

BACKGROUND

Asbestos is the collective name for a group of six distinct types of naturally occurring inorganic silicate compounds, which have a strong fibrous, crystalline structure. The fibres are heat-resistant and extremely durable, and, because of these qualities, asbestos had throughout the earlier part of the 20th Century, become a widely used material in construction and heavy industries. The majority of asbestos uses in the UK are in building materials such as asbestos cement sheeting, pipes for sewage and water distribution and insulation boards etc. The remainder is found in a variety of industrial products such as gaskets, brake linings, fan blades etc.

The three forms of asbestos used most in the UK for industrial and building applications belong to two subgroups; serpentine, consisting of chrysotile (white asbestos) and the amphibole subgroup comprising, crocidolite (blue asbestos) and amosite (brown asbestos). More recent installations should only contain chrysotile, though other forms may be present in older installations.

If asbestos material is found in the home it should not pose a health hazard to the occupants provided it is in a sound condition (i.e. not flaking or producing visible dust). Asbestos materials in a stable condition will only become a health risk if the surface is accidentally damaged or is deliberately drilled, sanded, sawn or scrubbed all of which may generate fibre-containing dust.

HEALTH RISKS

The main risk is from asbestos fibres in the form of dust. The fibres are of microscopic size, which can remain suspended in the air for long periods of time. The fibres may be inhaled by the occupants of the building and may penetrate deep into the lungs where they may lodge, giving rise to fibrosis and further damage. Most fibres will be less than 50 microns in length and many are under 1 micron.

Most of what is known about the risks of asbestos comes from heavy contamination in industrial settings. The risks to those exposed in non-industrial settings (e.g. hospitals, homes and schools) are likely to be extremely low, even where the building is known to contain significant amounts of asbestos materials. In some studies, exposure levels of asbestos dust in such buildings are less than one thousandth of the acceptable occupational exposure limits. Crocidolite is considered the most hazardous form and the greatest association with asbestos related diseases followed by amosite then chrysotile.

The main conditions associated with exposure to asbestos are as follows:

- Asbestosis is a chronic respiratory condition with a latency of over twenty years, following long exposure to high concentrations of asbestos dust. The characteristic symptoms are progressive breathlessness and a non-productive cough, with around one third of patients diagnosed progressing to pulmonary fibrosis. Smoking does not appear to increase the risk of asbestosis.
- Mesothelioma, (a form of cancer affecting the inner lining between the chest and lung and less commonly the abdomen), has a 35-45 year latency and is almost invariably associated with a history of asbestos exposure. Several studies have shown no increased risk of developing mesothelioma in non-industrial settings. However some cases of mesothelioma have been recorded where there is no direct or only minimal contact with any asbestos fibre dust.
- There is a risk of developing lung cancer (bronchial carcinoma) among insulation workers. The risk for such workers, who are heavily exposed to asbestos but do not smoke, is 5 times that of the general population. If exposed workers also smoke, the risk of lung cancer is 50 to 90 times that of the general population. This compares to a tenfold rise in the background risk of lung cancer for the general public who smoke. The combination of asbestos exposure and smoking leads to a greater increased risk.
- There are a number of other recognised health effects. However these are rare and any increased risk of other cancers is thought to be insignificant compared with the burden related to smoking and alcohol.
- Asbestos exposure is not recognised as being associated with causing congenital abnormalities (i.e. is not a teratogen) and ingestion or skin contact are unlikely to have a significant health impact. It is important however to emphasise that the risks of asbestosis or mesothelioma are extremely low except where there has been heavy or prolonged exposure to asbestos fibres.

Risks to Health from Asbestos Exposure

There is no readily available screening test to identify exposure to asbestos, nor any recommended strategy for biological monitoring for potential effects of exposure.

Risk assessment for asbestos is a controversial area. Most existing knowledge arises from experience in heavily exposed industrial and occupational settings. In general, cumulative lifetime exposure is cited as the most important risk factor.

Assessment of risk for an individual depends on:

- Measured level of exposure (fibres/ml of air).
- Activities undertaken in the environment (e.g. cleaning of dusty surfaces).
- Cumulative dose (dependent on cumulative time of exposure).
- Type of asbestos causing exposure.
- Increased risk from other lifestyle factors (e.g. cigarette smoking).
- Inherent genetic susceptibility.
- Age (the younger the age at time of exposure the higher the risk).

