the fixing of special frames inside the face piece, should be worn. If neither of these options are suitable, equipment that does not rely on a good face seal for protection should be provided, e.g., a powered or air-supplied hood or blouse.

Face fit tests, which involve the individual testing of the face seal on the wearer, must be carried out as part of the initial selection of the RPE and/or where the model of RPE is changed. Due to the high risk nature of asbestos they must also be repeated at least **once every 12 months** and if the individual loses or gains weight, undergoes any substantial dental work or develops any other facial changes around the face seal area. The user should also carry out a fit check on every occasion that a mask is worn to ensure that a good fit has been obtained.

A poorly fitting respirator may create a false sense of security and result in significant exposure to asbestos fibres. Employers should maintain a written respiratory protection program with specific procedures for fit testing and training.
Employees must be given adequate instruction, information and training on the following:

- How to fit and use the RPE correctly (including pre-use face fit each time it is worn);
- The uses and limitations of all RPE worn in the work area;
- How to recognise a reduction in air flow and what to do if it happens;
- The manufacturer's instructions on the use, storage and maintenance of the equipment;
- How to clean contaminated RPE when leaving the work area; and
- How to recognise medical signs and symptoms that may limit or prevent the effective use of RPE.

RPE may be prone to misuse, careless storage, or may not be suited to an individual, so it is essential that the use of RPE be subject to a strict management system. Guidance on a suitable approach is given in HSA guidance document ***'A Guide to Respiratory Protective Equipment'.***

Other Personal Protective Equipment

Other PPE will be required, including:

- ✓ Coveralls to prevent asbestos being carried from the workplace enclosure;
- ✓ Wellington boots or other smooth, easily cleanable footwear (without laces);
- ✓ Disposable underclothing, socks and gloves; and
- ✓ Other PPE as required, if shown necessary by the risk assessment.

Protective one piece coveralls, constructed from a material that will resist penetration from fibres, with seals at fasteners, neck, wrists and ankles must be worn whenever asbestos is likely to be deposited on clothing. Disposable coveralls are strongly recommended, but where non-disposable coveralls are worn, these must only be decontaminated by a specialist laundry equipped to accept and process asbestos contaminated items.

A Type 5, category 3 disposable coverall is the appropriate standard for asbestos work, and most commonly used in practice. The coveralls should be worn in such a way as to reduce the ingress of dust inside the garment. The coverall hood should be worn over the straps of the RPE and the coverall legs should be worn over footwear.

Recommended colors for different aspects of asbestos work include:

- Transit overalls – white
- Work area – Red
- At other times e.g. soft strips, when sheeting up, detenting etc - Blue

Further PPE may be required based on the outcome of the assessment; for example, waterproof clothing for outdoor work.

Personal clothing that accidentally becomes contaminated must be treated as if it were PPE and be decontaminated or treated as asbestos waste.

Section 11: Lower Risk Work with ACMs

This section describes the limited types of work activities with ACMs which are deemed lower risk and can avail of certain exemptions from the Asbestos Regulations.

It is important to refer to other sections in these Guidelines which are relevant for this type of work i.e. risk assessment, training, personal protective equipment, plans of work and waste disposal.

Exemptions from the Asbestos Regulations

Based on the required written Risk Assessment, Regulation 5 (b) of the Safety, Health and Welfare at Work (Exposure to Asbestos) Regulations 2006 & 2010 allows certain work activities to be carried out on specific types of ACMs whereby certain requirements of the regulations may be 'waived'.

The specific Regulations which may be waived relate solely to the need for an employer e.g. demolition contractor or maintenance contractor to:

1) Notify to the Authority of the intent to remove ACMs 14 days in advance of commencing the work (Regulation 11);
2) Make available an assessment of the health of employees (Regulation 20); and
3) Maintain the medical records relating to health assessment of employees (Regulation 21).

It should be noted that these three regulatory requirements may be waived only for specific tasks, where it is known that certain requirements are met which demonstrate that the activity is of low risk regarding potential exposure to asbestos fibres

These exceptions may only be introduced where the written risk assessment demonstrates that the exposure limit value (airborne concentration of asbestos in excess of 0.1 fibres per cm3 as an eight-hour time-weighted average (TWA)) will not be exceeded and that the work intended will ensure that employees' exposure is sporadic and is of low intensity.

It should be noted that "sporadic and low intensity" relates to the exposure and not the frequency that employees are employed to undertake asbestos work activities. The potential protection offered by RPE must not be used in the determination of low intensity and sporadic exposure to asbestos as the initial written risk assessment is based of exposure and does not take into account assigned protection factors for respiratory protective equipment.

No exposure to asbestos will be sporadic and of low intensity within the meaning of Regulation 5(b) if the concentration of asbestos in the air exceeds or is liable to exceed 0. 1 f per cm3 airborne fibres averaged over an 8-hour period. Work which is likely to result in exposures at or above this level cannot be considered to produce sporadic and low intensity exposure, and therefore the exemptions provided by Regulation 5(b) will not apply.

When these three criteria are established, only certain work activities may be performed without the need to notify the Authority, to make available health assessments and to retain medical records relating to health assessments, as follows:

a) Short, non-continuous maintenance activities in which only non-friable materials are handled;
b) Removal without deterioration of non-degraded materials in which the asbestos fibres are firmly linked in a matrix;
c) Encapsulation or sealing of asbestos-containing materials which are in good condition; or
d) Air monitoring and control, and collection of samples to ascertain whether a specific material contains asbestos (**See Section 15 on Health Surveillance**).

Therefore, the exemptions to some of the Regulations described can be applied only when a written risk assessment demonstrates that the exposure limit value will not be exceeded and it involve certain types of work activities. However the requirements as provided by the remainder of the Regulations will apply to all work with asbestos containing materials (ACMs). In particular, the work must be undertaken by trained workers in accordance with a plan of work and using proper controls to prevent exposure to and spread of asbestos as described in Section 12.

Key point

Any work with asbestos insulation (e.g. pipe/ thermal insulation), asbestos coatings (e.g. 'limpet' spray coating) and asbestos insulating board IS NOT deemed lower risk work. Work with these materials must be carried by competent specialist asbestos contractors.

Maintenance activities involving planned work with ACMs

Where work on ACMs is necessary e.g as a result of planned maintenance activities, repair or emergency works, the written risk assessment will be required to determine if the work activity meets the following criteria:

- exposure is sporadic and of low intensity
- exposure limit will not be exceeded and
- work involves short, non-continuous maintenance activities in which only **non-friable materials are** handled;

Maintenance activities involving non-friable ACMS and certain friable ACMs

In addition to non-friable ACMs, it is accepted that properly assessed short duration work with appropriate precautions involving ACMs in the friable category or deliberate activates which cause

a non-friable ACM to release fibres would not necessarily exceed the Exposure Limit Value. Such exposure would be considered sporadic and low in intensity if the work activity was short in duration and non-continuous and is carried out using the standard work methods and controls.

Examples (non-exhaustive) of non-friable ACM maintenance activities, permitted friable ACM maintenance activities and maintenance activities involving deliberate disturbance of non-friable ACMs are provided below:

- Removal of less than 10m2 of non-degraded asbestos cement panels or roof sheets to access services behind them.
- Removal of small amounts of non-degraded asbestos cement downpipes, gutters, bargeboards, ridge tiles or flu pipes/ cowls without deterioration
- Repairing damaged asbestos cement
- Removing asbestos cement or reinforced plastic product e.g. tank, duct, water cistern
- Painting asbestos cement sheets
- Removing metal cladding lined with asbestos-containing bitumen
- Removal and replacement of a Compressed Asbestos Gasket from a pipe flange
- Removal and replacement of an asbestos rope seal to a boiler
- Drilling holes in asbestos cement and other highly bonded materials
- Cleaning debris from guttering on an asbestos cement roof
- Removing small amounts of asbestos cement remnants e.g. debris from broken sheet
- Drilling and boring through textured coatings
- Inserting and removing screws through textured coatings
- Removing textured coating from a small area e.g. 1 square metre
- Cleaning up debris following collapse of a ceiling or wall covered with textured coating
- Removing an asbestos fire blanket
- Removing asbestos-containing bituminous products
- Removing asbestos friction linings
- Removing small amounts of asbestos-containing floor tiles and mastic
- Removing flexible asbestos duct connectors (gaiters)
- Removing compressed asbestos fibre gaskets and asbestos rope seals
- Removing an asbestos-containing 'arc shield' from electrical switchgear
- Removing a single asbestos-containing gas or electric heater
- Replacing an asbestos-containing fuse box or single fuse assembly
- Removing asbestos-containing mastic, sealant, beading, filler, putty or fixing

Short, non-continuous maintenance activities involving working with certain ACMs should not exceed 1 hour per employee in any seven day period and is limited to two hours where more than one operative is involved. The 1 or 2 hour

period commences when the ACM is physically disturbed and ceases when the area has been thoroughly cleaned.

This time criterion is recommended to reduce significantly the amount of time ACMs are worked with by maintenance personnel. However, short time duration jobs if done badly can lead to high levels of exposure. Therefore, written risk assessment and an appropriate plan of work are key to managing and minimising exposures.

Appropriately risk assessed and planned short non-continuous maintenance activities involving non-friable ACMs should not give rise to exposures above the exposure limit value and in the majority of cases, should be well below the exposure limit value. The recommended time criterion is more applicable to activities involving friable ACMs e.g. rope seals, gaskets etc or where deliberate controlled release of fibres e.g. drilling, is envisaged. However, works should be planned in such a way to keep the time required to work on all ACMs to a minimum.

Guidance on particular maintenance tasks involving ACMs

Guidance on some of the tasks is provided in the appendices of these Guidelines. A list of Health and Safety Executive (UK) asbestos essentials task sheets relevant to this Section are available for download from the HSE website at http://www.hse.gov.uk/asbestos/essentials/index.html and provide a good resource for developing relevant Plans of Work in conjunction with guidance and example Plan of Work provided in Section 14 (plans of work) of these Guidelines.

Each task sheet covers access, equipment, PPE, procedure, cleaning and visual inspection requirements. If the procedures are followed closely it will prevent or reduce exposure to asbestos fibres to a level as low as reasonably practicable.

Note
Any maintenance, repair work with asbestos insulation, spray coatings or insulating board is restricted to Specialist Asbestos Contractors

Work with ACMs where asbestos fibres are firmly linked in a matrix

Based on written risk assessment, the exempted regulations may apply where the works involve the removal of non-degraded ACMs without further deterioration, in which the asbestos fibres are firmly linked in a matrix.

The materials in which the asbestos fibres are firmly linked in a matrix include those listed as non-friable in Table 4: They include

a) asbestos cement products in non-degraded state

b) textured decorative coatings and paints which contain asbestos; and

c) any article of bitumen, plastic, resin or rubber which contains asbestos (e.g. vinyl floor tiles, toilet cisterns, roofing felt).

The exemptions will apply where these materials are in a non-degraded condition and can be safely removed without deterioration, for example

- Asbestos cement with a score of less than 55 using the Asbestos Cement Algorithm
- Asbestos cement roof tiles removed whole with minimal damage
- Textured coating applied on plasterboard which can be removed with minimal damage
- Vinyl floor tiles which remove whole with a tile scraper

Encapsulation of low risk asbestos-containing materials

Based on written risk assessment, the exemptions may apply to certain work activities involving encapsulation or sealing of asbestos-containing materials which are in good condition. A plan of work is required for encapsulation or sealing (enclosure) works

The asbestos survey report may recommend that some or all of the ACMs in a building be made safe by encapsulation or sealing (enclosure).

Work activities where encapsulation or sealing of insulation (vessel/pipe insulation) or asbestos insulating board in good condition is involved are excluded from the exemptions. Such work should be carried out by competent specialist asbestos contractors. **It is strongly recommended not to encapsulate asbestos spray 'Limpet' materials and arrange to remove as far as reasonably practicable by a specialist asbestos contractor**

Encapsulation can be achieved by various methods application of thin sealant coating or thick sealant coating impregnating the ACMs with a liquid that will harden. However, wetting may cause a material to detach from its substrate due to the weight of absorbed water.

The system employed to encapsulate will depend on the nature of the ACM, its condition and the type of protection required, taking into account flammability requirements. The coat must adhere firmly and the ACM must be sufficient to carry it.

Sealing (enclosure) can mean encasing the ACMs in a structure that may stand away from the ACMs.

Supervision of work

An experienced competent operative should must supervise any work that is carried out and prepare the Plan of Work (or method statement) for undertaking the work.

Working methods for lower risk work

There are some key working methods that should be employed to ensure minimum release of fibres during lower risk asbestos works.

These include

- Do not use power tools on ACMs**,** they create dust; use hand tools instead.
- Ensure surfaces that may get covered in dust and debris are covered with polythene sheeting
- Asbestos work area should be segregated to protect the safety of others. Whatever means of segregation are used, there is a need to post asbestos warning notices. You will need to segregate the work area to prevent the spread of asbestos fibres and prevent the exposure of people not involved in the work. How much you need to do depends on the outcome of your risk assessment, for example, the risk will be greater within an occupied building compared with external work. In most cases it is sufficient to mark out the work area with signs to prevent non-asbestos workers approaching.

- However, if the work is likely to result in significant disturbance, you need to consider erecting a physical barrier for segregation purposes. The extent of the barrier will depend on the outcome of the risk assessment carried out before the work starts. A physical barrier should prevent the spread of debris and airborne fibres, i.e. contain any dust which may be generated during the work activity, and so also assist in cleaning up the 'contaminated area' which should be within the segregated zone. This is usually done using the fabric of the building and heavy gauge polythene sheeting.
- Minimum number of workers should be used.
- Methods to minimise the release of asbestos fibres e.g. shadow vacuuming using a H-Type vacuum or wetting should be employed. Specialist wetting agents can make work easier, but some asbestos materials do not absorb liquid easily so other methods will also need to be used to control dust exposure; for example, a Class H vacuum cleaner.
- Use of damp cloths/ tacky cloths recommended
- Do not use sweeping or compressed air
- Minimising breakage of any ACM will also help reduce fibre release.
- Do not allow waste to accumulate - clear it up as you go. Do not let vehicles drive over it and crush it.
- Working with ACMs overhead should be avoided
- Use Personal Protective Equipment (PPE). The type of PPE used must be based on written risk assessment but may include suitable respiratory protective equipment (RPE), disposable overalls, etc (see below)

- Put asbestos waste carefully in a suitable sealed container such as a heavy duty polythene bag. Then put it in a second bag and label it to show that it contains asbestos.
- Wash hands and face before eating, drinking and smoking and at the end of the day's work.
- Where there is no choice but to use power or pneumatic tools, these tools should be set at the lowest effective speed with additional control measures such as Local Exhaust Ventilation (LEV).Typical measures include:
    - a cowl fitted with LEV located around a drill bit (the cowl should be fitted with a spring so that it remains in contact with the surface of the material as the drill bit penetrates), or
    - shadow vacuuming (this is where the nozzle of a type H (BS 5415) vacuum cleaner, fitted with a suitable attachment, is held as close as possible to the source of fibrerelease throughout the task)
    - Make sure the work area is thoroughly clean on completion of the work.
    - For asbestos cement, where reasonably practicable, avoid the need to attach items to and avoid routing items such as wiring and pipes through it

Hygiene arrangements for lower risk work with ACMs

When the removal work is completed, the surface of the working area and any equipment used should be wiped down with appropriate cleaning rags soaked in water. A contaminated rag should never be re-soaked as this will contaminate the water. Tape may be useful for removing small dust deposits.

Any asbestos waste, debris or contaminated material (including cleaning rags) should be placed into a suitable, UN-approved red bag, which contains the appropriate asbestos warning label, and then sealed with tape. The red bag should then be wiped clean before being carefully placed into a suitable, approved clear asbestos bag which should then also be sealed. The waste bags must be labelled to identify that they contain asbestos waste.

If the asbestos waste, debris or other material cannot fit into a waste bag, it must be double wrapped in two layers of strong 1000 gauge polythene. A red asbestos 1000 gauge bag or printed label (with the same information as the bag) should be securely attached to indicate it is asbestos waste.

Operatives must decontaminate themselves after working with asbestos in order to ensure that they do not expose themselves or others to asbestos fibres. The decontamination procedure should ensure that any asbestos contamination is removed prior to removal of the respirator. Contaminated clothing should be vacuumed using a Type H vacuum cleaner (BS 5415), and be removed on leaving the work area for work-breaks and at the end of the work period. It should be stored separately from clean clothing.

Existing site washing facilities can be used but access should be restricted to the asbestos workers during the time they carry out their work, and the facilities thoroughly cleaned afterwards. All disposable personal protective equipment should be disposed of as asbestos waste following each working shift.

Visual inspection, environmental or personal monitoring

For lower risk asbestos work, a visual inspection post works, as a minimum, must be carried out by a 'competent person'. A 'competent person' must possess suitable training and sufficient knowledge, experience and skill, for the safe performance of the specific work. For example, the competent person may be a maintenance supervisor or operative, a foreman on a demolition site or a health and safety officer who has received the appropriate training, knowledge and experience.

A thorough visual inspection is required to confirm that an asbestos work area is safe to be returned to normal use. It is the principal component in determining the successful removal of ACMs. The competent person must **self-certify via a written statement** stating the area

- is thoroughly cleaned & visually inspected
- has no visible traces of dust and debris remain and suitable for reoccupation.

Contents of a Written Statement of Cleaniness and Completion following low risk asbestos work
• Details of contractor • Site address • Location of works • Date or work • Start/Finish times (duration) • Scope of work (e.g. type of ACM worked on, nature of task, quantity removed etc) • Confirmation that work has been completed as per plan of work • Confirmation that work area is free of debris and visible settled dust • Confirmation that associated waste and contaminated materials have been disposed of appropriately • Name and Signature of competent person • Counter signature e.g. Client or Representative e.g. Site manager, health and safety officer etc

There is normally no need for environmental or personal monitoring to be carried out during low risk asbestos work as the required control measures should reduce levels of exposure to well below the exposure limit value .

The need for air monitoring should be determined as part of the assessment of the work. It may be required for one or more of the following reasons:

- to confirm that the method of work is adequate and that airborne concentrations of asbestos fibres are as low as reasonably practicable and that the correct choice of RPE has been made
- to confirm that there has been no measurable spread of airborne fibres to areas adjacent to where work has taken place
- to confirm that the work area has been adequately cleaned before being returned to normal use.

Air monitoring should be conducted by an independent competent analyst and carried out in accordance with Section 13. The independent analyst may also be employed to conduct the visual inspection and issue a site clearance for reoccupation certificate appropriate to the nature of the works.

Section 12: Work with Higher Risk Asbestos Containing Materials

This section provides practical guidance on the standards required for the **abatement** of higher risk ACMs, where encapsulation or removal of ACMs is considered the most appropriate option. Most work with ACMs which can lead to a high release of asbestos fibres is restricted to **specialist asbestos contractors**.

Selecting a Specialist Asbestos Contractor

In accordance with Section 18 of the 2005 Act, the importance of careful selection of a suitable contractor to undertake repair or removal of ACMs cannot be overestimated.

