

Asbestos – background information

Asbestos is an emotive topic, with the fear of ‘one fibre can kill’ a common response in many people, and it derives from the Greek word meaning ‘unquenchable’ or ‘indestructible’, as it was thought to be impossible to destroy. It can be, although it requires temperatures above 1200°C to reduce it to a silicate slag, and its fire retardant properties caused it to be used in a wide range of building materials and engine casings and components. The toxic properties were known since Roman times, but were conclusively proven in the 1930s, although it took until 1999 before its use was banned.

Chemically, asbestos is the name given to a group of fibrous, naturally occurring, complex silicate minerals, including chrysotile (white), crocidolite (blue), amosite (brown), and the three fibrous forms of anthophyllite, actinolite and tremolite. It is a class 1 carcinogen, and causes a range of respiratory diseases, such as asbestosis and mesothelioma – often remaining latent for 15 – 40 years, as the needle shaped fibres may lodge in the lungs but take some time to cause symptoms.

Analysis of Soils, Aggregates and Ballast

UKAS requirements became more stringent in 2011, to ensure all laboratories were offering similar methods. HSG 248 ‘The Analyst’s Guide for Sampling, Analysis and Clearance Procedures’ states that any quantification of asbestos in ACMs must be accredited. UKAS will no longer accept a visual screen for asbestos presence/absence, and quantification should be based on methods to include free fibres as well as any Asbestos Containing Material (ACM).

- Stage 1 – Identification using Stereo-microscopy and Polarised Light Microscopy

This must be performed microscopically (x10 – 40), and visual scanning of the sample is not considered to be adequate. Fibres can be identified for asbestos type by PLM (x100) using Dispersion Staining.

- Stage 2 – Quantification

Quantification consists of gravimetric analysis of Asbestos Containing Materials (ACMs), where ACMs are handpicked from the sample and weighed.

If the result is needed for hazardous waste consignment only, and if a result after gravimetric analysis is > 0.1%, the sample will be consigned as hazardous, and there is no requirement to proceed with the PCOM method.

However, if the result is < 0.1%, then free fibres may be present, and they will not be visible for hand removal and gravimetric quantification, so therefore the result could

significantly underestimate the asbestos content, and fibre evaluation is therefore required.

- Stage 3 – Quantification of free fibres by Phase Contrast Optical Microscopy (PCOM) with a reporting limit of 0.001%.

This method (based on HSE Research Document Contract No. 83/1996 (*L.S.T. Davies, et al*), involves mixing the soil with water, and then removing an aliquot of water plus fibres, which are then measured and counted. These results are converted to % asbestos by weight.

Currently, there is no Soil Guideline Value (SGV) for asbestos, so most human health risk assessments use the 0.001% limit, which is based on a study performed by the Institute of Occupational Medicine (Research Report TM/88/14 1988 *Addison J., Davies L.S.T., Robertson A., Willey R.J.*). This study utilised the 'dustiness' test, where air is blown through a dried soil, and any fibres are trapped and measured. This is probably the most accurate way to estimate the likely generation of fibres from a soil, but is very time consuming and expensive to perform.

Water Absorption Test

DETS are one of only two laboratories in the UK to be UKAS accredited for differentiating licensable and non-licensable materials (asbestos containing boards/cement products) using our Water Absorption method based on HSE L143 (ACOP: Working with materials containing asbestos). A weighed, representative sample is immersed in water for two hours, then reweighed, and the % water absorbed calculated:

- Asbestos cement (AC) is defined as a material which is predominantly a mixture of cement and chrysotile, and which in its dry state, absorbs less than 30% water by weight, and therefore does not require a license to work on.
- Asbestos insulating board (AIB) is defined as a lightly compressed board made from asbestos fibre and hydrated Portland cement or calcium silicate with other filler material, and when in its dry state, absorbs greater than 30% water by weight, and therefore does require a license to work on.

Requirements for clients:

- Samples suspected of containing asbestos must be double bagged.
- Any sample requiring quantification must be performed on a separate whole sample – samples which have been used for other analyses are not suitable.
- The purpose of the analysis must be defined on the Chain of Custody, i.e. Waste Categorisation or other purpose, as this may determine if the Stage 3 analysis is required or not.

For further information, please contact your Account Manager or:

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