Monitoring of fibres carried out in public and educational buildings known to have significant amounts of asbestos present suggests that in most cases the level of exposure is one thousandth or less the accepted occupational exposure limit. One study estimated that the risk of asbestos-related illness from lifetime public exposure (e.g. full time attendance at a school for 10 years or 20 years spent in an office) is around one case per 100,000 persons exposed. Overall, the risk from non-industrial exposure, even in buildings known to have significant amounts of asbestos present, appears to be very low indeed. This remains true despite the fact that children may have greater exposure than adults owing to their higher respiratory rate and closer proximity to dust at floor level.

Risks associated with building renovation

Much concern stems from public occupancy of buildings where asbestos removal is required or has occurred. Evidence from studies of buildings before, during and after renovation demonstrated that asbestos fibre levels were negligible before renovation, increased markedly during renovation and remained elevated but at very low levels for several months afterwards. The highest post renovation levels of fibres detected were in the order of 0.001 fibres per ml (air). Such levels are 100th to 1000th the level found in an occupational setting and are therefore considered not to pose an appreciable risk of causing asbestos related disease.

Screening and monitoring issues

Owing to the long latency of detectable disease and the non-specific character of symptoms if they appear, there is little to recommend the issuing of health warnings except where there has been high-level exposure. There is no biological monitoring that will give information on levels of exposure, and the Health and Safety Executive's recommendations regarding medical examination and two yearly follow-ups relate more to establishing baselines for assessment of future problems where there has been heavy industrial exposure.

When asbestos is found in domestic, public and educational buildings the overall message should therefore be one of reassurance that adverse health effects are very unlikely for the occupants. However, there may be issues relating to contractors employed to work on buildings found at a later date to have asbestos present in a suspect or friable condition. Again, these situations will have to be followed up on an individual basis in an attempt to evaluate the risk of exposure.

Behaviour of asbestos in fires

Although asbestos is typically used for its fire-protective and non-combustible properties, fires and explosions in buildings can lead to the exposure and release of fibrous materials contained therein. As a result, airborne concentrations of respirable dust will be elevated, with the possibility of localised high concentrations in the vicinity of the damaged building. However, at the temperatures generated within fires, asbestos is thermally unstable. Indeed, blue asbestos starts to decompose at temperatures in the region of 450°C, and brown and white at 400 - 600°C. Although the asbestos is still fibrous in appearance, the fibres readily disintegrate to a fine dust that is of lower pathogenicity than the original fibres.

Some asbestos may also be deposited as larger pieces. Whilst smaller fragments (including fibres) will eventually settle out, the respirable fraction (<5-10µm) may travel considerable distances in some circumstances. In the open, rainfall will act as a cleaning mechanism and therefore the climate, season and weather conditions will all influence the degree and duration of any potential exposure. The use of water/foam in controlling the fire will also inhibit the potential spread of fibres and therefore before clean up commences it may be advantageous to regularly moisten the area during the interim to prevent it drying out

In addition to exposure during fires involving asbestos cement, there is a possibility of exposure, particularly to the staff involved, during any subsequent clean-up process. This process will involve both manual and wet mechanical clean up. Such a clean-up process should be well defined and documented. If all necessary precautionary measures are taken, including the use of protective clothing and 'wet' pick-up processes, there should be no significant risk to personnel involved in the clean-up process.

LEGISLATION REQUIREMENTS

The control of asbestos within the workplace and the protection of employees are fully regulated under the Health & Safety at Work etc Act 1974 and its relevant regulations. The principal components of this legislation and that designed to protect the general public is as follows:

- Employers have a responsibility under Sections 2 and 3 of the Health & Safety at Work etc Act 1974 and in particular, responsibility in relation to The Management of Health & Safety at Work Regulations 1999. Section 2 of the Occupiers Liability (Scotland) Act 1960 places a duty on the occupier of land to take reasonable care for the safety of, "a person entering thereon in respect of dangers which are due to the state of the premises or to anything done or omitted to be done on them".
- Nuisance provisions of Section 79 of the Environmental Protection Act 1990 refer to "Any premises in such a state as to be prejudicial to health or a nuisance".
- At common law, employers working with asbestos owe a duty of care to those who could be exposed to asbestos emanating from the relevant premises. A duty of care could also be possibly owed to the general public by contractors etc working with asbestos.
- Further advice on the above duties and responsibilities can be obtained from the Health and Safety Executive
- Under the Health and Safety at Work etc Act 1974 asbestos is controlled by Asbestos Regulations 2006 (SI 2006 No.2739)