The Regulations (Schedule 4) require such companies to provide evidence of their ability to carry out the work to clients, inspectors etc on request. This includes the following:

- Company safety statement and associated risk assessments;
- Training plan and individual training certificates including safepass cards;
- Individual training records for employees (operatives);
- Confirmation of health assessments (Medical certificates) of employees undertaking the asbestos work;
- Respiratory protective equipment face fit certificates for employees undertaking the asbestos work; and
- Relevant experience

A client should also confirm appropriate insurances e.g. public and employer liability are held by the specialist contractor and request references. Although not mandatory, membership of a relevant trade association e.g. ARCA (Ireland), is also an indicator of professional attitude and the association can be contacted to gain reassurance about the competence of the contractor. ARCA carry out mandatory site auditing of their full members and awards accreditation which is renewable annually.

In order to ensure that the contractors are all quoting on the same basis for a particular job, it is recommended that a client or his representative (e.g. PSDS, PSCS) provide or confirm the following information to the contractors.

- the scope of the work to be carried out;
- the results of the relevant parts of the survey of the premises;
- accurate bill of quantities to determine extent of ACMs and for accurate waste estimation
- site plans;
- information about site-based hazards that the contractors may need to take into account;
- site safety rules including permit-to-work regimes;
- access to the working area including siting of decontamination facilities and waste skips;
- access to water and power supplies;

- use of site facilities;
- time constraints;
- penalty clauses;
- whether the work area is unoccupied or if there will be people working near it;
- emergency procedures;
- arrangements for liaison during the contract;
- whether the work will be supervised/managed by a third party; and
- any other issues that might affect the way the contractors will carry out their work.

The information should also include a list of the information you require to be included in the quote to be prepared. The list below indicates the range of information that a contractor should provide in addition to the price for the work:

- the estimated duration of the contract;
- the estimated number of personnel expected to be on site;
- risk assessment(s) for the job including estimated exposures for removal
- plan of work (method statement) –see below;
- emergency procedures; and
- a possible start date.

The specialist contractor will almost always need to visit the site to assess the job in order to provide a detailed quote. The contractors should be made aware of any constraints on their work which may affect costs, such as working times, and any site safety training requirements.

Supervision of asbestos removal work

In most cases a minimum of three operatives (including the site supervisor) will be required on site at any one time when notifiable asbestos removal work is being undertaken. An **'outside man',** i.e., an operative outside of the working enclosure, must be available at all times whilst work is taking place in the enclosure. Although in practice this person is often the supervisor, this need not be the case.

If consideration is being given to using less than three operatives on a project, this must be clearly justified in the **Plan of Work**.

Site documentation

The specialist contractor should maintain a site pack with the following documentation (non-exhaustive list)

- Notification form

- Plan of Work
- Safety statement
- Risk assessments
- Training certificates
- Face-fit tests
- RPE examination records
- Evidence of medical examinations
- Test certificates for all plant and equipment used on the site
- Site log i.e daily checks of DCU, Enclosure, Airlocks, NPUs and H-Type Vacuums
- Air monitoring results e.g. personal, leak testing, background, clearance tests and previous clearance cert for hygiene unit
- Record of smoke test
- Safepass cards

Working methods for higher risk asbestos containing materials

Encapsulation

The removal of existing ACMs can itself present the greatest risk of significant exposure to asbestos fibres. In some cases it may not be necessary to remove the ACMs, and the materials can be protected or encapsulated.

These processes themselves require proper management as control limits may be exceeded, especially when working on asbestos insulating board or thermal insulation. Therefore, encapsulation would require a specialist contractor with an understanding of the techniques to carry out the work, as fibres may be released. Before considering this option, consideration should be given to the following matters:

- ✓ The type and condition of the ACM;
- ✓ Whether the substrate is sound enough to allow the encapsulation to adhere;
- ✓ Whether any water penetration via the substrate will increase the weight on the encapsulation and cause it to fall away from the ACM;
- ✓ Whether further damage could occur due to traffic operations, bird attack or rodent attack vandalism;
- ✓ Whether access is available to allow the process to be effective;
- ✓ Whether the encapsulant will ensure the thermal and acoustic attributes of the structure are maintained; and
- ✓ Whether the approach is simply putting off the day when the asbestos has to be removed at further significant cost.

Various types of encapsulation are available, each suitable for particular applications. Each have their particular advantages, be they 'boxing-in' the ACM with board materials, or the use of bulk brush or spray applied polymeric or cementatious materials. The correct choice depends on the location and condition of the ACM, its ability to take the weight of any encapsulant and the ease in which the encapsulant can be applied to the ACM. Some materials will simply seal the surface and not offer any protection against impact damage.

Removal of asbestos insulation, asbestos insulation board and asbestos coatings

Work involving the removal of asbestos insulation, asbestos insulation board or asbestos coatings must be carried out in a manner that reduces the potential exposure to asbestos fibres to those undertaking the task, and other persons in the vicinity. The contractor carrying out the removal of ACMs will be expected to include details in the Plan of Work (or method statement) of the control measures that are to be put in place to achieve this aim.

If the removal involves work at heights, then the Plan of work must specify safe procedures for this type of work. Scaffolds, towers of Mobile elevated work plat forms may be required to access the ACMs. The Plan of work should include measures for protecting this equipment from cross contamination e.g. by wrapping or covering with polythene, decontamination prior to removal of enclosure and inspection prior to dismantling.

The method of removal of the asbestos will have an obvious effect on the amount of asbestos fibre that becomes airborne and the method selected should minimise fibre release. The methods to be used should be clearly stated in the Plan of Work, but uncontrolled dry stripping of asbestos, use of power tools, power washing and hot working **must never take place**.

There are two broad categories of controlled stripping techniques which can be used to minimise the release of fibres during asbestos removal:

- Controlled wet stripping; and
- Dry stripping with control at source.

The type of method (or combination of methods) used will depend on a number of factors including:

- The type of ACM, e.g., lagging, sprayed coating, board;
- The thickness of the ACM;
- The presence and nature of any coating on the ACM;

- The type and nature of fixing, e.g., nailed, screwed; and
- Miscellaneous factors, e.g., whether pipework is redundant, the material is damaged, accessibility etc.

Wet spray method

The wet spray method is the preferred asbestos removal method and should be used for the removal of asbestos from structures and plant. The wet spray method requires the use of a constant low-pressure water supply for wetting down asbestos and related items to suppress asbestos fibres. This can be achieved with a mains-supplied garden hose fitted with a pistol grip. If no water supply is readily available, a portable pressurised vessel (for example, a pump-up garden sprayer) may be used. Other methods involve the use of Airless Sprayers or 'Gracos' as in the picture below which are suitable for larger ACM removal projects.

The design of the spraying equipment will depend on the availability of a water supply and access to the area to be sprayed.

The wet spray method involves applying a fine water spray to the asbestos in a manner that ensures the entire surface of the asbestos is saturated and the run-off is minimised. The asbestos should be maintained in a wet condition throughout the removal.

A wetting agent (surfactant), for example, detergent, may be added to the water to facilitate more rapid wetting of the asbestos. A manually controlled, consistent low-pressure, fine spray (for example, from an adjustable pistol-grip garden hose) is recommended.

For very small areas, a small spray water bottle may be sufficient. In all cases, the use of water should be in the form of a mist to minimise the potential to generate respirable dust.

The asbestos should be wetted through to its full depth and the water spray should be directed at the site of the cut. The wetted material should be removed as the cut is progressed.

Immediately after the asbestos is removed from its fixed or installed position, spray should be directed on sides previously not exposed.

Wherever reasonably practicable, a H-type vacuum cleaner should be used in conjunction with the wet spray method. The H-type vacuum cleaner should be used prior to spraying asbestos with water and for the collection of any dust spread over a large area.

Consideration should be given to applying a PVA emulsion as it may be more effective than water (with a wetting agent) in minimising fibre release. For example, PVA can be applied and allowed to dry on asbestos cement roofing prior to its removal as an alternative method to prevent slip hazards.

Saturation and water injection method

The soaking method with total saturation should be used if the asbestos is so thick that the spray method will not suppress the asbestos significantly. This method involves injecting water or a water-based solution under low pressure (3.5bar) directly into friable asbestos such as laggings, sprayed coatings and painted AIB. It is a process that requires specific training in relation to the use of the equipment and the process.

The asbestos is soaked by the introduction of water or other wetting agents through an appropriate applicator that consists of an injection head with numerous side holes or outlets through which the water or wetting agent is fed to the asbestos.

To facilitate more rapid wetting of the asbestos, holes or cuts should be made in the outer covering to enable the water or wetting agent to be injected in such a manner as to ensure that asbestos is saturated but not just washed out through a liquid passage.

The soaking should be done before removal. The quantity of water or wetting agent and the time to soak will depend on the thickness of the asbestos, access to the asbestos and location of the holes.

The saturated asbestos should then be removed in sections, placed in properly labelled container, sealed and disposed of as with the spray method.

Dry method

The dry method is not preferred as there is a much greater potential for airborne asbestos fibres to be generated. The dry removal method can only be used if the wet spray or soaking methods are not suitable, for example, if there are live electrical conductors or if major electrical equipment could be permanently damaged or made dangerous by contact with water.

Wrap and cut method is also used, in particular for pipework/vessels which are redundant. This method means less contact time with asbestos. Flanges containing Compressed Asbestos Fibre gaskets on pipework which is redundant should be cut either side and disposed of rather than opened up to remove the individual CAF gaskets.

Shadow Vacuum technique

Local exhaust ventilation using High efficiency vacuum cleaners can be applied to capture any asbestos fibres released during work with ACM. Such controls can be used during the removal of ceiling tiles by carefully vacuuming the top of the ceiling tile during removal. Similar techniques can be used whilst unscrewing AIB.

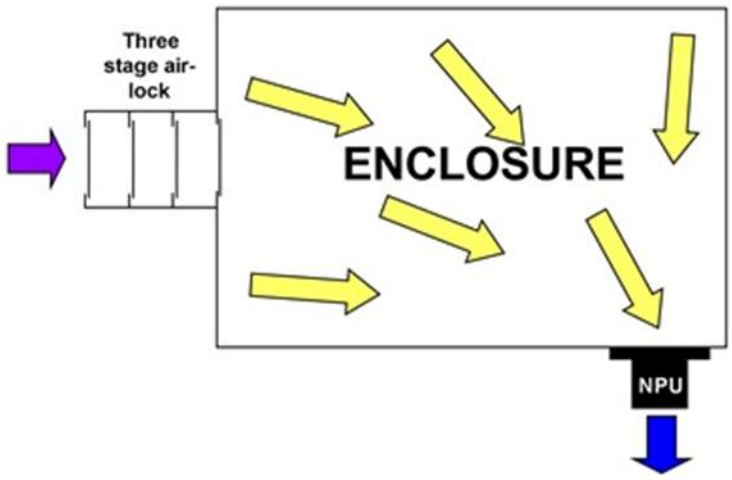
Enclosures

Fig X - *Enclosure with 3 stage airlock, warning signage, transparent 500g polythene wall and unit to provide appropriate negative pressure. A H-Type vacuum is available for decontamination within the 3-stage airlock and a garden sprayer with PVA solution is on standby for any unforeseen release of asbestos fibre outside the enclosure*

Enclosures are a fundamental component in the control of the risks associated with the release of asbestos fibres during removal work, and are required for almost all notifiable asbestos removal work. Where consideration is being given to such work without the provision of an **enclosure**, this should be discussed with the Health and Safety Authority at an early stage.

Prior to constructing an enclosure, consideration should be given to the following:

- Whether a pre-clean of the area is required using H-types and PPE/RPE.
- Disposing of non-asbestos waste in the area (including transit routes and waste routes)
- Removing or covering items that would be difficult to clean if they became contaminated (e.g. protecting carpets by covering with disposable timber panels and polythene)
- Blocking openings (such as air conditioning systems, ventilation systems) to prevent spread of asbestos fibre
- Sealing opening (e.g. pipe penetrations) using expanding foam but such use of chemicals must be risk assessed for both human health and fire regulations.
- Ensuring the enclosure does not obstruct emergency escape routes or that adequate alternative routes are sign posted
- Ensuring smoke alarms are deactivated
- Ensuring electricity is deactivated by a competent person and an isolation certificate is obtained



Enclosures are formed using timber, 1000 gauge polythene, tape and spay-tac adhesive. Enclosures should a reasonable size and should correspond to sketch in the contractor's Plan of Work. They should be designed to allow sufficient airflow through to avoid 'dead spots'.

The **enclosure** should be maintained under negative pressure (e.g. 5 Pa), and the pressure should be as uniform as possible throughout the enclosure. Negative pressure units with pressure monitoring facilities and supplementary air inlets should be located to achieve good air flow and to avoid dead spots. Air movement should be checked during the smoke test following construction of the enclosure. The negative air units should operate continuously (24 hours a day) until all asbestos removal work and decontamination within the enclosure has been completed, a clearance certificate issued and the enclosure dismantled. If the units stop during removal work, the specialist contractor must ensure all removal work ceases immediately until the problem is rectified and the required number of units are in

operation. To minimise the risk of airborne asbestos fibres escaping the enclosure, the delay should be as short as possible to avoid interruption. Consideration should be given to backup negative pressure units and the use of a generator. NPUs should be ducted outside.

With the use of appropriate negative pressure units, there should be at least 8 air changes per hour within the enclosure. Therefore accurate ventilation calculations for enclosures are critical. This is achieved as follows:

Enclosure calculations

The required NPU size in cubic feet per minute (CFM) can be calculated using the formula

$$\frac{Enclosure\ volume\ \ cubic\ ft\ x\ No.of\ air\ changes\ per\ hour}{60\ (minutes)} = CFM\ (req)$$

N.B. 1 cubic foot = 0.0283 cubic meters

	NPU unit required (Cubic feet per minute (CFM) required)
Enclosure Area (cubic feet)	8 air changes per hour
≤3750	500
≤5000	*
≤11250	1500
≤15000	2000
≤20000	*
≤30000	4000
≤40000	*
*Use combination of NPUs to achieve required negative pressure	

Each enclosure must have a viewing panel (minimum 600mm x 300mm), wherever possible, including a viewing panel on the inner stage of the **3 stage airlock**. The use of closed circuit television (CCTV) may be required to enable the work and workers to be inspected without needing to enter the enclosure e.g. basement boiler rooms, roof spaces, complex enclosures etc.

An **exclusion 'buffer' zone** around the enclosure should be created, as far as practicable, using red asbestos barrier tape. Depending on the location, additional barriers (e.g. heras fencing) should be installed to stop unauthorized access.

Additional signage, as appropriate, must be used and should comply with The Safety Health and Welfare at Work (General Application) Regulations 2007 (Chapter 1 of Part 7: Safety Signs at Places of Work)(S.I. 299/2007)

Airlocks and **bag locks** should be of an appropriate size for the ***controlled*** movement of personnel, waste and equipment in and out of the work area. They should be constructed from minimum 50 x 50mm timber battens, 1000 gauge polytene and duct tape to minimum dimensions 1m x 1m x 2m (height). Airlock flaps should cober airlock openings and be weighted.

Appropriate signage must be displayed on the airlock and bag lock to warn and control unauthorized access.

Enclosures may only be dismantled once all of the following are done:

(a) asbestos removal work has been completed
(b) visual inspection by an independent person is satisfactory, and
(c) Air monitoring results are found to be less than 0.01 fibres/ml.

The polythene that formed the enclosure must be disposed of as asbestos waste, along with any other contaminated material that assisted in forming the enclosure. In some cases, structures used in building the enclosure (other than the polythene that formed the enclosure) may be wrapped and sealed in plastic and not opened until in a similar controlled environment, such as another asbestos removal enclosure (for example, collapsible rods used to form the enclosure frame).

Smoke tests

A smoke test using a non-toxic smoke generator should be carried out on all enclosures as part of an integrity inspection prior to works commencing. This should be

witnessed, where possible, by the Client or his/her representative or analyst and a record should be made by the asbestos contractor. The test should be carried out with Negative Pressure Units (NPU) deactivated and then turned on. This will allow the witnesses to detect 'dead spots'. Dead spots can be addressed using 'roving heads' attached to the NPU.

Sometimes it may not be possible to conduct a smoke test due to being unable to deactivate local fire detection systems etc. In such circumstances, the Client must be informed and suitable air monitoring arrangements put in place to detect asbestos fibre leaks and establish enclosure integrity.

Thorough visual inspection of the work area enclosure and the air extraction equipment installed should be carried out at the beginning of each working shift.

Maintenance of plant and equipment

This section applies to all forms of equipment used to control levels of dust, such as vacuum cleaners, air extraction equipment and filtration units. All equipment should be subject to regular visual inspection (at the start of every shift), monitoring and maintenance, which should all be recorded. Chapter 2 (Use of Work Equipment) of Part 2 of the Safety, Health and Welfare at Work Regulations 2007 (S.I. 299 of 2007) would apply to all work equipment.

All new equipment used in the controlled removal of ACMs should comply with the British Standard *BS 8520-2009 Equipment used in the controlled removal of asbestos-containing materials*.

This British Standard has 3 parts:
Part 1: Controlled wetting of Asbestos-containing materials – Specification (BS 8520-1:2009);
Part 2: Negative pressure units – Specification (*BS 8520-2:2009) and*
Part 3: Operation, cleaning and maintenance of class H vacuum cleaners – Code of practice (*BS 8520-3:2009).*

Fig x – Wet stripping equipment - Copyright permission to be sought

Fig X – Negative pressure unit- Copyright permission to be sought

Fig x – H-Type Vacuum Copyright permission to be sought

The performance of the negative pressure unit should be checked after it has been thoroughly examined to establish that airflow through the unit, and pressure drop across the HEPA filter, meets the manufacturer's specification. Where the airflow has dropped below its design capacity (e.g., a 2000 cubic feet per minute (cfm) unit is only achieving 1500 cfm), this should be clearly marked on the unit itself and included on the test certificate. The lower figure must be used in ventilation calculations. NPUs should have a non-return flap to prevent reverse flow and a pressure gauge .

Thorough examination and testing of negative pressure equipment must be carried out regularly e.g. six months in accordance with the manufacturer's instructions by a trained and competent person. They should be electrically tested and have their filter tested (usually a DOP test (Di-Octyl Phthalate or dispersed oil particulate). Maintenance work on these units should only be performed after they have been thoroughly decontaminated, or the work may be carried out under controlled conditions, such as in an asbestos removal enclosure while wearing appropriate PPE.

A coarse pre-filter should be installed on the air intake side of the negative air unit to prolong the useful life of the HEPA filter. These pre-filters may need to be changed once per work shift or more frequently depending on dust loads. Used pre-filters must be disposed of as asbestos waste.

Class 'H' vacuum cleaners should be thoroughly examined regularly e.g. six months by a competent person and in accordance with the manufacturer's instructions. The effectiveness of the HEPA filter should be established during these examinations, but a filtration test for the entire vacuum cleaner must be available, not just the HEPA filter.

Defects in any equipment should be reported and corrected as soon as possible. Where a defect may result in exposures above the relevant control limit, the work should be stopped until the defect is repaired and adequate control resumed.

Hygiene measures

Asbestos workers are potentially most at risk of developing asbestos –related diseases. Removal processes by their nature disturb and release asbestos fibres, resulting in operatives and their clothing being contaminated with fibres which can become airborne and thus become inhaled.

Operatives should not eat, drink or smoke in asbestos work area or the washing and changing facilities; or not to take food, drink or cigarettes into such areas. Sufficient notices should be put up in prominent places in and around asbestos work area on the prohibition of eating, drinking and smoking.

Where eating and drinking is required during working hours, a designated area should be agreed for such purposes. The area should be situated away from the asbestos work area and entry to the eating and drinking area while wearing contaminated personal protective equipment or carrying equipment contaminated with asbestos is prohibited.

Any operative working with asbestos insulation, asbestos insulation board and coatings should therefore be subjected to rigorous decontamination procedures. This will also prevent the spread of asbestos contamination outside the work areas. This is not only important for the operatives themselves but also for others who may become exposed to asbestos fibres which are not removed.

The provision of an appropriate hygiene unit, usually referred to as a **decontamination unit, or DCU,** is essential for notifiable asbestos work. A DCU is a three stage unit with a shower between a "clean end" and a "dirty end". The DCU should be fully cleanable, with adjustable heated shower and separate areas for clean clothing and for discarding contaminated disposable work clothing. The unit should contain, in a prominent position in the clean end, a copy of the **clearance certificate** from the most recent asbestos removal job.

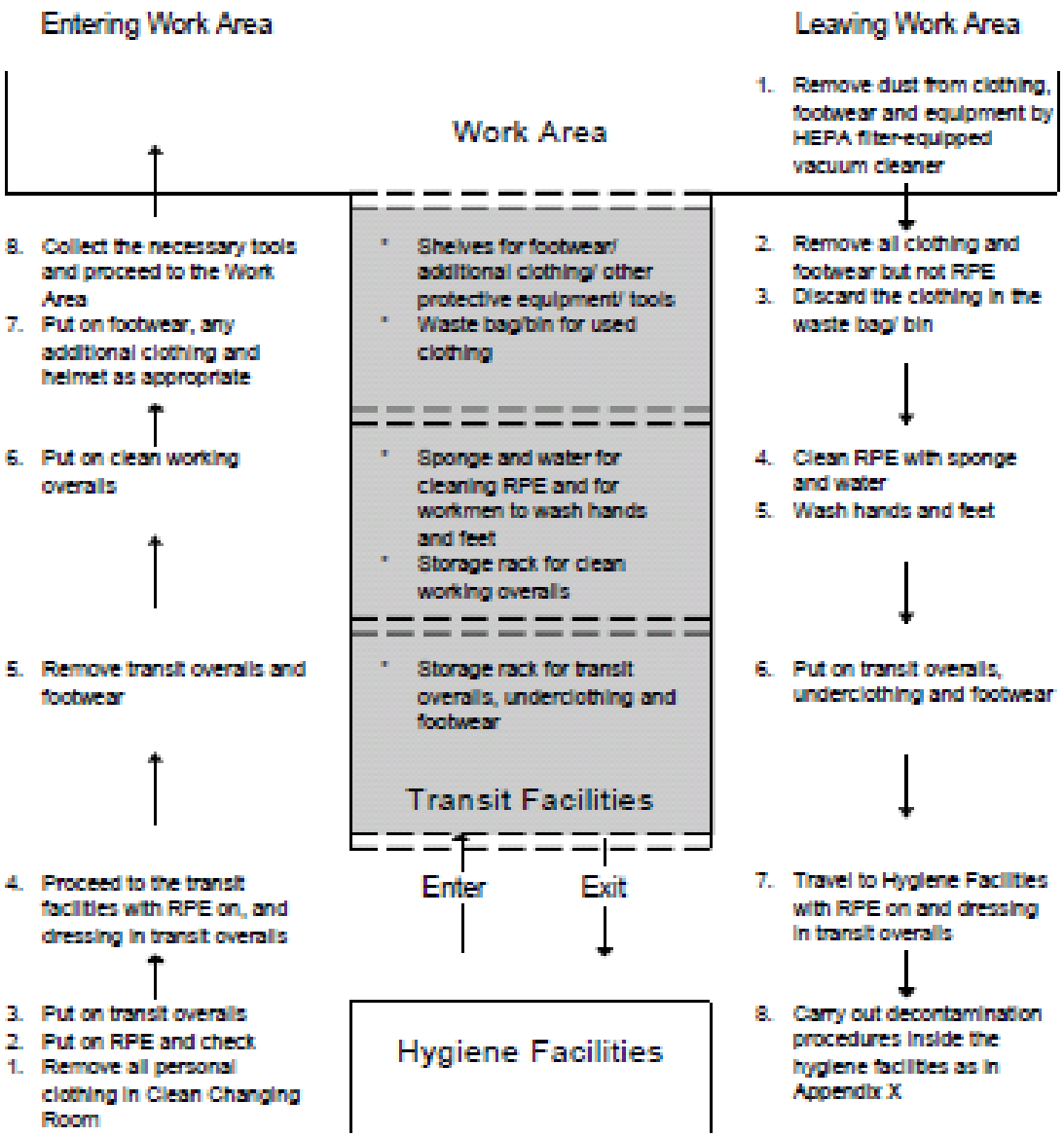
A minimum of one shower (decontamination unit) should be available for every four operatives involved in the asbestos work. There should be filtration of waste water to prevent spread of asbestos.

Extract ventilation with a high-efficiency-particulate-air (HEPA) filter produces a flow of air (through grilles) from "clean end" to "dirty end" of the decontamination unit. Self-closing doors maintain the separation of the sections. In cold seasons, the clean end should be heated to provide an adequately warm environment for changing and showering.

Ideally, a DCU should be connected to the enclosure. Where transiting arrangements are in place (i.e., the DCU is not directly linked to the enclosure) additional procedures, PPE and preliminary decontamination is required at the enclosure before travelling to the DCU for full decontamination. There must be a clean bucket of water and sponge. A dedicated H-type vacuum should be available in the airlock for primary decontamination The following two diagrams describe recommended procedures for Operatives when transiting and when the DCU is attached directly to the Enclosure.

Arrangements should be made for the facilities to be cleaned at least at the end of each working day. The daily cleaning should include the removal of all dust by vacuum cleaning and then thorough wash down or wet mopping of all exposed surfaces. Debris should not be allowed to accumulate but should be cleared and bagged for disposal as asbestos waste.

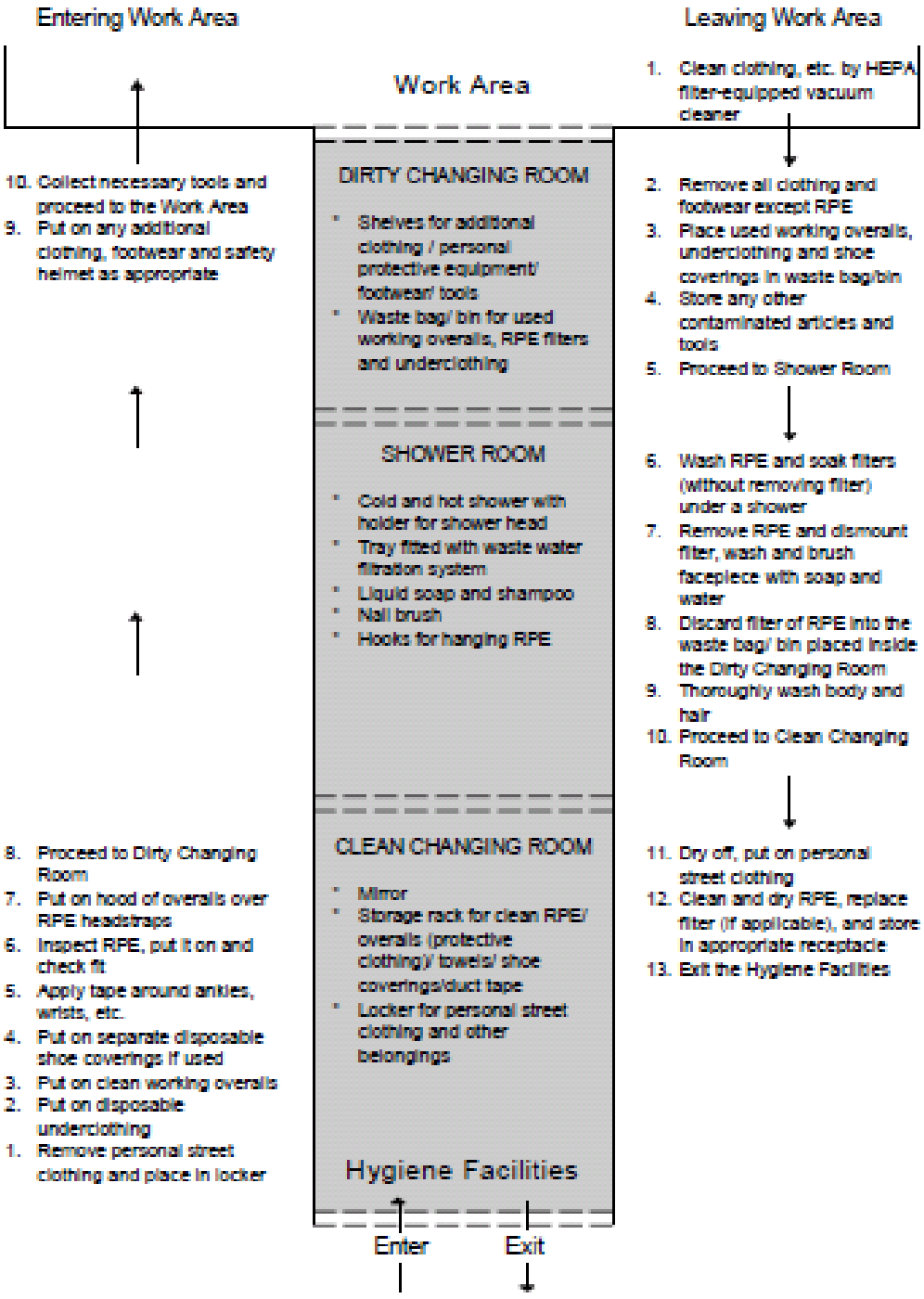
Procedures for entering and leaving work area through transit facilities



Note : 1. Transit overalls are protective clothing for transit purposes only, while working overalls are protective clothing used in the work area. Transit overalls should be clearly distinguishable from the working overalls, for example by use of different colours or markings.

2. The workman may not put on RPE in travelling between the transit facilities and the hygiene facilities if wearing the RPE is considered hazardous. In this case, the RPE should be packed in a plastic bag and carried by the workman.

Procedures for entering and leaving work area through hygiene facilities



Arrangements to deal with accidents, incidents and emergencies

The risk of an accident occurring in an enclosure during asbestos removal is always a possibility, for example, a worker collapsing or falling from height within the enclosure. Emergency procedures for the evacuation of ill or injured personnel, therefore, need to be written into the Plan of Work.

Decontamination should be carried out as far as possible. Where practicable employees should vacuum themselves and the victim, and sponge down RPE and boots, but evacuation of the seriously ill or injured person should not be delayed by over-elaborate attempts to decontaminate the casualty. If the victim can be moved, work colleagues can move them outside, if necessary, by slitting the walls of the enclosure. In some situations it may be necessary for the casualty to be treated inside the enclosure.

Arrangements for contacting the emergency services should be established in advance. If an accident occurs, information should be given to the relevant accident and emergency services at the time of the call to enable those services to prepare their own response and precautionary procedures for asbestos and other hazards. Spare disposable protective clothing and disposable respiratory protective equipment should be kept available for personnel who have to enter the enclosure and who do not have their own equipment; for example, paramedics.

As asbestos personnel work in many different premises and buildings, it is important that they are familiar with the procedures and arrangements in the event of a fire or other emergency requiring evacuation. Even in unoccupied buildings, there may be specific factors associated with the site which increases the potential risk of fire or other emergency situation; so the means of identifying such an event, and the means of escape must be planned.

This is particularly important if the enclosure or DCU is located in a relatively inaccessible area, or the escape route is awkward or lengthy. Although, where practicable, basic decontamination is desirable if escape becomes necessary, evacuation from the premises must be the overwhelming priority and should not be delayed by undergoing decontamination.

After reaching a safe area after any accident or emergency, PPE and RPE should be decontaminated as far as possible.

Section 13: Role of the Independent Competent Analyst

An independent Competent Analyst ('Analyst') will be required for all notifiable work and may also be required for some lower risk asbestos abatement works in order to provide **'site clearance certification for reoccupation'** (Clearance Certificate) and other types of air monitoring as described in this Section.

An 'independent' Analyst

It is strongly recommended that the Client or representative commissioning the asbestos works **directly employs** the Analyst/Analytical Laboratory. However, the Asbestos Regulations require that the 'employer' i.e. the asbestos contractor, arranges for a clearance certificate for site reoccupation. Therefore, the asbestos contractor should engage the Client's nominated Analyst.

Independence and **impartiality** of the Analyst is seen as a key element in ensuring external influences are minimised. To be independent, the Analyst must be independent from the asbestos contractor. This means that if a laboratory has any 'links' with a removal contractor by common ownership, common management, contractual arrangements, informal understanding, or other means that may have an ability to influence the outcome of a Clearance Certificate, then the laboratory shall not perform site clearance for that removal contractor which has links with the laboratory.

If, due to exceptional circumstances, the laboratory has to perform site clearance certification for a removal contractor that has links with the laboratory, then the laboratory must demonstrate that the Analysts have the necessary independence to be completely impartial when conducting site clearance certification. The Client or representative commissioning the asbestos works should be informed of such circumstances.

Any laboratory, whether it has links with removal contractors or not, should identify the circumstances in which analysts may encounter commercial, financial or other pressures that may affect their impartiality and operational judgement in carrying out on-site clearance work, and shall demonstrate the measures taken to assure impartiality.

Quality Assurance and Competence

Individuals and organisations engaged in analytical activities should have in-house documented procedures which conform to a recognized quality assurance system such as the international standard ISO 17025 *General requirements for the competence of testing and calibration laboratories*. Clients should confirm that such a system is being complied with.

Accreditation to ISO 17025 for fibre counting and sampling, provided by the Irish National Accreditation Board (INAB), provides independent evaluation that an self-employed analyst or organisation has the ability to meet the standards set out in these Guidelines, the WHO 1997

reference method and other relevant Irish standards I.S. EN ISO 16000-7:2007 and/or technical guidance documents e.g. HSE (UK) technical standard HSG 248.

Conformity assessment by INAB cover areas such as organisation, quality systems, control of records, personnel, accommodation and environmental conditions, test and calibration methods, method validation, equipment, handling of test and calibration items, and reporting results.

Notwithstanding an individual analyst or organisation's accreditation status, the Authority require satisfactory participation in internationally recognised proficiency schemes such as the **Regular Inter-laboratory Counting Exchange (RICE)** for fibre counting, administered by the UK Health and Safety Laboratory, which demonstrates independent verification of analytical competence and a commitment to continually improve performance.

Individuals engaged in analytical activities must hold appropriate recognised qualifications. The recommended industry specific qualifications, as currently required by INAB and provided by the **British Occupational Hygiene Society (BOHS)** are described below.

Work Activity	Recommended Qualification (s)
Air sampling	• BOHS S301: *Asbestos and Other* Fibres or BOHS W504 (International Module) Asbestos and Other Fibres and/or • BOHS P404: Air Sampling and Clearance Testing of Asbestos **or** • BOHS Certificate of Competency in Asbestos (CoCA)
Fibre counting	• BOHS S301: Asbestos and Other Fibres or BOHS W504 (International Module) and/or • BOHS P403: Asbestos Fibre Counting (PCM) **or** • BOHS Certificate of Competency in Asbestos (CoCA)

The Client or his/her representative should also ensure that the Analyst/ laboratory holds suitable liability insurance cover that relates to the carrying out of site clearance certification following asbestos removal. Public & Employers Liability and Professional Indemnity (this shall also include bodily injury cover) would be required as a minimum.

Phase Contrast Microscopy (PCM)

Determination of asbestos fibre number concentrations in air must be carried out by the recommended WHO method of 1997 using Phase Contrast Microscopy (PCM) or equivalent as per Regulation 10(3) of the Asbestos Regulations.

A sample is collected by drawing a known volume of air through a membrane filter by means of a sampling pump. The filter is rendered transparent (cleared) and mounted on a microscope slide. Fibres on a measured area of the filter are counted visually using PCM and the number of fibres in the volume of air is calculated.

Further information on the PCM method can be found in Appendix 4.

Many fibres are too small to be visible by optical microscopy. The smallest visible fibres will be about 0.2 -0.25µm wide. Therefore the PCM method represents only a proportion of the total number of fibres present and the result is only an index of the numerical concentration of fibres and is not an absolute measure of the number of fibres present.

The method does not identify the chemical composition of the fibres or discriminate between asbestos and non asbestos fibres. However, other methods can be used such Polarised Light Microscopy. scanning electron microscopy and transmission electron microscopy. Further details on the last two methods can be found in Appendix 4.

Air-monitoring (sampling)

The need for air monitoring should be determined as part of the assessment of the work. It may be required for one or more of the following reasons:

- To confirm that airborne concentrations of asbestos fibres are as low as reasonably practicable and that the correct choice of RPE has been made
- To confirm that there has been no measurable spread of airborne fibres to areas adjacent to where work with asbestos cement has taken place
- To confirm that the work area has been adequately cleaned before being returned to normal use.

Those who commissions the asbestos removal work must ensure the results of the air monitoring are given to the following persons:

- workers at the workplace
- health and safety representatives for the workplace
- persons conducting businesses or undertakings at the workplace, and
- other persons at the workplace.

If the workplace is domestic premises, the asbestos removal contractor must ensure the results are given to the following:

- the person who commissioned the work
- workers at the workplace
- the owner/ occupier of the domestic premises

Air monitoring is thereby classified depending on its purpose as follows:

- **Compliance monitoring** is conducted to check that exposure to workers does not exceed the control limit of **0.1 fibres per cm^3**.

- **Background monitoring** is generally conducted to check that fibre levels in the air are below the recommended level, usually during minor remedial works or when accidental damage has occurred to ACMs. Recommended airborne fibre levels should be below **0.01fibres per cm^3**

- **Leak (enclosure check)** monitoring is preformed outside the enclosure while asbestos removal work is in progress to check that control measures are adequate. It should be used to augment frequent, thorough visual inspections of the enclosure. A number of sample locations should be considered e.g. airlocks, baglocks, negative pressure unit exhausts. Action should be taken as follows based on results of leak testing;

Action level	Control measure
< 0.01 fibres per cm^3	• No new controls necessary
>0.01 but less than 0.02f/cm^3	• Review control measures • Investigate cause of breach • Implement controls to eliminate or minimise exposure and prevent further release
> 0.02 f/cm^3	• Stop removal work • Investigate the cause: Conduct a thorough visual inspection of the enclosure and associated equipment in consultation with all workers involved with the removal work • Implement controls to eliminate or minimise exposure and prevent further release Extend the isolated/barricaded area around the removal area/enclosure as far as reasonably practicable (until fibre levels are at or below 0.01 fibres/cm^3, wet wipe and vacuum the surrounding area, seal any identified leaks (e.g. with expandable foam or tape) and smoke test the enclosure until it is satisfactorily sealed. • Do not recommence removal work until further air monitoring is conducted. Do not recommence until fibre levels are at or below 0.01 fibres/cm3

- **Personal monitoring** is where operatives' exposure is measured within an enclosure during asbestos removal works to check that the protection factor of their respiratory protective equipment (RPE) is not exceeded. The filter holder should point downwards and be fixed to the upper lapel or shoulder of the workers clothing. It should be within 0.2m of the workers mouth/nose. If a respirator is worn, sampling should be carried out away from the clean air exhaust. For work with asbestos insulation, spray etc, it is recommended that sampling should be conducted at a frequency of no less than one sample for every 4 operatives at the commencement of the work and subsequently every working day.