These regulations require work with the most dangerous types of asbestos – coating, lagging and asbestos insulating board, to be carried out only by contractors who have a licence issued by the Health and Safety Executive and lay down the practices, which must be followed for all work with asbestos, including that which requires a licence. Employers must prevent the exposure of employees to asbestos, or, where this is not reasonably practicable, reduce exposure to a level, which is as low as possible. The Regulations also require the:-

- Provision and cleaning of protective clothing
- Cleanliness of premises and plant
- Demarcation of designated "asbestos areas"
- Monitoring of air for concentrations of asbestos
- Maintenance of health records and medical surveillance
- Provision of washing and changing facilities and
- Labelling of raw asbestos and asbestos waste

Consideration is being given to amend these regulations to place a duty on employers/occupiers to establish whether asbestos is present in any building under their control.

Control of Asbestos Regulations 2006 (SI 2006 No.2739)

These regulations prohibit the importation into the United Kingdom, and the supply and use within Great Britain, of amphibole asbestos – crocidolite (blue) asbestos and amosite (brown) asbestos, and chrysotile (white) asbestos.

- The Health and Safety at Work etc Act and the above Regulations are principally enforced by the Health and Safety Executive who are the sole enforcement authority in relation to public buildings such as schools and other council owned property. Consequently, if a building is open to public access it will most probably come within the scope of the Act and the HSE as at least one employee will be present inside the building while it is in use. The Act also places obligations on employers to safeguard both employees and non-employees i.e. customers, visitors etc.

PRINCIPLES OF GOOD PRACTICE

The emphasis should always be on minimising human exposure at all times for workers and the general public. This involves carrying out a proper risk assessment and following appropriate procedures during disturbance, removal and disposal of asbestos materials and dust.

A proper risk assessment may indicate that the removal of the asbestos is not the best solution, particularly if the asbestos is in a sound condition and can be managed with only minor maintenance or repair. Removal may, in some cases, result in a short term increase in exposure when the building is re-occupied which can nullify the potential benefit of reduced exposure in the longer term.

Asbestos removal therefore is not always the best solution in terms of controlling exposure to the occupants however each case is site specific when assessments are being made.

Work activities in relation to asbestos fall into the following categories:

- The manufacture and installation of asbestos containing products is prohibited (except in a small number of excepted and specific instances).
- Asbestos removal and disposal (planned and non-planned i.e. following a fire or building demolition).

There are strict controls on the stripping and disposal of asbestos, not only to protect the employees carrying out the work but also to protect employees/occupants returning to the building once the work has been completed.

- In relation to unplanned removal of debris containing asbestos i.e. following a fire, demolition, fly tipping etc, material may be exposed to the atmosphere for sometime before safe removal can be arranged. In the interim period efforts should be made to reduce the risk of continued environmental contamination and exposure to the public by keeping the exposed material dampened or covered with such materials as plastic sheeting or a layer of soil cover. The amount of fibres released in such circumstances is likely to be very low and airborne dispersal will minimise any potential risk of human exposure. Decontamination of the surrounding land or property should not be necessary in normal circumstances.

Clearance monitoring is required in such buildings and these cannot be reoccupied until a background level of <0.01 fibres/ml of air are achieved. This level is set in *Guidance Note EH10 (Revised): Asbestos Exposure Limits and Measurement of Airborne Dust Concentrations*.

- In relation to the workplace safety the personal exposure of workers should not exceed the control limits set out below. The revised levels, set by HSE in 1999, are as follows:

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| For dust consisting of or containing any form or mixture of asbestos, including chrysotile (white asbestos) | 0.2 fibres/ml when measured or calculated in relation to a 4-hour reference period. 0.6 fibres/ml averaged over any 10-minute period |
| For dust consisting of or containing chrysotile (white asbestos) alone | 0.3 fibres/ml when measured or calculated in relation to a 4-hour reference period. 0.9 fibres/ml averaged over any 10-minute period. |

- It has to be remembered, however, that these are not safe limits of exposure and employers are required to reduce exposure to as low as is reasonably practicable.

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