- **Clearance air monitoring:** A Four-stage clearance is the procedure carried out following the removal of friable asbestos. A visual inspection must be conducted by the analyst to ensure that the area has been cleaned to a satisfactory standard and is suitable for re-occupation. Clearance air monitoring is then conducted inside the enclosure to check that airborne fibre levels are below the recommended limit i.e. **0.01fibres per cm^3 .** However, if one or more sample results exceeds this limit, where four samples where taken, a further cycle of measurements must be undertaken after appropriate remedial action is completed. For larger areas 1 in 5 sample results may lie between **0.01 fibres per cm3 and 0.015 fibres per cm^3.** Once satisfactory results are achieved the analyst will issue a site clearance certificate of re-occupation.

- **Reassurance monitoring –** This may be conducted in certain circumstances (such as when an enclosure has been removed on completion of asbestos remedial works) to confirm that the airborne fibre levels are satisfactory. Recommended airborne fibre levels should be below **0.01fibres per cm^3**

- **Prevalent sampling –** air monitoring performed during normal occupancy of an area where asbestos materials are being managed. Recommended airborne fibre levels should be below **0.01fibres per cm^3.** Air conditioning systems should be left on and to avoid dilution of asbestos fibre concentrations, windows, doors and other openings should be kept closed for 3 hours prior to sampling and during sampling periods. Normal occupancy activities should continue in their usual manner.

Contents of an Air Monitoring Report

Air monitoring must contain the following information to confirm that sampling and analysis was carried out in accordance with current technical air testing standards e.g. WHO 1997 method and HSG (UK) 248.

Air monitoring reports – Information requirements	
• NPL test slide No • Graticule Diameter • Microscope ref • Flowmeter No • Diameter of exposed filter • Sample numbers	• Sampling Pump numbers • Initial/final and mean flows • Volume collected • No of fibres counted • No of fields counted • Concentration of fibres/ limit of

• Time on/ off • Duration (mins)	detection • Site temperature reading • Site pressure reading

Clearance Certification

The Analyst must not issue a clearance certificate to the 'employer' i.e. asbestos contractor unless they are satisfied that the asbestos removal area and the area immediately surrounding it are free from visible asbestos contamination. To do this, they can conduct a visual inspection for evidence of dust and debris. Air monitoring must also be conducted and the results of that test must show that asbestos concentrations are below 0.01 fibres/ml.

If a clearance certificate has not been obtained, the asbestos removal area must not be re-occupied for normal use or other work activities. A clearance certificate must be issued before the area can be re-occupied for demolition or other work.

Unauthorised persons cannot enter the asbestos removal work area prior to a clearance certificate being issued and any protective barricades should remain in place until completion of all licensed asbestos removal work and the final clearance certificate is issued.

A copy of Clearance Certification should be posted outside the area during and after dismantling of the enclosure. A copy should also be sent to the Client or his/her representative.

A clearance certificate must be made available to an HSA Inspector upon request.

Site Clearance Certification Procedure

The site clearance certification process for notifiable work involves four stages (4SC):-

Stage 1 - preliminary check of site condition and job completeness

Stage 2 - a thorough visual inspection inside the enclosure/work area

Stage 3 - clearance air monitoring

Stage 4 - final assessment post-enclosure/work area dismantling

The 4SC process:

- minimises the risk of the 'cleared' area becoming re-contaminated with asbestos after the enclosure has been removed, resulting from the immediate surrounding areas, the fabric of the enclosure or from beneath covered plant
- minimises the risk of asbestos debris being found on transit and waste routes, and areas around the skip and hygiene facility, post clearance; and

- reduces the risk to site employees and others of exposure to asbestos, after the contractors have left site

Stage 1

Whilst carrying out the Stage 1 preliminary inspection of areas surrounding the enclosure/work area, transit and waste routes etc, the analyst shall record the presence of materials such as building rubble and debris etc, where this may give rise to any doubt regarding the completeness of the Stage 1 inspection. The analyst shall initially consult with the asbestos removal contractor requesting that interfering materials be cleared. If this is not possible or practicable, relevant details shall be recorded on the Certificate of Reoccupation. A detailed inspection of the hygiene unit should also be made to establish that it is fully operational.

The analyst shall also record, and request the removal of, any obvious asbestos debris arising from the removal work - particular attention should be paid in areas adjacent to waste skips (and the contractor's vehicle, if present during the inspection). In the event that substantial asbestos debris remains within the area and indicates that the final clean has not been undertaken thoroughly enough, then the analyst shall record (and report) a clearance failure at Stage 1.

A copy of the contractor's plan of work or method statement must be reviewed by the analyst when carrying out the Stage 1 inspection in order to establish the extent of works to be undertaken. If this information is not available the Stage 1 fail must be recorded. In the event that a copy of the diagram from the contractor's plan of work is not available, the analyst shall produce a site diagram including approximate dimensions, detailing the location of the enclosure, air locks, hygiene unit, transit and waste routes etc.

This diagram shall form part of the laboratory's formal records system. Where changes or amendments to the site layout have been made these should be noted and the revised diagrams counter-signed by the contractor to verify their authenticity.

The analyst shall record the presence or absence of viewing panel(s), for the purpose of inspection of enclosures from the outside. Other methods of viewing, such as webcams or CCTV may also be useful during inspections. In the event that viewing panels are not present, the analyst must record the absence of viewing panels within the site records and proceed with the inspection. Additionally, the analyst should discuss with the contractor's representative whether smoke tests or leak testing have been carried out on the enclosure and should record details of any discussions held (and any documentation examined). Asbestos Contractors should carry out daily visual checks of enclosure integrity. The analyst can also check the contractor's records for supporting evidence. Such evidence will be of potential use to the analyst in assessing the integrity of the enclosure, as part of the Stage 1 inspection. The analyst should, however, bear in mind that such testing may have been carried out some time prior to the clearance. The integrity of the enclosure must again be verified and recorded as part of Stage 1.

The presence of any known asbestos-containing materials (ACMs) that are to remain in-situ following site clearance certification must be recorded by the analyst on the Certificate of Reoccupation. A record shall be kept of any ACMs noted to remain in the enclosure during the Stage 2 visual inspection.

It is advisable for laboratories to obtain photographic records of prevailing conditions inside and adjacent to enclosures (including records of any suspected asbestos containing materials in or around the enclosure). The laboratory should obtain the permission of the site owner/client prior to taking photographs.

Stage 2

The analyst must inspect the airlock and baglock prior to entering the enclosure. The standard of cleaniness of these can provide a indicator of conditions within the enclosure. On entering the enclosure, the analyst (wearing suitable PPE) must record the presence of leaking pipes, seepage of groundwater, 'dusty' surfaces (that may compromise the ability to read the filters after air sampling), inaccessible asbestos etc, on the Certificate of Reoccupation.

The analyst must record whether any sealants or lock-down sprays have been used in or around the work area. There should be no use of sealants prior to the 4-stage clearance procedure (unless they are used as part of the control during the removal process - eg removing AIB ceiling tiles, or as permanent sealing). If sealants (eg PVA) have been used in a bid to obtain clearance, then this is a potential fail. If there is evidence of unauthorised use of sealant then the analyst should direct that sealants be removed before proceeding any further with the 4SC procedure. The analyst can authorise the use of sealants, but reasons and justification for their use (eg where non-asbestos dust within the enclosure may cause an air test failure) must be recorded on the Certificate of Reoccupation.

The analyst must check for the completeness of the removal of ACMs from underlying surfaces, the presence of any visible asbestos debris and any fine settled dust. A bright torch, screw driver/chisel and mirror are critical tools for visual inspections. Other equipment such as ladders, lighting, H-Type Vacuum and means of primary decontamination in the air lock e.g. sponge/water etc.

The analyst must be accompanied by a representative from the specialist contractor. Minor remediation can be carried out by the contractor during the visual inspection. The analyst must decide when 'minor' becomes 'major' and withdraw and fail the enclosure at that point.

The following scenarios may also be relevant during a stage 2 inspection

- *Enclosure is wet:* An enclosure should not be wet but there are occasions e.g. ground water issues, when having a completely dry enclosure. All reasonable efforts should be made to remedy wet areas within an enclosure before an analyst passess his/her visual inspections

- *Loose rubble floors*: This would be relevant in undercrofts. If not addressed in the Plan of work, the analyst should agree a specified excavation depth to ensure contaminated rubble/soil is fully removed.
- *Waste ACMs remaining in enclosure during visual inspection*: This sometimes occurs when it is difficult to remove wrapped ACMs from an enclosure via the baglock e.g. large AC/AIB panels. The analyst should complete the visual inspection (including checking the wrapped ACMs) and the ACMs can then be removed after dismantling of the air locks.
- *Inaccessible ACMs:* It is sometimes impossible to remove all traces of ACM e.g. overspray on breeze brick walls. The analyst should satify themselves that all reasonable effosrts have been made to remove residue before allowing the affected areas to be treated with sealant e.g. atomised polymeric emulsion paint.

The findings of the stage 2 inspection should be recorded on the Certificate of Reoccupation.

Stage 3

Clearance air testing will only take place once the analyst has completed a satisfactory visual inspection. If a lot of fine cleaning was required during Stage 2, then it may be appropriate to allow the enclosure to vent for additional time before air testing.

Representative sampling within the enclosure should be carried out in accordance with guidance in Appendix 4. One the analyst re-enters the enclosure with sampling pumps, he/she should ensure that any H-type vacuum exhaust and hose are sealed with duct tape. The NPU should be switched off and the pre-filter covered and sealed with polythene.

The filter holders should point downwards and be fixed 1-2m above the floor by using integrated masts. It is not good practice to attach the filter holders to polythene sheeting with tape. Sampling in risers, lift shafts etc will have to take place at representative heights.

Dust disturbance must then take place once the pumps are activated. This should be done on horizontal surfaces where dust may have settled in the vicinity of the sampling pumps and be undertaken by sweeping all areas with a (new) brush. Brushes must be disposed of as asbestos waste.

After air sampling the analyst must check the final flow rate (which must be within ±2%) and collect samples for PCM analysis. The enclosure will pass if results are below 0.01fibres per cm^3 or as discussed earlier under 'clearance testing' above.

Information to be recorded should include enclosure details (including the information which is required by HSG 248), sampling position(s), calibration of individual sampling pumps, details of "pooled" samples (where relevant), on/off times of pumps with dates and relevant environmental conditions (to include temperature and barometric pressure).

Stage 4

This is the final stage of the 4SC process. The analyst (wearing suitable PPE) must check areas following dismantling of the enclosure and carry out additional reassurance air sampling during the dismantling period and afterwards, if require. The analyst should record what was found and the outcome on the certificate of reoccupation.

Hygiene facility

The analyst must discuss with the removal contractor whether testing is required in the hygiene unit. It should be noted that separate clearance certification must be issued for this purpose. The analyst must record the outcome of any relevant discussions held with the contractor. A visual inspection is required. Air testing should take place in the shower and dirty end of the DCU by propping the separating door open and using one sampling pump.

Contents of a Site Clearance Certificate of Reoccupation for notifiable enclosure work and hygiene facilities

The following key items to be included in site clearance certification for reoccupation are taken from HSE (UK) technical guidance document HSG 248.

Site clearance certification for Enclosure work

Preliminaries
• Laboratory name, address and contact details • Accreditation logo and number (if relevant) • Contract, job and reference Nos • Accredited or other methods used • Name, address and contact details of Client • Site address for clearance • Areas to be assessed and brief description of work • Include attachment no's if adding drawings, pictures, plans of work or notification forms • Name and address of asbestos contractor • Name and contact number for asbestos contractor site supervisor • Anticipated start and confirmed start of 4SC assessment
Stage 1-Preliminary check of site condition and job completeness
• Plan of work checked (any issues, ACMs to remain) • Work areas, Enclosures/ NPUs & Hygiene Faciltites • Skip area/ waste route, transit rout • DCU • State if passed/failed – record comments/observations • Record time & date and signature of analyst

Stage 2 – Thorough visual inspection
• Airlock, baglock, enclosure free of debris, waste bags etc • All ACMs removed from enclosure • Interior surfaces free of debris and fine settled dust • State if passed/failed – record comments/observations • Record time & date and signature of analyst
Stage 3 – Clearance air monitoring
• Record if areas were dry • NPUs deactivated • No evidence of lock down sprays • Original floor surface uncovered • Disturbance used (state type) • Total time of disturbance • Area/volume of enclosure • No. of air samples collected and diagram indicating locations of sampling pumps. • Results of the air tests • State if passed/failed – record comments/observations • Record time & date and signature of analyst
Stage 4 – Assessment of the site for reoccupation
• Former enclosure area free of dust and debris • Transit route and waste routes free from debris/ sacks and waste • All ACMs removed as per POW and any ACMs remaining intact • State if passed/failed – record comments/observations • Record time & date and signature of analyst
Contractors acknowledgment and distribution of certificate
• Contractor to sign certificate based on assessment of analyst i.e. all four stages passed, stage 2 fail etc. • Analyst to record names of those who received/ will receive a copy of the Certificate.

Site clearance certification for Hygiene facilities

Preliminaries – Record the following
• Laboratory name, address and contact details • Accreditation logo and number (if relevant) • Contract, job and reference Nos

- Accredited or other methods used
- Name, address and contact details of Client
- Site address of DCU for clearance
- Areas to be assessed and brief description of work
- Include attachment no's if adding drawings, pictures, plans of work or notification forms
- Name and address of asbestos contractor
- Name and contact number for asbestos contractor site supervisor
- Anticipated start and confirmed start dates

Thorough visual inspection - Record the following

- Hygiene facilities free from waste/debris, dust, contaminated clothing
- State if passed/failed – record comments/observations
- Record time & date and signature of analyst

Clearance air monitoring in the DCU

- Areas are dry
- NPU deactivated
- Disturbance method used and duration of disturbance
- Floor area of shower/ dirty end of DCU
- No. of air samples collected
- Results of air tests
- State if passed/failed – record comments/observations
- Record time & date and signature of analyst

Contractors acknowledgment and distribution of certificate

- Contractor to sign certificate based on assessment of analyst .
- Analyst to record names of those who received/ will receive a copy of the Certificate.

Section 14: Plans of Work

A Plan of Work (also referred to as a Method Statement) as required by Regulation 15 of the Asbestos Regulations, must be developed and complied with for **all works** which might disturb ACMs. The plan of work must be in writing and drawn up before any work commences. The employer whose employees are intended to perform these work activities is responsible for drawing up the plan.

The plan of work should be discussed and explained to the employees concerned and they must be given information and instruction in the methods and control measures planned to be used on-site, including the use of respiratory and personal protective equipment.

The method and requirements related to decontamination measures must be explained and implemented by all concerned and must be appropriate to the risk from exposure and any possible contamination which could occur while performing the work.

Where any additional risk of exposure arises, other than those identified initially and on which the plan of work was developed, work must be stopped immediately and the plan of work must be revised and further developed to take account of those changes and the risks involved.

Lower Risk Plans of Work

The plan of work must include information on the nature and duration of the planned work, the number of persons working, the address and location of the work, the planned methods and control measures to be used, arrangements relating to keeping the plant, equipment and site clean and the handling, storage and disposal plans for the ACMs. The plan of work must include a site drawing.

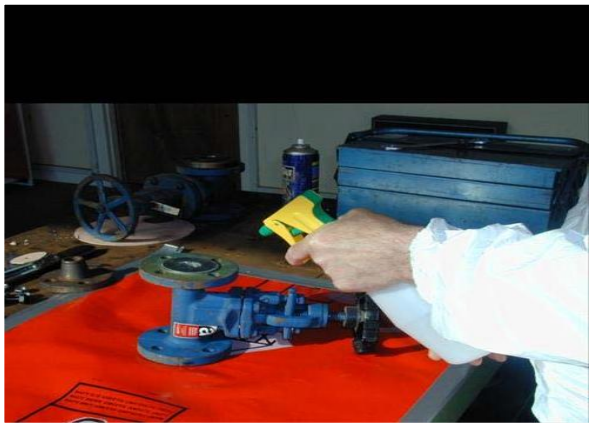
Example: Plan of Work for the removal of Compressed Asbestos Gaskets (CAF)

PLAN OF WORK	
Location	Plant room 101
Date	On-going
Operative (s)	J.C & B.H.
Supervisor	J. Smith
Work Activity	Removal of. Compressed Asbestos Gaskets (CAF) from process line 101
Duration of works	Less than 1 hour - non-continuous short duration work
Expected exposure level	Less than 0.1fibres per m^3 based on initial written risk assessment dated 12/12/2010
Procedure	
Access	Take precautions to prevent the risk of falling if this work is at height. Minimise the number of people present. Restrict access - close doors, and use warning tape and notices.

	Ensure adequate lighting.
Equipment	500-gauge polythene sheeting and duct tape; warning tape and notices; Type H vacuum cleaner (BS EN5415) to collect adhering gasket residues; scraper; garden type sprayer; bucket of water and rags; and asbestos waste container, e.g. labeled polythene sack.
Personal protective equipment (PPE)	disposable overalls fitted with a hood - Type 5, category 3 disposable coverall boots without laces (laced boots are hard to decontaminate) Respiratory protective equipment (FFP3) Gloves – single use disposable Wear hearing protection
Enabling works	Ensure the system has been made safe (pipework emptied, electrical supply isolated, etc). Protect surfaces in the restricted area from contamination. Cover with 500-gauge polythene sheeting and fix with duct tape. Protect vulnerable components with polythene sheeting.
Removal	Unbolt or unscrew the flange, or dismantle the equipment. Once accessible, dampen the asbestos. Continue dampening as it is exposed. Ease the gasket or rope seal away with the scraper, and into the asbestos waste container. Keep damp, and scrape away asbestos residues. Where there is a lot of residue, gently scrape it away using 'shadow vacuuming'
Cleaning	Clean the equipment and the area with a Type H vacuum cleaner and/or wet rags. Put used rags, polythene sheeting and other waste in the waste container. Tape the container closed.
Visual inspection	Visually inspect the area to make sure that it has been cleaned properly - has no visible traces of dust and debris remain and suitable for reoccupation and complete self-certification form. Clearance air sampling is not required.
Personal decontamination	Clean boots with damp rags Where available, clean your overalls with the brush attachment on a Class H vacuum cleaner. Vacuum off the brush Otherwise, use damp rags by a 'patting' action. Rubbing can disturb fibres. Peel off disposable overalls. They should be inside out. Put them in a suitable asbestos waste container. Bag up re-usable overalls for a specialist laundry.

	Finally, remove your disposable respirator and place it in the asbestos waste container. Tape the container closed. Use site wash facilities and restrict access until finished. Ensure wash facilities are cleaned

Use of tape and polythene sheeting to protect a work area before cleaning asbestos gaskets from a valve



Damping the asbestos gasket on a valve

Use of shadow vacuuming to capture dust released in cleaning asbestos from a valve.

Cleaning up the work area carefully, with H-Type vacuum cleaner and wet waste rags.

Higher Risk Asbestos Plans of Work

The following is a summary of the elements which should be considered in a Plan of Work (Method Statement) for removal of ACMs subject to Notification. This list is not intended to be exhaustive, and each job must be considered individually by the Specialist Asbestos Contractor.

1. **Scope of Work**
   - ✓ Name of client
   - ✓ Name of Supervisor
   - ✓ Full address of site
   - ✓ Name of Waste disposal contractor
   - ✓ Name of consultant/ air monitoring organization
   - ✓ Name of Project supervisor design stage
   - ✓ Name of Project supervisor construction stage
   - ✓ Names of any other relevant sub-contractors
   - ✓ Details of survey carried out – by whom and when
   - ✓ Type of asbestos identified
   - ✓ Form of asbestos e.g. lagging, spray, asbestos insulating board etc.
   - ✓ Location of asbestos e.g. roof space
   - ✓ Quantity to be removed e.g. number of bags
   - ✓ Number of operatives required including persons working outside enclosure
   - ✓ Start and Finish date – to include setting up and dismantling of enclosures

2. **Hygiene Facilities**
   - ✓ Description of faciltites to be used e.g. mobile unit complying with HSE (UK) publication HSG247, Appendix 8.1 'Minimum design criteria for asbestos hygiene units'
   - ✓ Location of Hygiene facility (shown on site plan)
   - ✓ Designated transit route

3. **Waste Disposal**
   - ✓ Bagging system to be used
   - ✓ Temporary storage of bags
   - ✓ Waste routes (shown on site plan)
   - ✓ Skip locations (shown on site plan)
   - ✓ Transportation and final disposal arrangements

4. **Enclosure (s) of Work (shown on site plan)**
   - ✓ Construction of enclosure
   - ✓ Volume of enclosure
   - ✓ Location of airlocks (personnel and bagging locks)
   - ✓ Additional screening, if required e.g. heras fencing
   - ✓ Details and locations of viewing panels
   - ✓ Warning notices

5. Control measures
- ✓ Details of expected exposure levels
- ✓ Specification of negative pressure units
- ✓ Number of air changes per hour
- ✓ Siting of negative air pressure units (shown on site plan)
- ✓ Method of smoke testing and witnessing
- ✓ Type and specification of respirator (positive pressure type)
- ✓ Maintenance arrangements for RPE and equipment
- ✓ Protective clothing
- ✓ Decontamination of employees
- ✓ Specification of vacuum cleaner
- ✓ Examination of controls etc and record keeping

6. Method of Work
- ✓ Wet strip technique to be used
- ✓ Additional local exhaust ventilation required
- ✓ Tools to be used
- ✓ Access equipment
- ✓ Lighting
- ✓ Clearance of waste
- ✓ Additional controls to reduce exposure

7. Decontamination Features
- ✓ Cleaning and vacuuming before leaving enclosure
- ✓ Removal of contaminated overalls
- ✓ Washing of boots and masks
- ✓ Removal of masks
- ✓ Disposal of transit and working overalls

8. Air Monitoring
- ✓ Air sampling plan for duration of works
- ✓ Systems for monitoring and controlling the effectiveness of the enclosure
- ✓ Analysis by which laboratory

9. Final Clearance
- ✓ Final cleaning arrangements
- ✓ Thorough visual examination
- ✓ Air monitoring (see 8 above)
- ✓ Removal of enclosure and disposal
- ✓ Final visual

10. Emergency procedures
- ✓ Fire precautions
- ✓ First aid arrangements
- ✓ Minor incident procedures
- ✓ Major incident procedures
- ✓ Co-ordination with external emergency services i.e. local emergency services numbers

11. Site Documentation

- ✓ Safety Statement (Risk Assessments)
- ✓ Plan of Work (Method statement)
- ✓ Training certificates
- ✓ Medical certificates
- ✓ Face fit certificates
- ✓ Equipment maintenance and inspection records (including test certificates for NPU and H type vacuum cleaners)
- ✓ Record of inspections and tests of enclosures
- ✓ Records of air tests of decontamination unit (DCU)
- ✓ Site Log

12. Other matters

- ✓ Protection of other persons on or near the work site
- ✓ Supervision of job
- ✓ Clients' requirements
- ✓ Work on live plant etc
- ✓ Heat stress
- ✓ Liaison with client/employees
- ✓ Special characteristics of site

A copy of the Plan of Work must be kept at the workplace where the asbestos removal works are taking place for the duration of the works.

Section 15: Health Surveillance & Registers

Health Assessments

Employers must make arrangements to enable their employees who are engaged in activities where the exposure limit value may/will be exceeded to avail of an adequate and suitable assessment of their health. Employees should co-operate with their employer in attending medical examinations.

The health assessment must be carried out by a responsible medical practitioner with knowledge of the medical issues arising from work with asbestos. The health assessment must be carried out prior to the employee engaging in the work activity and **every three (3) years** thereafter where the relevant work activities continues (with or without interruption).

Health monitoring must include the following and should follow current principles and practices of occupational medicine:

- consideration of the worker's demographic, medical and occupational history
- a personal interview
- consideration of records of the worker's personal exposure, and
- a physical examination of the worker with emphasis on the respiratory system, including standardised respiratory function tests unless another form of health monitoring is recommended by a registered medical practitioner.

The medical practitioner may decide on further tests e.g. sputum cytology tests or chest X–rays, in accordance with the latest occupational health knowledge available.

Medical Records relating to Health Assessments

The responsible medical practitioner must record the following in an individual's medical record.

- Name and address of employee
- Name of employer and relevant address(s)
- Date of birth of employee
- Date of commencement of asbestos exposure (if known)
- Medical history of employee
- Occupational History of employee
- Results of asbestos sampling which relates to the employees exposure
- Results of clinical examination and significance of results
- Details of any action taken by the

The medical records of each employee must be maintained by the appropriate responsible medical practitioner for 40 years after the last assessment is recorded in the medical record.

An employee or his/her employer may apply to the Authority within 28 days of a health assessment if either are aggrieved by the outcome of the assessment. For the purposes of this requirement, contact should be made with the **Occupational Health Unit** of the Health and Safety Authority. The Authority will designate a person i.e. medical practioner, under Section 63 of the Act to conduct an appropriate review of the case.

Employees can request, upon reasonable notice to their responsible medical practioner, access to their individual medical record.

A responsible medical practitioner or his/her personal representative may have to transfer individual records (e.g. retirement, ceases trading etc) to another responsible medical practioner. Where a dispute or a difficulty arises, the Authority shall decide upon the most appropriate action.

Where an undertaking (business e.g. asbestos removal company) ceases to trade, an employer must also contact the Health and Safety Authority (via its appointed responsible medical practitioner) and confirm arrangements for the retention of individual medical records.

Occupational Health Registers

Employers must establish and maintain an Occupational Health Register for all employees who undertake asbestos work activities which are not subject to exemptions under Regulation 5(b).

The Occupational Health Register should ideally be kept indefinitely, but in any event for a minimum of 40 years following the end of an individual's exposure.

It should be kept in a safe place and contain information as set out under Schedule 6 of the Asbestos Regulations.

Contents of an Occupational Health Register	
• Name and address of registered business • Address of asbestos site location • Brief description of asbestos activity e.g. removal of 10 sq.m of AIB ceiling tiles • Nature and duration of work activity • Level of exposure (without RPE protection factor) e.g. 4f/ml • Name and address of each employee • Dates/ time of each assessment • Name of assessor • Details of the nature of each assessment of	• Dates and results of any air – monitoring ➢ Personal sampling – name and job description of person monitored ➢ Static sampling – location of static samples ➢ Length of sampling times in each case; and ➢ The results and the interpretations of the results of such sampling • Include any recommendation from the registered medical practitioner e.g fit, unfit or fit with restrictions etc

the risk of exposure to asbestos • Details on tests and examinations of RPE and unique identifiers for individual RPE devices	

The occupational health register must not contain any medically confidential information but must contain the non-medical confidential results of the Health Assessment, as provided and included on the register by the responsible medical practitioner.

The occupational health register must be made available upon reasonable notice to an employee or his/her representative. However, the identity of other employees must not be disclosed. The occupational health register must also be made available to an HSA Inspector or person designated under Section 63 of the Act when requested.

Where an undertaking (business e.g. asbestos removal company) ceases to trade, the employer or his representative (e.g. Liquidator) must contact the Health and Safety Authority and ensure that the occupational health register is made available to the Authority.

For the purposes of this requirement, contact should be made with the Occupational Health Unit of the Health and Safety Authority.

Heath Surveillance for those who undertake Air Monitoring and Material Sampling of ACMs

Based on written risk assessment, the exemptions described in Section 5 may apply to work activities where air monitoring and collection of samples is taking place to ascertain whether a specific material contains asbestos.

Employers of analysts/ surveyors or self employed analysts/ surveyors must conduct a written risk assessment for their exposure to determine if air monitoring/ survey activities will produce low and sporadic exposures and in any event be below the exposure limit value. A plan of work is also required.

Analysts entering enclosures during removal or remedial work to conduct visual inspections and clearance air monitoring should be aware that fibre concentrations in air can exceed (and in some cases well exceed) the exposure limit value, especially where dust disturbance activities are carried out as part of their work e.g. brushing where poor standards of fine cleaning have occurred following removal of AIB, thermal insulation etc..

Analysts may also on occasion be exposed inadvertently without RPE to 'asbestos leaks' as a result of enclosure breaches which may exceed the exposure limit value.

Therefore, based on the examples above, the exemption for medical surveillance and retention of health records would not apply in these circumstances. Notification to the Authority would not be required as related works would have been notified by the relevant specialist asbestos contractor.

Those involved in obtaining material samples from ACMs to ascertain asbestos content must also conduct written risk assessments and develop written plans of work. If sampling procedures are followed in accordance with best practice, it is very unlikely that exposures will exceed the exposure limit value. However, the exposure limit value can be exceeded in certain circumstances e.g. entering contaminated roofspaces, ducts or risers.

Therefore, based on the examples above, the exemption for medical surveillance and retention of health records would not apply in these circumstances. Notification to the Authority would not be required as such works would have been notified by the associated specialist asbestos contractor.

It is recommended that health surveillance in accordance with the Regulations be made available to analysts and surveyors.

Asbestosis & Mesothelioma Register

The Health and Safety Authority are required under the Asbestos Regulations to maintain an **Asbestos & Mesothelioma Register**.

Where a responsible medical practitioner becomes aware of an asbestosis case or mesothelioma, this must be reported to the Authority in writing and person designated under Section 63 of the Act will process the correspondence and record an entry.

For the purposes of this requirement, contact should be made with the **Occupational Health Unit** of the Health and Safety Authority.

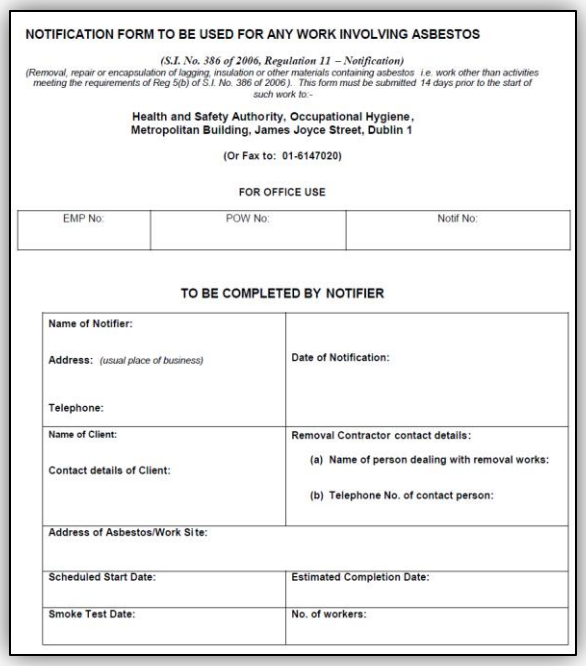
Section 16: Notification to the Health and Safety Authority

Regulation 11 of the 2006 Asbestos Regulations requires an employer, based on written risk assessment, to submit a notification, in writing, to the Health and Safety Authority where the planned asbestos-related work activity will expose, or could possibly expose, his or her workers to a concentration of asbestos fibres in air in excess of the exposure limit value of 0.1 fibres per cm^3 and/or where the work activity does not meet the criteria set out in regulation 5(b) i.e. short duration maintenance works with non-friable ACMs, removal of non –degraded bonded materials without deterioration, encapsulation or sealing of non-friable ACMs in good condition.

An employer must submit a written notification, accompanied by the site specific Plan of Work (otherwise referred to as the Method Statement) to the Health and Safety Authority, 14 days before commencing any work. Notification of friable ACM removal will normally be submitted by the asbestos removal contractor, who is involved in the planned asbestos related work activity.

Notification can be made using the Authority's notification form available in the 'Licensing & Notifications' webpage at www.hsa.ie or by other equivalent means. Notifications and the plan of work / method statement for the proposed works may be submitted as follows:

- By email to asbestos.notif@hsa.ie
- In writing to the Health and Safety Authority, Occupational Hygiene Unit, The Metropolitan Building, James Joyce Street, Dublin 1
- By fax, for the attention of the Occupational Hygiene Unit, to 01 – 6147020



NOTIFICATION FORM TO BE USED FOR ANY WORK INVOLVING ASBESTOS

(S.I. No. 386 of 2006, Regulation 11 – Notification)

(Removal, repair or encapsulation of lagging, insulation or other materials containing asbestos i.e. work other than activities meeting the requirements of Reg 5(b) of S.I. No. 386 of 2006). This form must be submitted 14 days prior to the start of such work to:-

Health and Safety Authority, Occupational Hygiene, Metropolitan Building, James Joyce Street, Dublin 1

(Or Fax to: 01-6147020)

FOR OFFICE USE

EMP No:	POW No:	Notif No:

TO BE COMPLETED BY NOTIFIER

Name of Notifier: **Address:** *(usual place of business)* **Telephone:**	**Date of Notification:**
Name of Client: **Contact details of Client:**	**Removal Contractor contact details:** **(a) Name of person dealing with removal works:** **(b) Telephone No. of contact person:**
Address of Asbestos/Work Site:	
Scheduled Start Date:	**Estimated Completion Date:**
Smoke Test Date:	**No. of workers:**

If using other means of notification than the Authority's notification form, then all of the information as detailed in Schedule 3 of the Safety, Health and Welfare at Work (Exposure to Asbestos) Regulations 2006, must be included in the notification. This information is a legal requirement. In the event of incomplete information being submitted, the 14 day notification period will not commence until all information has been received by the Authority.

Where there is a material change in the nature of the work to which the original notification relates which results in the original notification no longer being valid, for example, the work ceases before

the planned date, the original work process is altered etc. the employer must inform the Authority in writing and submit a new notification for the work activity along with the reasons in writing for the new notification.

Employers must keep copies of all notifications and plans of work submitted to the Authority.

Waivers

Occasionally, on request, a waiver of the 14 days notification period may be applied for from the Authority, which will consider the reasons for the waiver request. In general a waiver will only be considered when it is justifiably related to an emergency or an incident requiring emergency remediation, the need to make safe a site or workplace, where the demand of normal activity in the premises is essential and cannot be delayed beyond the essential need to do the asbestos work, etc. Such urgent works may only commence once the Authority has formally granted the waiver of the notification period.

It should be noted that well planned, risk assessed and properly surveyed work should not require a request for a waiver. Ideally waiver requests should occur infrequently and generally result from accidents or dangerous occurrences which require urgent remedial action to be undertaken that could not be anticipated or foreseen.

Notifiable work activities

The following table provides a non-exhaustive guide to the types of work activities that should be notified to the HSA.

Activity	Comment
Removal or encapsulation of asbestos spray, lagging and AIB materials	These ACMs are very friable when disturbed and strict controls are required. This also includes external AIB soffits.
Removal of asbestos cement corrugated or flat panels where materials are in a degraded state	For asbestos cement roofs/panels with a score ≥ 55 using the Asbestos cement Algorithm in section 6 and where the extent of the AC material is greater than 10m^2. These works would not comply with regulation 5 (b)
Cleaning asbestos cement roofs > 10m2	This work can give risk to elevated fibre levels

Overcladding of asbestos cement roofs	This work normally requires pre-environmental cleans and disturbance of ACMs leading to elevated fibre levels
Encapsulation of asbestos cement roofs with a chemical based solution	These works normally require a surface pre-clean (elevated fibre levels) and involves significant contact time on fragile roofs
Remediation of fire damaged asbestos cement	
Removal of textured coating from concrete substrates	This involves deterioration of the textured coating during removal and does not comply with regulation 5 (b)
Removal of asbestos containing floor tiles and/or adhesive where significant disturbance is unavoidable	This generally involves deterioration of the floor tiles during removal and aggressive removal of bitumen adhesive. This work does not comply with regulation 5(b)
Dismantling of boilers containing or suspected to contain ACMs	These works generally involve deterioration of the ACMS during removal or present contaminated dust scenarios
Removal of CAF/ Rope gaskets	These works generally involve deterioration of the materials during removal. However a once-off notification can be submitted covering a period of 1 year where work is an infrequent repetitive task
Removal of vinyl flooring with asbestos backing	These works generally involve deterioration of the materials during removal
Removal of soil contaminated with friable ACMs or damaged non-friable materials	Works with friable materials must be carried out by a specialist asbestos contractor

Non-notifiable work activities

The following table provides a non-exhaustive guide to the types of work activities that are not considered notifiable to the HSA.

Activity	Comment
Removal of asbestos cement corrugated or flat	For asbestos cement roofs/panels with a

panels where materials are in a non-degraded state	score ≤54 using the Asbestos cement Algorithm in section 6
Removal of asbestos down pipes, gutters where materials are in a non-degraded state	
Removal of high pressure asbestos cement water mains where materials are in a non – degraded state	Minimal controlled disturbance may be required to separate pipes
Removal of textured coating on plasterboard	The plasterboard with textured coating should be removed in sections with minimal disturbance of the ACM
Removal of asbestos containing floor tiles where disturbance is minimal and any adhesive is to remain in-situ/screeded over	
Removal of equipment containing internal ACMs without disturbance	
Removal of asbestos containing toilet cisterns whole	

Section 17: Management and Disposal of ACMs

Disposal, storage & packaging advice for lower risk work with ACMs

When the removal work is completed, the surface of the working area and any equipment used should be wiped down with appropriate cleaning rags soaked in water. A contaminated rag should never be re-soaked as this will contaminate the water. Tape may be useful for removing small dust deposits.

Any asbestos waste, debris or contaminated material (including cleaning rags) should be placed into a suitable, UN-approved red bag, which contains the appropriate asbestos warning label, and then sealed with tape. The red bag should then be wiped clean before being carefully placed into a suitable, approved clear asbestos bag which should then also be sealed. The waste bags must be labelled to identify that they contain asbestos waste.

If the asbestos waste, debris or other material cannot fit into a waste bag, it must be double wrapped in two layers of strong polythene. A red asbestos bag or printed label (with the same information as the bag) should be securely attached to indicate it is asbestos waste.

Where bagged or wrapped waste is stored temporarily, it must be placed in a dedicated locked skip or suitably marked receptacle. Care should be taken to ensure that any temporary storage location is not in an area where it may be exposed to vandalism. Waste should only be stored for a minimum period on site. Disposal of waste should be undertaken via a hazardous waste transfer station or using an approved EPA waste contractor – see section below on '**Movement of asbestos waste within Ireland and abroad'.**

Disposal, storage & packaging advice for specialist contractors and large scale removal of asbestos cement

Asbestos waste, debris, or material considered to be contaminated with asbestos fibres should be placed directly into suitable bags and sealed, or packed and sealed. This includes all enclosure building materials (such as timber and sheeting) and any items that have been present and unprotected inside contaminated areas and cannot, or will not, be cleaned (including tools and equipment).

It also includes all disposable PPE used in the enclosure, transit and waste routes, and disposable or discarded items used in cleaning and decontamination, such as clothes and towels. Waste water from the buckets in the airlocks should be discarded through the filtered drainage system in the shower of the DCU.

Solid waste should be double bagged using suitable, UN-approved packaging. This should include a

red inner bag, which contains the appropriate asbestos warning label, and a clear outer bag. The following protocol should be followed for bagging (or wrapping) waste:

- Ensure the waste material has been dampened down (in the case of AIB) or is wet (a doughy consistency for lagging materials);
- Place the waste carefully into a red waste bag and seal with strong tape;
- In the inner stage of the bag lock (or airlock if no bag lock), the bag should be wiped down and transferred to the middle stage;
- In the middle stage the red bag should be placed in a clear asbestos waste bag, which should then be sealed and wiped down in a similar manner;
- The double-bagged waste should then be collected from the outer stage and transferred to the waste skip.

If wrapping a large object e.g. asbestos cement which cannot fit into the asbestos waste bags, the item should be managed as follows

- Intact sheeting shall be double wrapped in heavy gauge polythene (minimum 1000 gauge), generously and securely sealed with good quality tape (preferably 75mm duct tape), and banded to standard heavy duty four way pallets (1200mm x 1000mm with supports all round underneath). When sheets are longer than 2m a minimum of two pallets shall be used to support the load.
- A maximum of one tonne shall be placed in each package.
- A general rule of thumb is 25 sheets = 1000kg.
- The maximum dimensions of a pallet with sheeting is 4000mm x 1000mm x 700mm
- The maximum length accepted is 4000mm.
- All pallets of sheeting shall be level on top for stacking purposes.
- All packages shall be labelled with asbestos 'a' labels on at least two sides.

For Slates and Broken Sheeting:

- Slates and broken sheeting shall be placed in UN

approved FIBCs

- The FIBCs shall be goose necked, tied and taped
- FIBCs must conform to UN standard 13H3/Z
- All packages shall be labelled with asbestos 'a' labels on at least two sides
- Ensure that contents do not exceed the maximum permissible weight
- The maximum permissible weight can be located at the end of the UN code
- FIBCs shall be kept clean and free from any outer debris
- Ensure that the outer packaging is free of rubbing or tearing damage

Where bagged or wrapped waste is stored temporarily, it must be kept in an appropriately locked compound, skip or, where this is not practicable, in a suitable locked vehicle. Care should be taken to ensure that any temporary storage location is not in an area where it may be exposed to vandalism, nor close to an area considered to be sensitive, e.g., a school playground.

Where temporary storage of waste bags is required on site (only where it is not reasonably practicable to transfer waste bags directly to a suitable waste skip) this should be in a dedicated, locked room. Appropriate asbestos warning signs should be erected and every exposed surface of the room should be smooth and impervious so as to allow thorough cleaning after the bags have been removed. This is usually achieved by lining with polythene sheeting.

A sealed bulkhead must be provided in vehicles used to transport asbestos waste to segregate passengers from the waste. Tools and other equipment should also be segregated to prevent bags being ruptured during transit.

Movement of asbestos waste within Ireland and abroad

The disposal of asbestos and ACMs is covered by the provisions of the **Waste Management Act 1996 to 2005**. ACMs are classified as hazardous waste under European waste legislation, and a specific code applies to waste construction material containing asbestos, as listed in the **European Waste Catalogue and Hazardous Waste List**, available from the Environmental Protection Agency (EPA).

Prior to any removal work, as part of developing the Plan of Work, a suitable facility for disposal should be identified. Asbestos waste can also be disposed of via **hazardous waste transfer stations** licensed by the Environmental Protection Agency. These facilities accept asbestos containing waste and then arrange to have the waste disposed of at an appropriate facility abroad. Details of hazardous waste transfer stations are available from the Environmental Protection Agency (EPA).

Any hauliers or contractors used to transport asbestos waste must be authorised under the **Waste Management (Collection Permit) Regulations, 2007, (S.I. No. 820 of 2007)** and have a valid waste collection permit to collect this type of waste. Prior to any removal work, selection of a haulier who has a **Waste Collection Permit** which covers the local authority area and includes the relevant EWC code is critical.

The movement of hazardous waste within the state is subject to a **notification procedure**. The **European Communities (Shipments of Hazardous Waste exclusively within Ireland) Regulations 2011 (No. 324/2011)** were introduced to streamline the administration of legislation on the movement or shipments of hazardous waste exclusively within Ireland. In line with the system of control for shipments of waste from Ireland, the Regulations provide for the designation of **Dublin City Council (DCC),** with effect from 1st July 2011, as the sole competent authority responsible for supervising and controlling internal shipments of hazardous waste, in accordance with Article 33 of the Waste Shipments Regulation (EC) No 1013/2006.

The Regulations apply to the collection, transport and transfer of hazardous waste exclusively within the State and set out the duties and responsibilities of producers, consignors, carriers, collectors, holders and consignees in such matters. DCC has established an online electronic system (**Waste Transfer Form**) for the supervision and control of shipments of hazardous waste within the State. The electronic system replaces the previous paper based **C1 system**. For further information, contact Dublin City Council (National TFS Office) at 01 222 4402/4522 or email: nationaltfs@dublincity.ie

A person guilty of an offence under the European Communities (Shipments of Hazardous Waste exclusively within Ireland) Regulations 2011 (No. 324/2011) is liable (a) on summary conviction, to a fine not exceeding €3,000, or imprisonment for a term not exceeding 3 months, or both, or (b) on conviction on indictment, to a fine not exceeding €500,000, or imprisonment for a term not

exceeding 3 years, or both.

Asbestos waste is exported abroad and disposed of through landfill. The **trans-frontier shipment** of asbestos waste is subject to control procedures under EU and national legislation. All transfrontier shipments of waste originating in any local authority area in the State after the 12 July 2007, that are subject to the prior written notification procedures must be notified to and through Dublin City Council at the **National TFS Office** established to implement and enforce the **S.I. No. 419 of 2007 Waste Management (Shipments of Waste) Regulations, 2007.**

Asbestos is also subject to dangerous goods transport regulations, it is therefore important that you seek advice from a competent person, e.g. a dangerous goods safety adviser. The European Communities (Carriage of dangerous goods by road and use of transportable pressure equipment) Regulations 2011 (S.I. 349 of 2011) provides the legal framework provide the legal framework under which all dangerous goods, including asbestos, may be transported by road.

Further guidance on this legislation and a guidance note on ADR Special Provision 168 is available on the Authority's ADR webpages at www.hsa.ie. Asbestos which is immersed or fixed in a natural or artificial binder (for example asbestos cement) is such a way that no escape of hazardous quantities of respirable asbestos fibres can occur during carriage is not subject to the requirements of the European Communities (Carriage of dangerous goods by road and use of transportable pressure equipment) Regulations 2011 (S.I. 349 of 2011)

Disposal of materials containing asbestos, other than in an approved manner, will result in prosecution, under the Waste Management Act, 1996 to 2005 of those found responsible for such activity.

Disposal of waste is outside the remit of the Health & Safety Authority. **For further information on waste disposal or illegal waste disposal activities, contact should be made with Dublin City Council or the Environmental Protection Agency**.

Section 18: References and Further Information

References

Asbestos: The licensed contractors' guide Health and Safety Guidance HSG 247 HSE Books 2006 ISBN 0-7176-2874-4

Asbestos: The analysts' guide for sampling, analysis and clearance procedures Health and Safety Guidance HSG 248 HSE Books 2005 ISBN 0-7176-2875-2

Asbestos: The survey guide HSG 264HSE Books 2010 ISBN 978 0 7176 6385 9

Asbestos essentials: A task manual for building, maintenance and allied trades on non-licensed asbestos work Health and Safety Guidance HSG 210 HSE Books 2008 ISBN 978-0-7176-6263-0

A comprehensive guide to managing asbestos in premises Health and Safety Guidance HSG 227 HSE Books 2002 ISBN 0-7176-2381-5

Guide to Implementing an Effective Respiratory Protective Device Program Irish Standard EN 529 *Respiratory Protective Devices- Recommendations for selection, use, care and maintenance-guidance document* www.nsai.ie

Hodgson, J.T. and Darnton A. (2000) The quantitative risks of mesothelioms and lung cancer in relation to asbestos exposure. Annals of Occupational Hygiene, Volume 44, No 8, pages 565-601.

Introduction to Asbestos Essentials Health and Safety Guidance HSG 213 HSE Books 2001 ISBN 0-7176-1901-X

Personal exposure during work with asbestos Health and Safety Laboratory IR/L/MF/00/15

A practical guide on best practice to prevent or minimise asbestos risks in work that involves (or may involve) asbestos: for the employer, the workers and the labour inspector – A guide issued by the Senior Labour Inspectors Committee (SLIC) – A non binding guide to best practice European Commission

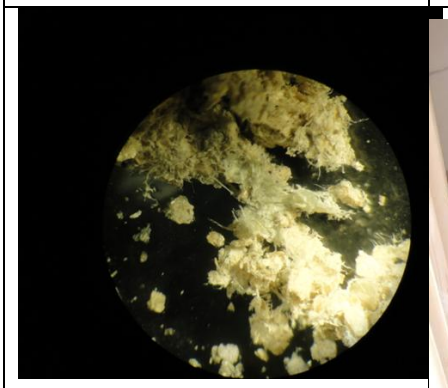
Straif K. The Carcinogenicity of Asbestos - Evaluations by IARC and WHO, Recent Developments and Global Burden of Asbestos-Related Cancer. Abstract SY02-07 of paper presented during Symposia: Asbestos - A Global Disaster in Seoul, Korea. Collection of Conference Abstracts of the XVII World Congress on Safety and Health at Work , 28-29. 2009.

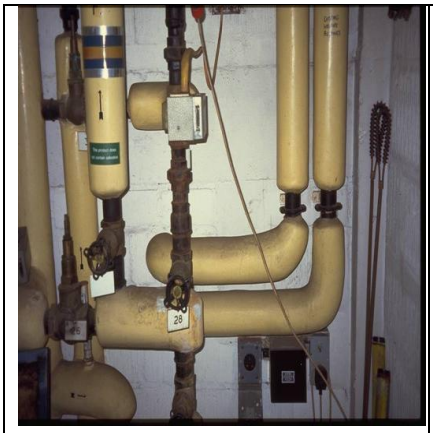
Useful Contacts

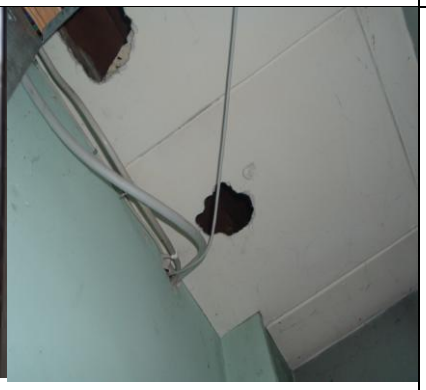
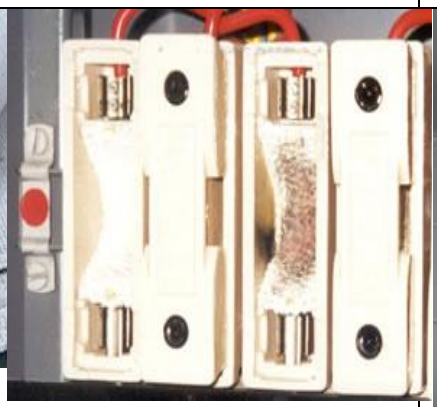
HSA is not responsible for, and cannot guarantee the accuracy of, information on sites that it does not manage; nor should the inclusion of a hyperlink be taken to mean endorsement by the HSA of the site to which it points.

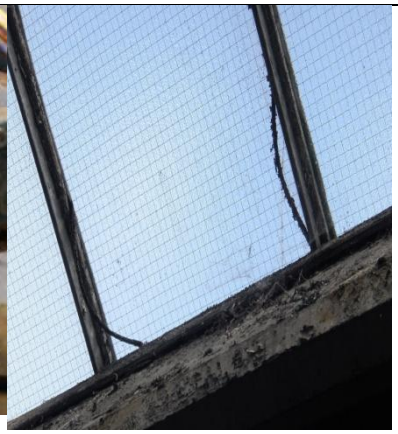
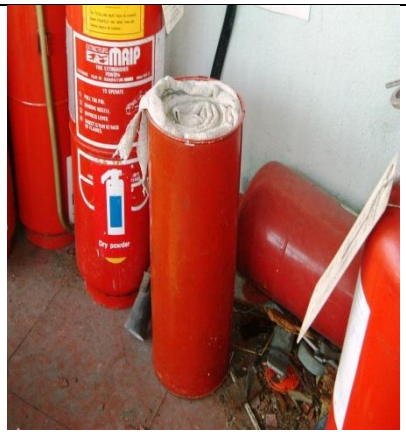
Organisation	Website address
Irish National Accreditation Board	**http://www.inab.ie/**
Asbestos Removal Contractors Association (Ireland)	**http://www.arca.org.uk/asbestos-removal-contractors/republic-of-ireland-asbestos-removal-contractors.asp**
Irish Association of Demolition Contractors	
Occupational Hygiene Society of Ireland	**http://www.ohireland.org/**
British Occupational Hygiene society	**http://www.bohs.org/**
Health and Safety Laboratory (UK)	**http://www.hsl.gov.uk/**
Health and Safety Executive (UK)	**http://www.hse.gov.uk/**
Irish Faculty of Occupational Medicine	**http://www.rcpi.ie**

Appendix 1: Photographic examples of ACMs

		
1. Asbestos Spray coating	1. Asbestos Spray coating	1. Asbestos Spray coating
		
Asbestos Spray coating containing vermiculite and chrysotile	Asbestos loose lagging	Asbestos lagging in very poor condition

		
Asbestos composite lagging – applied by hand	Asbestos sectional lagging to pipe work in poor condition	Chrysotile paper insulation to pipe beneath man made mineral fibre sectional insulation
		
Chrysotile rope wrapping to pipe bend.	Thermal insulation to calorifiers	

		
AIB ceiling tiles	AIB cladding to steel beams and as firebreak above door.	AIB soffit panels below roof
		
AIB 'fillet' panel between wall and window	Damaged AIB ceiling tiles	
		
Chrysotile fire blanket	Chrysotile flashguards to electrical fuses	Chrysotile rope to access hatch to boiler flue

		
Compressed asbestos fibre (CAF) gaskets to flanges of pipework	Chysotile rope seals in skylight glazing	Chrysotile Asbestos fire blanket
		
Textured coating to ceiling containing chrysotile	Textured coating to ceiling containing chrysotile	Asbestos cement panels to cold store
		

Asbestos cement down pipe and bargeboards	Asbestos cement roof	Asbestos cement roof tiles
		
Asbestos cement water main	Asbestos cement water tank	Asbestos cement panels in fume cupboard. AC flue pipes can also be present
		
Asbestos (amosite) toilet cistern	Asbestos containing floor tiles	Asbestos containing floor tiles
		
Bitumen acoustic pad to underside of sink	Asbestos in brake shoes of motor vehicle	

Appendix 2 - Asbestos Cement - Specific Guidance

The following guidance must be read in conjunction with Section 11 on *Lower risk work with ACMs* should be followed i.e. advice on working methods, visual inspections and other relevant Sections of these *Guidelines* regarding Plan of Work for lower risk work, PPE requirements, training etc.

Drilling holes in asbestos cement (and/or other tightly bonded materials)

This task should only be considered after performance of risk assessment. Ideally tasks which have the potential to release asbestos fibres from a bound matrix (for example, drilling) should not be undertaken unless all possible alternative methods have proven not to be possible. The methodology as outlined can be used where holes have to be drilled in asbestos cement, floor tiles, decorative coatings, bitumen products containing asbestos and other tightly bonded (in a matrix) materials containing asbestos.

Cover the point to be drilled (including rear area, if accessible) with tape to prevent edges crumbling. If cable or pipe-work is to be passed through the drilled hole ensure that the hole is made slightly bigger to prevent abrasion. Cover the entry and exit points (if accessible) with a generous amount of thick paste (for example, wallpaper paste). Drill through the paste. Use wet rags to clean off paste and debris generated (including surfaces at the rear, if accessible). Seal cut edges with appropriate sealant. If a cable is to be passed through, insert a sleeve to protect the inner edge of the hole. Use wet rags to clean equipment, surfaces and segregated area.

Cleaning debris from guttering on an asbestos cement roof

This task refers to situations where debris containing asbestos needs to be removed from guttering (which may or may not be made of asbestos) on an asbestos cement roof.

Erect an access work platform appropriate to the task. Mix water and detergent. Using a watering can or garden type spray, pour the water into the gutter but avoid over wetting as this will create a slurry. Remove the debris using a scoop or trowel. Wet the material or debris again if dry material is uncovered. Repeat this process as many times as is necessary during the task. Place the debris immediately and directly into the assigned asbestos waste container. Use wet rags to clean equipment, assess work platform, etc.

Removal of asbestos cement debris

This task refers to situations where there is contamination from asbestos damaged cement and includes decontamination work following the rupture of asbestos cement cladding in a fire.

(Note: This task is not for use when cleaning debris from damaged asbestos lagging, coating, insulating board etc.)

Using a garden type spray dampen the debris. Pick up larger pieces of debris and place immediately and directly into a designated asbestos waste container. In smaller or awkward areas, use wet rags

to wipe clean contaminated surfaces. For larger areas, such as following the rupturing of asbestos cement in a fire, it is not always practical to wipe all surfaces, so cleaning may need to be restricted to obvious contamination in occupied areas, for example, windows. If the contaminated surface is rough, keep the asbestos debris damp and scrape into the designated asbestos waste container. Tape can be pressed onto dust deposits to pick them up. If necessary, based on risk assessment, repair the asbestos cement, following recommended safe practices.

Repairing damaged asbestos cement

The task refers to situations where, based on risk assessment, it is considered necessary to repair damaged asbestos cement. (Note: This method must not be used for repair of other types of asbestos-containing materials e.g. AIB, lagging etc.)

If the asbestos cement is badly damaged with holes etc., based on risk assessment, this material should be removed in accordance with recommended safe practices and procedures as outlined in these Guidelines. Dampen down any debris using a garden type spray. Clean up debris and dampened loose material and dispose of immediately and directly into a designated asbestos waste container. Paint damaged areas of asbestos cement (see below) . Alternatively, protect asbestos cement by attaching a non-asbestos panel over the asbestos cement and clearly mark its location on site plans or designs of the building or structure so that it can be managed and assessed regarding potential to release fibres over time.

Painting asbestos cement sheets

This task relates to situations where asbestos cement is in good condition and requires painting. Care must be taken when performing this task and workers should be trained for the task.

NEVER prepare surfaces by sanding. If lichen or other growths are present, remove using the recommended practices and procedures outlined in this Appendix. Before starting the task, check the asbestos cement for damage (and if necessary repair) and assess the risk to the workers fully. Wipe dusty surfaces with a wet cloth. It is recommended that a low-pressure spray be used to apply the paint. If this is not possible the paint may alternatively be applied using a roller or brush lightly to avoid abrasion or damage. Spray the paint on the surface using a sweeping movement. Do not concentrate on one area as this can cause damage to the surface being painted, i.e. the asbestos cement. Paint both sides of the sheet.

Removal of asbestos cement products such as flues and tanks

This task relates to situations where asbestos cement products such as flues, water tanks etc. require to be removed from areas such as attics, lofts etc. If these asbestos cement products are covered or sheathed in asbestos insulating board this task and associated procedures cannot be used. It is important, therefore, to initially survey, and clearly identify, the type of asbestos material concerned. If, following a risk assessment, such asbestos cement products should be identified as redundant, i.e. no longer needed or used, and it is considered they will not, by virtue of their presence and location, interfere with any other work and are assessed to be in good condition, then

it is best practice to label and note their location rather than undertake removal works. If those products are left in situ the location should be marked on the plans or designs of the building and the products should be assessed to ensure that they remain in good condition and undisturbed.

If the asbestos cement product is in an area such as an attic, board out an area which can be worked on large enough to prevent contamination of adjacent attic insulation. Use 1,000 gauge polythene sheeting, secured with duct tape, to cover any surface within the segregated area which could become contaminated.

Where possible minimise breakage of asbestos cement. Every effort should be made to try to remove the asbestos cement product intact or whole, strengthening damaged areas or sections with duct tape as required. In order to remove the product intact, where possible, the supports should be unscrewed. If this is not possible, ensure that the asbestos cement is adequately dampened. Wrap the asbestos cement fully in 1,000 gauge polythene before breaking. Using a hammer, carefully break the asbestos cement product into pieces small enough for removal. It is not necessary, nor recommended, that the breaking process should continue to a stage of producing dust and minute pieces. The need to break the product relates to the effort required to release or remove the product. The larger the pieces the less dusty the residue generated. All debris must be placed immediately and directly into designated asbestos waste containers. Larger items such as flues, which cannot be placed in such containers because of their shape and size, must be double wrapped in 1,000 gauge polythene and affixed with appropriate asbestos-warning stickers or labels. Use wet rags to clean equipment and the segregated area.

Asbestos roof over-cladding

Asbestos roof over cladding is an alternative to removing an asbestos cement roof. However, such an option presents its own inherent hazards and risks and must be managed accordingly. The Health and Safety Authority require this type of work to be notified (See Section 16) as it involves significant disturbance of the asbestos materials and dust generation.

It is recommended that a check for contamination on top of existing steel beams, and purlins etc is carried out before any work commences to establish a “pre work” agreed condition state. A plan of work as described in Section 14 must be developed and take into consideration

- Access and fire risks and precautions to be taken.
- Expected exposure using controls specified.
- How the release of fibres from the materials will be controlled.
- How fibre and debris will be prevented from spreading to occupied areas, especially areas below the roof.
- How areas which may have become contaminated with asbestos, particularly areas below the roof are to be thoroughly cleaned as necessary when work is complete.
- How debris will be prevented from contaminating the unoccupied areas.
- What protective clothing and respirators are to be worn.

The recommended method for fixing the overcladding sheets is using a self drilling tapping screw rather than a hook or J bolt.

Specific controls will vary with the nature of the job, but for most overcladding jobs you will need:

a. Refer to 'drilling holes in asbestos cement' advice above
b. Visqueen - to cover surfaces that are likely to become contaminated e.g. crash decks and the area of flooring or roof space beneath the exterior roof sheets Note: Visqueen can create a slip hazard. It will not usually be necessary to visqueen boards used to access the roof.
c. Signs and barriers to segregate the area to keep out unauthorised persons, including areas beneath the roof.
d. Fine water spray to dampen down areas prior to working on them
e. FFP3 respirators that have been face-fit tested on the individual
f. Wear suitable coveralls with a hood: Note this should be Type 5, category 3.
g. Asbestos waste bags in which to place any debris arising from drilling etc and a suitable means of sealing them
h. Somewhere to take off potentially contaminated coveralls etc Note: On a roof, the use of vacuum cleaners with HEPA filters and readily cleanable footwear such as wellington boots normally recommended, is considered impracticable and potentially unsafe
i. All visible debris should be cleaned up and disposed of as special waste.

Make sure that any changes are noted in the asbestos management plan for the premises so that future contractors can be alerted to the presence of asbestos.

If it is a job to which the Construction Regulations apply, information about residual asbestos must be placed in the Safety File.

Cleaning weathered asbestos cement

Long-term weathering of external asbestos cement products, such as corrugated sheeting, can result in the release of quantities of fibrous debris which can accumulate in areas such as drainage gutters, on roofs, as well as other surfaces exposed to the dust. As this accumulated material can be dry in nature, where reasonably practicable, and before any work commences, these areas should be cleaned out, keeping the debris wet. The wet debris can be removed and placed in a suitable container, and disposed of as asbestos waste. Any remaining residues can be removed using a low-dust technique such as damp cloths (disposed of as asbestos waste).

After years of use the external surface of asbestos cement may become covered in lichens, algae or moss. For aesthetic reasons, or before application of surface coatings, you may need to remove these growths. Great care must be taken when cleaning weathered asbestos cement. Moss and lichen growth is normal and, while it may not be attractive, this growth is not detrimental to the material. Consideration must be given before performing this task as to whether or not it is absolutely necessary, as this activity can result in the release of, and exposure to, asbestos fibres.

Operators also must consider the fact that this work may need to be carried out at a high level, with the associated risk of falls and, therefore, the system of work must be planned to perform the task safely. The following techniques have been known to be used:

- High-pressure water jetting
- Remote cleaning
- Cleaning with surface biocides.

The practice of dry scraping or wire brushing is not recommended, can lead to high exposures to asbestos fibres and should be avoided.

As with all asbestos-related work activities, prior to commencing the work, access to the work area should be restricted using notices, warning tape etc.

High-pressure water jetting

High-pressure water jetting is a technique which has been used in the past. Apart from the risk of driving debris between the overlaps of the roof covering, causing the roof to leak, there are several health and safety problems associated with this method, for instance, the jet can cause serious injury. Due to the range of problems associate with this method of cleaning, it is not recommended and other alternative safer methods should be used.

There have been several examples of untrained personnel carrying out this work, without the proper precautions and supervision. This has resulted in exposure of the operators (and others not involved in the work) to asbestos fibres, and in gross contamination of buildings and surrounding areas. Subsequent clean-up operations have proved very expensive.

Remote cleaning

There are remotely operated units available with enclosed rotary cleaning heads which use high-pressure jets and brushes to clean asbestos cement roof sheets. This system has the advantage of the operator being remote from the immediate cleaning area thus reducing the potential risk of exposure to asbestos. However, provision still needs to be made to collect the resulting slurry. The manufacturer's operating instructions should be followed closely and the equipment operated by workers who have received specific training and are properly supervised. Operators must take great care as they may need to carry out the work at a high level, with the associated risk of falls.

Cleaning with surface biocides

There is a range of approved biocide products which can be used to kill plant material growing on asbestos cement surfaces. However, if considering the use of biocides, an assessment must be performed to select the most appropriate biocide and to ensure that it does not in any other way increase the potential for exposure to asbestos fibres. Advice should be sought as to the best biocide for the intended work. Some biocides can irritate the skin and so workers should wear protective gloves. Care should be taken to note and follow any safety and health-related information available,

such as a label on the biocide container or in its associated Safety Data Sheet (SDS). Specific information relating to biocides can also be obtained from the Pesticides Control Service, Department of Agriculture and Food Laboratories, Backweston Campus, Youngs' Cross, Celbridge, Co. Kildare. For further information see www.pcs.agriculture.gov.ie

Products containing salts of dichlorophen or o-phenylphenol, or benzalkonium chloride (quaternary ammonium salts), will kill plant material. These cause no damage to asbestos cement if they are used at the recommended concentrations during non-frosty conditions. The biocides should be applied as low-pressure sprays or as washes only.

Once the biocide has been applied, time must be allowed for the moss and algae to die. This process may take several days. Once moss and algae are dead, they can be removed with water, using gentle scraping. All debris should be treated as asbestos waste and placed directly into an asbestos waste container. Dead lichen crusts and ivy roots are unlikely to be removed so easily and these are probably better left where they are. Note that the roots of mosses may well hold loosened asbestos fibre. Therefore, efforts to remove them could in fact increase the risk of exposure to asbestos fibres and actually cause damage to the integrity of the roof sheeting, so it is important to assess these possibilities before commencing the task.

This method is preferable to the use of gentle wet brushing alone for moss and algae because the pesticide product will first loosen the moss and algae's hold on the asbestos cement, making removal easier. However, operators need to take great care as they may have to carry out the work at a high level, with the associated risk of falls.

For cleaning an asbestos cement roof

Due to the nature and fragility of an asbestos cement roof and the difficulties associated with access, the possibility of something going wrong and leading to possible exposure to asbestos fibres, this cleaning work should be performed only by specialist roof cleaning contractors. These contractors will have specialist-cleaning machines for the specific task. The technique creates a lot of slurry which must not enter the building and should be collected for disposal. Gaps and other possible points of entry for the slurry should be sealed using polythene sheeting secured with duct tape. However, care must be taken during this sealing procedure as it is dangerous to seal over exhaust vents from heating units in use. The down pipes should be disconnected to allow the slurry generated to be diverted directly to a collection and filtration system. Any solid waste and/debris should be kept wet and disposed of in designated asbestos waste containers. Clean water should then be used to flush out the slurry collection system.

Removal and demolition of asbestos cement sheeting

Dismantling and demolishing buildings, roofed or clad with asbestos cement sheeting, presents special problems, especially if they are old and crumbling. Many asbestos cement products, such as roof sheets, cladding, drainpipes and gutters, are located at a height and

therefore present a risk of falls. Asbestos cement is a fragile material, and people must not walk on it as it cannot be relied on to support a person's weight. It is important to emphasise that falls from, and through, fragile roofs are of major concern and a factor in deaths in construction work annually. Precautions to prevent such accidents must be given priority and be considered at the stage of preparing the risk assessment for a job.

In order to minimise exposure and control the spread of asbestos fibres, you need to consider the following general precautions:

- Where reasonably practicable, the asbestos cement should be removed before the rest of the structure is demolished
- Where possible, avoid breaking or cutting the sheets; should broken pieces or debris occur, these should be kept damp, hand-picked and bagged without delay
- Keep the material dampened when working on it (taking particular care regarding the overlap of sheets) Consideration should be given to applying a PVA emulsion as it may be more effective than water (with a wetting agent) in minimising fibre release. For example, PVA can be applied and allowed to dry on asbestos cement roofing prior to its removal as an alternative method to prevent slip hazards.
- use hand bolt cutters to release sheets, i.e. avoid the use of powered tools which generate fine dust
- check for debris in the fasteners or bolt holes and clean with wet rags
- Where possible, lower the material intact onto a clean hard surface (do not use rubble chutes)
- Where Mobile Elevated Work Platforms (MEWPs) are used, consideration must be taken regarding the weight of the sheets with respect to the load capacity or load bearing of the MEWP used for the task
- Once lowered to the ground, sheets should be double-wrapped in heavy (1,000) gauge polythene and stacked in a safe and secure place for disposal as soon as possible (in accordance with local rules)
- Waste and debris must be removed from the site as soon as possible to prevent it being crushed underfoot or by moving vehicles
- Do not bulldoze broken asbestos cement or sheets into piles or use mechanical means to break asbestos cement materials
- Do not sweep asbestos cement debris
- Dispose of the waste and debris safely and promptly.

Manual dismantling methods

If asbestos cement sheets are in good condition and it is reasonably practicable to produce a safe system of work and provide safe access, they should be taken down whole. Roof sheets should preferably be removed from underneath (cutting the bolts manually with croppers) using mobile elevating work platforms, such as scissor lifts or cherry pickers, to gain access.

The sheets should not be dropped or damaged. Fixings should be carefully removed using bolt cutters. Operators may require suitable PPE, including RPE, based on the outcome of the risk assessment performed by a competent person(s). Once the sheets have been removed and wrapped intact in polythene sheeting, they should be placed in an appropriate enclosed container for safe disposal in accordance with the relevant legislation.

Remote dismantling methods

If the sheets are disintegrating, the risk of falls is too great or the building is in a dangerous state of collapse, then remote demolition techniques such as deliberate controlled collapse should be considered based on the outcome of a risk assessment performed by a competent person(s). Remote demolition will give rise to low exposures for the equipment operators, and to those who subsequently load the waste into lorries for disposal.

When remote techniques are used, the work area must be continually sprayed with water to suppress the spread of dust which may contain asbestos fibres. The roof sheeting should be broken into the building in a controlled manner onto the floor or hard standing, for instance by using excavators fitted with suitable demolition attachments. You should ensure that this area is clear of other materials before work commences, where possible, given the outcome of the risk assessment and the condition of the building. The system of work should be designed to minimise breakage of sheets. Before, and while loading the broken sheeting into lorries, you should keep it damp by spraying with water. Where possible debris, broken pieces and sheets should be bagged or wrapped in polythene. The lorries should be securely covered or sealed over to prevent the asbestos waste drying out on its way to disposal.

To members of the public, the remote method can appear noisy, dusty and often uncontrolled. They are often concerned about demolition of this type when they know or suspect the building was roofed or clad with asbestos cement. In order to alleviate these concerns about this type of work, contractors should:

- Keep the neighbours informed about the work
- Carry out background air sampling at the perimeter of the site
- Clearly cordon off the work, erect warning signs and prevent unauthorised access to the demarcated work area.

Asbestos cement in fires

Asbestos fibres can change their mineral structure following prolonged exposure to heat. But research has shown that in fires, only the outer layers of the material containing asbestos cement are altered with the interior often remaining unaffected. This means that there will still be hazardous asbestos fibres present in debris and ash.

Exposure to the heat of a fire can cause the cement content of asbestos cement roofing, cladding, etc. to violently rupture, discharging asbestos fibres into the atmosphere and spreading debris over

a wide area. Fire can also weaken the binding matrix in asbestos cement, resulting in fibres being released more easily if the solid debris or ash from the fire is disturbed. The emergency services, building occupants and contractors involved in remedial work will be those most likely to be exposed following a fire.

Before taking any remedial action, you should determine the types of materials containing asbestos present in the building. The risk from debris and ash, containing only asbestos cement, will be low as long as a number of simple precautions are taken when decontaminating the area:

- The contaminated area should be cordoned off and warning notices posted
- Only essential personnel should enter the cordoned off area
- Personnel should wear suitable PPE, including RPE
- Disturbance of ash and debris should be kept to a minimum
- The debris should be carefully dampened down, avoiding over-wetting (to prevent the build up and spread of slurried material) and carefully removed, for example by shovelling
- Larger pieces of debris should be picked up by hand and placed in heavy gauge polythene bags (made secure and appropriately labelled).

Where other materials containing asbestos cement such as asbestos insulation, asbestos coating, or AIB are present in the building, more stringent precautions will be required and the remedial work must be carried out by a specialist asbestos abatement contractor.

Asbestos cement water mains

Work on AC pipework may involve removing sections of pipework for replacement or tapping existing AC pipes to connect new services.

A machine should excavate to expose A-C pipe. Hand excavate areas under pipe where cuts/breaks are planned. Excavation operations should be carefully executed so that pipe damage does not occur prior to removal.

AC coupling removal may be accomplished by gradually splitting the coupling lengthwise using a chisel and hammer. After the top of the coupling has been split, a crowbar or similar tool is used as a lever to split the bottom of the coupling. **KEEP MATERIAL WET AT ALL TIMES.**

Pressure or “wet” tapping for service connections is performed in the trench while the pipe is under pressure. The equipment (manual driven) is affixed to the pipe by means of a chain yoke. A combination boring-and-inserting bar drills and taps the pipe wall and inserts a corporation stop or pipe plug. The pressure chamber, which protects against water leakage, also catches the asbestos-cement chips, so this is essentially a dust-free operation. To minimize (1) the fouling of valves, regulators, meters, and other equipment with chips and (2)

unnecessary addition of asbestos to drinking water, provisions should be made for downstream flushing or use of tapping equipment with positive purge or "blow-off" features. **KEEP MATERIAL WET AT ALL TIMES.**

The **Environmental Protection Agency** should be contacted directly if on-site burial of AC pipes is proposed in the Plan of Work.

Appendix 3 - Other ACMs – Specific Guidance

This section provides further guidance on working with particular ACMs. Information on risk assessment, plans of work, selection of appropriate PPE/RPE etc is provided elsewhere in these Guidelines and must be consulted.

Removing asbestos contaminated soil

Asbestos-contaminated soil comprises of non-attached pieces of asbestos cement products and other material containing asbestos uncovered in soil during other work activities. Contamination can be detected during building and road construction and excavation, waste disposal, damage following a severe weather event such as a hail storm, weathering over time or when asbestos is poorly handled or damaged during removal.

A risk assessment by an independent competent person should determine the most appropriate control measures and remediation strategies.

Asbestos-contaminated soil is also subject to requirements of other regulatory agencies such as the EPA and Local Authorities.

Removal of asbestos from contaminated soil will require a Specialist Asbestos Contractor for any friable asbestos to be removed

For all asbestos removal requiring a Specialist Asbestos Contractor, an air monitoring program must be implemented by an Independent Analyst to ensure the control measures do not release of airborne asbestos fibre. When all visible asbestos has been removed, and the air monitoring program indicates that the level of respirable asbestos fibres does not exceed 0.01fibres per cm^3 (10 per cent of the Exposure Limits Value), the Independent Analyst must complete the clearance certificate.

All asbestos and any contaminated soil removed must be disposed of as asbestos waste.

Immediate action

If the soil is suspected of containing asbestos, the person with management or control of the workplace must assume the soil contains asbestos and cease work immediately. A competent person should take samples of the material for analysis to confirm or refute that assumption.

If confirmed, the person with management or control of the workplace must ensure control measures are implemented to minimise the release of airborne asbestos. The control measures include:

- preparation of an asbestos management plan for the site
- setting the boundaries of the contamination as determined by an competent person
- ensuring there is minimal disturbance of the contaminated soil until the asbestos management procedures have been implemented
- isolating and securing the removal work site using signs and barriers
- controlling dust with dust suppression techniques (such as water and wetting agents)
- providing PPE based on the level of contamination and the control measures implemented
- sampling and/or air monitoring
- providing education and training for workers on hazards and safe work practices to minimise airborne dust exposure, and
- implementing decontamination procedures for the workers and the equipment.

Removal of vinyl floor tiles and adhesive

Vinyl floor tiles and bitumen adhesive should be managed in situ if in good condition. If floor tiles are damaged and must be removed, it is recommended to leave and manage the bitumen in-situ by screeding over prior to installation of new flooring. Precautions will be needed for any future disturbance e.g. installing pipework, chasing floors etc.

Where the removal of vinyl floor tiles and associated bitumen adhesive is required, the following procedure should be followed:

Place a scraper in joint between tiles and gently lift, minimising breakage. Spray atomised water during tile lifting periods. Tiles with attached bitumen should be appropriately bagged. All upstanding floor tile adhesive should be scraped and removed as far as reasonably practicable and disposed of as asbestos waste. Sanding or scrabbling floors is prohibited due to increased dust levels (containing both asbestos fibre and respirable crystalline silicate)

Where a client requires complete removal of bitumen e.g. adhesive may interfere with new floor bonding agent, specialised diamond headed floor grinders with attached H-Type vacuums should be considered. Such work should only be carried out by specialist asbestos contractors as there is a risk of exposure during the emptying of the vacuum equipment.

As the methods above do not give rise to dust levels, an enclosure under negative pressure is not required. However, non-work items should be sheeted over with polythene and a **2-stage airlock** with primary decontamination facilities e.g. water/sponge and H-type vacuum installed.

Removal of textured coatings

Some textured coating are applied to plasterboard which can be cut out in sections; and therefore can be removed with minimal deteriorations.

However, textured coatings applied to concrete substrates will require chemical and mechanical removal. Such coatings should be removed using penetrating stripping fluid or gel, or a steam generator. It must not be removed by sanding, grinding etc. Dampen and pick off any loose pieces of coating and put them in the waste container. Either brush on penetrating fluid gently, or dampen and loosen the coating with steam. When loose, gently scrape the coating into the dustpan. Empty this into an appropriate UN approved asbestos waste bag.

For both scenarios above, an enclosure under negative pressure is not required. Non-work surfaces should be sheeted over. A 2-stage airlock with primary decontamination is required.

Appendix 4 – Analytical methods for asbestos fibre counting & air monitoring protocols

Phase Contrast Microscopy (PCM)

A full description of the PCM method is set out in the HSE (UK) technical guidance document HSG 248: Asbestos: The Analysts Guide for sampling, analysis and clearance procedures.

The main characteristics of the PCM method are:

Sampling	
Filter	Membrane of mixed esters of cellulose or cellulose nitrate, 0.8-1.2µm pore size, 25mm diameter
Filter Holder	Fitted with an electrically conducting cowl
Transport	In closed holders
Flow rate	1-16 litres per minute
Blanks	Sampling media, 4 % of filters Field, ≥2% of samples
	Sampling time depends on the expected concentration of fibres
Sample preparation	
	Acetone-triacetin
Sample Evaluation	
Technique	Phase contrast optical microscopy
Microscope	Positive phase contrast, x40 Objective, x400-600 magnification Walton-Beckett graticule, Type G-22 (100±2µm diameter HSE/NPL Mark II test slide Stage Micrometer (1mm long, 2µm divisions
Calibration	To meet visibility requirements of the test slide
Analyte	Fibres (Visual count)
Counting rules	Selecting counting fields at random, subject to defined criteria A countable fibre is >5µm long, < 3µm wide and with a length:width

	ratio > 3:1 subject to defined rules when it overlaps the graticlue perimeter and when it touches other fibres or particles.
Lower limit of measurement	10 fibres per 100 graticule fields
Results	Results are expressed in terms of numbers of fibres/cm^3 of air sampled

Representative Air Monitoring

To obtain representative sampling it is important to ensure that sufficient number of air samples is taken. One method is to assess the area to be sampled in 'room units' where one room unit equates to 10m^2. Two samples as a minimum should be collected for each separate area except for areas less that 10m^2, where one sample is sufficient. For large areas, the number of 'room units' should be calculated using the following empirical Equation, and round up to the next integer.

$$n_{RU} = \frac{14A}{730+A}$$

Where

n_{RU} is the number of room units;

A is the area of the large room in square meters, m^2

Elevated areas e.g. platforms, galleries, mezzanines etc should be assessed separately.

Number (N) of room units under evaluation (^nRU rounded up)	Minimum samples required	
	Prevalent sampling	Background / clearance/ reassurance sampling
1 to 2	2	2
3 to 4	2	3
5 to 6	3	4
7 to 8	3	5
9 to 11	3	6
12 to 14	3	7
15 to 17	4	8
18 to 20	4	9
21 to 25	5	10
26 to 31	5	11
32 to 38	6	12
39 to 46	6	13
47 to 55	7	14

More than 55	N/8 (rounded up)	N/4 (Rounded up)

The table below recommends the following flow rates rates (litres per minute), minimum volume of air to be sampled. Minimum number of graticule areas to be examined and airborne concentrations at the limit of quantification. As can be seen for static sampling, flow rates can be increased to achieve the limit of quantification in a shorter period. However, this may introduce high particulate loading on filters, therefore particle loading should not exceed 10% of the surface area of the filter. Air sampling should not be conducted where other dusts and smoke are present.

Application	Flow rate (l/min)	Min Volume to be sampled	Min graticules to be counted	Limit of quantification
Personal sampling				
8 hour Exposure Limit value (0.1 fibres per cm3)	1	480	200	0.01
Static sampling				
Clearance air test	8- 16	480	200	0.01
Background	8-16	480	200	0.01
*Leak	8-16	480	200	0.01
Reassurance	8-16	480	200	0.01
Prevalent	8-16	480	200	0.01

**Short sampling periods can be used for personal and leak testing e.g. 15 or 30 minutes mins to allow for quick assessments of personal exposure or containment controls however high flow rates should be used to achieve adequate analytical sensitivity. For personal sampling, the analyst should satisfy themselves that the monitoring will be representative of the entire work period and can be compared with confidence against the Exposure Limit Value.*

Air samplers should generally be located at least 2m from walls and positioned 1.2m to 1.5m above the floor surface.

Quality assurance

- Filters used for field blanks must undergo the complete sample preparation procedure. Field blanks should be at least 10% of the number of air samples taken, with a minimum of one per site and one per day.
- It is recommended that at least 10% replicate samples (cross checks) are checked by another competent analyst and results should be consistent.
- Filter cassettes should also be examined e.g. four filter prepared and counted from each cassette.

Other analytical methods

Indirect Transmission electron microscopy (TEM)

Identifies elementary chemical composition and crystalline structure) and counts the fibres. It is possible to examine objects with a diameter of < 0.01 µm. It can also count fibres with a length >

0.5 µm. The sampling may take a long time (if the filter is overloaded, it will only be possible to analyse one section) It is possible to lose fibres or change their dimension distribution during the preparation process

Complex and extremely costly method (both as an investment and for operating).

Direct Transmission Electron Microscopy (TEM)

Identifies (elementary chemical composition and crystalline structure) and counts the fibres. It is possible to examine objects with a diameter < 0.01 µm. It also counts fibres > 0.5 µm in length

The aerosol is not disturbed during the observation.The preparation is tricky to perform.Requires an optimal load of the deposit on the filter. Complex and extremely costly method (both as an investment and for operating)

With the current atmospheric measurement conditions (8-hour individual sampling at a maximum flow of 4 l/min), the limit of the analytical quantification is 0.0025 f/ml

Scanning electron microscopy

Counts the fibres and determines the elementary chemical composition. The preparation is less restrictive than with TEM. The filter is read directly. The chemical analysis alone does not specifically identify the fibres. Resolution problems for asbestos fibres with a diameter < 0.2 µm (same resolution as PCM). Less sensitive than TEM. The limit of analytical quantification is higher than for TEM.

Appendix 5 - Sampling of Bulk Materials for Asbestos Content

Sampling equipment

The following PPE and sampling equipment is recommended for taking materials suspected of containing asbestos.

Protective equipment , including:	
• Respirators, ori-nasal and full-face • Suitable footwear	• Disposable overalls • Disposable overshoes • Disposable gloves
Survey Box/ Bag containing:	
• hammer • screwdrivers, plane and philips • tweezers • filler • stanley knife • torch • polythene sample bags, small and large • atomiser spray • asbestos warning labels	• chisel, ideally 2 No. • pliers • coring tool • paint or ET10/150 • foil tape • sampling bags • damp cloths/tack rags • warning sign
Optional equipment, dependent on type of work anticipated:	
• collapsible framing for enclosure • 1000 gauge polythene for enclosure • large 500 gauge waste bags	• light weight step ladder • bucket and sponge • H-type vacuum cleaner

It is the responsibility of the analyst to ensure that appropriate sampling equipment, sampling bags etc are available for all sampling activities.

Bulk sampling may be carried out as part of a survey or as a 'one-off' bulk sampling exercise following instruction from client. Sampling Asbestos Containing Materials (ACMs) can give rise to exposure to asbestos. The sampling work must be carried out in a manner which avoids disruption to client operations and must protect the health and safety of all persons who may be at risk.

Areas to be sampled inside buildings should be as far as possible be unoccupied and entry restricted e.g. use of notice '**KEEP OUT – Asbestos Sampling in Progress'**, during the sampling period.

Appendix 5 – Sampling of Bulk Materials for Asbestos Content

Version: v1.0

Before conducting bulk sampling activities, it is important that an assessment of the risks to health and safety of sampling personnel is carried out. If bulk sampling is part of a survey, client identified site specific H&S risks should be available to the sampling personnel via the Pre-Survey Questionnaire and subsequent Survey Plan. The majority of site based risks will be covered by in-house generic risk assessments familiar to analysts. However, additional risks may become apparent whilst on site. No attempt should be made to obtain a sample until safe access to the bulk material can be guaranteed.

Typical risks on site may include:

- Working at Heights, in ceiling voids or on fragile roofs
- Working on operable machinery or plant
- Working in confined spaces
- Chemical hazards
- Electrical hazards
- Biological hazards
- Noise hazards
- Lone working

Sampling personnel must also take physical and practical factors into account prior to sampling. These include the following non-exhaustive examples.

- *Accessibility of the material to be sampled*: For example, floor ducts can be a source of draughts, the removal of a floor duct cover can result in asbestos fibres being blown out of or along the duct. Therefore, a polythene enclosure should be erected before the removal of the duct cover. Cable Chambers require gas checks before entry and due to their location i.e. below ground level, are often partially flooded. A further consideration is the presence of rat droppings!
- *High level materials such as roofing or ceiling tiles*. Is a ladder adequate enough or should a scaffold tower be considered?
- *Wet surfaces.*
- *High temperatures.* The sampling strategy here may require at least two people due to safety reasons and short sampling periods.
- *Concealed behind other materials.* If damage is anticipated in reaching a sample, consideration should be given to an enclosure, which may in turn require decontamination procedures to be carried out and air monitoring.
- *Lifts*. This may require a lift engineer to be present together with suitable safety harnesses.
- *Friability of the Material to be Sampled:* The more friable the material, the greater the release of airborne fibres likely to occur during sampling. Again, dependent on location or occupancy of the area to be sampled, a polythene enclosure may be required.
- *Correct Precautions:* Disposable gloves, disposable overalls and at least an ori-nasal mask should be worn. In certain circumstances e.g. where the respirable fibre concentrations are unknown, increased personal protective equipment (PPE) is advised,

together with either disposable overboots or boots that can be cleaned.

- *The Correct Sampling Tools:* This is very much dependent on the type of material to be sampled. The aim is to obtain a sufficiently representative sample, causing minimum disturbance to the material being sampled and therefore, minimum fibre release.
- *Occupancy:* If sampling is likely to cause undue consternation to occupants or, if inconvenient 'enclosure' requirements are needed, it may be necessary to conduct sampling procedures at night/weekends/early in the morning.
- *Material integrity:* Will sampling compromise integrity of building component e.g. sampling an asbestos flue pipe may damage flue and release gases.

Personal Protective Equipment (PPE) for bulk sampling

Sampling personnel must wear adequate personal protective equipment. The type of material sampled and amount of disturbance required will dictate PPE and respirator type required.

Disposable overalls, overshoes and gloves should be worn when there is a likelihood of asbestos contaminating clothing during bulk sampling. Overalls must carry the CE mark for Category III (Type 5). They can be worn over normal clothing but should be carefully removed after use by turning inside out and **be disposed of as asbestos waste**. For some sites, more stringent decontamination procedures may be necessary e.g. contaminated crawl ducts, spray insulation in ceiling voids etc. Positive pressure respirators, transit procedures, a decontamination unit and full decontamination procedures would be required in these instances. Such occurrences would be identified during the initial site assessment.

Appropriate respiratory protective equipment (RPE) should be worn during sampling. The following table illustrates minimum RPE requirements for bulk sampling.

MATERIAL BEING SAMPLED	PPE
Very Low Friability e.g. floor tiles, roof tiles, eternit	None
Low Friability, low content e.g. asbestos cement, artex	None required, operative may wish to wear overalls and orinasal mask
Medium Friability e.g. asbestos insulating board, easily accessible pipe lagging in good condition	Overalls, disposable gloves and orinasal mask
High Friability e.g. lagging with poor access or poor condition, sprayed materials	Overalls, disposable gloves and full face mask

Appendix 5 – Sampling of Bulk Materials for Asbestos Content

Version: v1.0

Sampling Strategy

If the same type of material appears to be extensive, it may not be necessary to sample *every* unit e.g. ceiling tiles. A representative number of samples should be taken. However, the surveyor must ensure that the visual inspection identifies any difference in size, shape, colour, surface texture, bevelled edges etc., which may indicate differences in material types. Samples should be taken of each apparently different material observed. After assessing the extent of the material and any variations or repairs, representative samples of about 3-5cm^2 area and through the entire depth of the suspect material should be taken.

Examples of situations where noticeably different areas may be encountered:-

Ceiling Tiles	Boiler Rooms
Around lights	Valves
areas of renewal	around repaired areas
straddling partitions	gaskets
adjacent to windows	at elbows
adjacent to walls	in sleevings
	core sample of boiler casing
	pipework

Suggested representative sampling rates where material to be sampled appears uniform:-

• Spray coating	2 samples taken at either end of sprayed surface per area
• Insulation – pipes	2 samples along individual pipe runs needing repair or replacement 3 – 4 samples if entire plant room due refurbishment i.e. enough to condemn all pipe work.
• Insulation – boilers	At least 2 samples per unit
• AIB	1 sample per room or 1 per 25m^2
• AC	1 sample per AC product encountered (eg pipe, flat sheet, profiled sheet)
• Ropes & yarns	1 small piece

• Cloth	1 small fragment
• Millboard/paper	1 sample per sheet
• Bitumen Felt/ torched felt	1 sample per roof section
• Textured Coating	2 samples per area
• Floor Tiles	1 sample per colour per area

The above sampling rates may be adapted depending on the site and the circumstances prevailing. For example, repairs and patching may add to this variability and increase the number of samples.

Sampling Methodology

The following examples indicate suggested methods for sampling specific materials. For further information on asbestos based materials see appendix.

Low Risk Materials

Low risk materials are those that emit low levels of dust when correctly sampled. e.g. floor tiles, asbestos cement.

Floor Tiles

- A Stanley knife may be sufficient to sample a floor tile. No special protective measures are required.
- A sample in the region of 4cm2 is sufficient.
- Making good is limited to the application of paint if appropriate.

Asbestos Cement

Keep the sample point wet and either snap off a corner using a pair of pliers or cut off a section with a Stanley knife.
Making good involves either sealing the broken edge and closing the gap using filler if the material has a direct solid backing or, sealing the exposed edge with paint in cases where there is no direct solid backing.

Dust and debris -' Wipe tests'
Sampling procedure is dependent upon whether suspected asbestos material is visible or if samples are of general surface lying dust.

If obvious suspect material is seen this is to be placed in a sample bag with clean tweezers/pliers.

If general dust is to be sampled either:

- with clean tweezers transfer as much dust as possible into a small clean tin or sample bag
- wipe the surface with a membrane filter or avery label, place into tin or sample bag
- use a sampler pump and filter head with membrane filter to 'vacuum' up dust - this is the most suitable technique if very little dust is visible.

Note: In order to detect trace quantities of asbestos contamination it is important to collect as much dust as possible.

Textured Coatings
Scrape off using chisel straight into sample bag. Make good using paint.

High Risk Materials
This type of material is capable of producing high concentrations of airborne fibres. e.g. asbestos boards, woven material, insulation or lagging with hard set external coating, sprayed applications.

Asbestos Boards
- The preferred method of sampling is to cut off a section with a Stanley knife, keeping the sampling point wet.
- Regular damping using an atomiser will be required when sampling particularly friable boards. Consideration should be given to providing polythene sheeting.
- Making good as per asbestos cement i.e. filler or paint.

Woven Materials
- Full precautions must be taken. The material to be sampled must be wet and a section may be removed using a Stanley knife and forceps.
- Making good is achieved by using a sealant or paint.

Insulation or Lagging with Hard Set External Coating
This material is often present around pipework and heating equipment e.g. calorifiers, boilers etc., and may not be homogeneous especially around elbows, flanges and joints, particularly if it was applied wet in several layers. Full depth coring using a dedicated coring tool is required. Analysts taking samples must take full protective measures e.g. RPE and PPE.

Sprayed Applications
Sprayed coatings on ceilings, walls, pillars, etc., are occasionally hard but are usually loose and friable. There is often a surface application of chrysotile in the form of 'paper' or paint. For sampling, all the precautions recommended for lagging must be observed but the following variations apply:-

a) No polythene bag should be taped directly onto a sprayed coating, it should be applied to an unsprayed item e.g. window frame, painted wall, etc., or, a length of tape should be attached to the sprayed coating and the bag taped to it. This length of tape must NOT be removed at the end of sampling.

b) Extra care must be taken when sampling ceilings, as there is a tendency for this material to become dislodged.

c) It is often possible to obtain a sample by using forceps alone. This method has the advantage of causing minimum disturbance and therefore minimum risk. A full depth sample must still be taken when using this method.

d) Sprayed applications are often above false ceilings. It must be remembered that the top surface of a false ceiling may be contaminated with loose fibres. False ceilings must be lifted off with care and remaining fixtures must be cleaned when sampling is complete.

Sample Recording and Site labelling

All high risk samples i.e. AIB, laggings, rope etc should be double bagged, in 6x4" sample bags provided, for the protection of sampler and Laboratory staff who have to handle them later. Sample information should be written on the inside bag only with an indelible marker/pen and should follow the example below. All small bagged samples should be placed in a large 12x8" sealable bag with general site details. An asbestos label should be affixed to the larger sample bag.

Unique identifier: e.g. DA150105/01 + Job number
Client Name Building e.g. Hibernian complex
Sub building/Floor level/ Room or Area/ description of sample


The sample position may be labelled with an Bulk Sample ID sticker, if requested by the Client.

Emergency procedures

Should an accident occur during sampling, e.g. an overhead sample falling to the floor or a panel

being shattered, then the following procedure should be adopted.

- Immediately seal off the room. If necessary, seal the doors with a polythene airlock or apply tape around the door together with adequate warning notices until an airlock can be erected.

- If practicable, clean away all suspect material from the floor by using either a vacuum cleaner fitted with an H-type filter or, using damp cloths or tack rags (these are to be double sealed in polythene on completion and disposed of as asbestos waste).

- Conduct reassurance air monitoring. New disposable overalls should be worn during this sampling period and dust disturbance performed. On completion of the air monitoring, the overalls, etc., are to be double sealed in polythene and disposed of as asbestos waste.