

M504 Asbestos product types, uses in buildings and surveys

Use of asbestos products

- Widespread use of asbestos in industrial and building applications
 - Only three forms widely used – chrysotile, amosite and crocidolite (about 90% used was chrysotile)
 - About 3000 different products have been listed
 - Although many countries have now banned most uses of asbestos, large quantities of asbestos products remain in-situ in buildings in these countries
 - Estimated that about 6 million tonnes of asbestos remain in buildings in the UK

(RICS 2003)

Use of asbestos products

- Although many countries have now banned most uses of asbestos, asbestos containing materials are still being installed in many countries
 - Presence of asbestos containing materials may be even more widespread in these countries
 - Many asbestos containing materials may be present without any indication (e.g. labels, register etc)
- Even in countries that have banned installation of new asbestos there is no general requirement to remove existing asbestos materials
 - Asbestos in good condition and unlikely to be disturbed can be left in place and managed

Asbestos - spray coatings

- Thermal and anti-condensation insulation on underside of roofs (sometimes walls)
- Fire protection on steel and reinforced concrete beams / columns and on underside of floors.
- Very high asbestos content (55 – 85%) with a cement based binder. All types of asbestos used
- Spray coatings have a very high potential for fibre release if unsealed, particularly if knocked or abraded.





Asbestos insulation

- Used as thermal insulation to pipework, boilers, calorifiers, tanks etc
 - Often hand applied as wet lagging in small batches
 - Also used as pre-formed sectional lagging
- All types of asbestos used
 - Very variable asbestos content (6 - 85 %)
- Ease of fibre release depends on type of insulation used and the surface treatment











Asbestos insulating board (AIB)

- Used extensively as fire breaks, infill panels, partitions, ceilings, ceiling tiles, linings to roofs and walls, external canopies and porch linings
- Fire protection, acoustic and thermal insulation
- Usually 15 - 25 % asbestos (usually brown)
 - Some boards contain mix of brown and white asbestos
- Can be easily broken giving significant fibre release.
 - Sawing and drilling will also give significant releases.
 - Surface abrasion can give significant fibre release, but may be greatly reduced if the surface is sealed or painted.

























Asbestos - cement sheet

- Used extensively for corrugated roofing, wall cladding and panels, rain water goods (gutters, pipes, drains), fascias
- Also used as artificial roofing slates, window sills, laboratory worktops, water tanks and ducts
- Usually 10 - 15 % asbestos (all types)
 - Vast majority – white
 - Occasionally blue and very occasionally brown











Asbestos - other uses

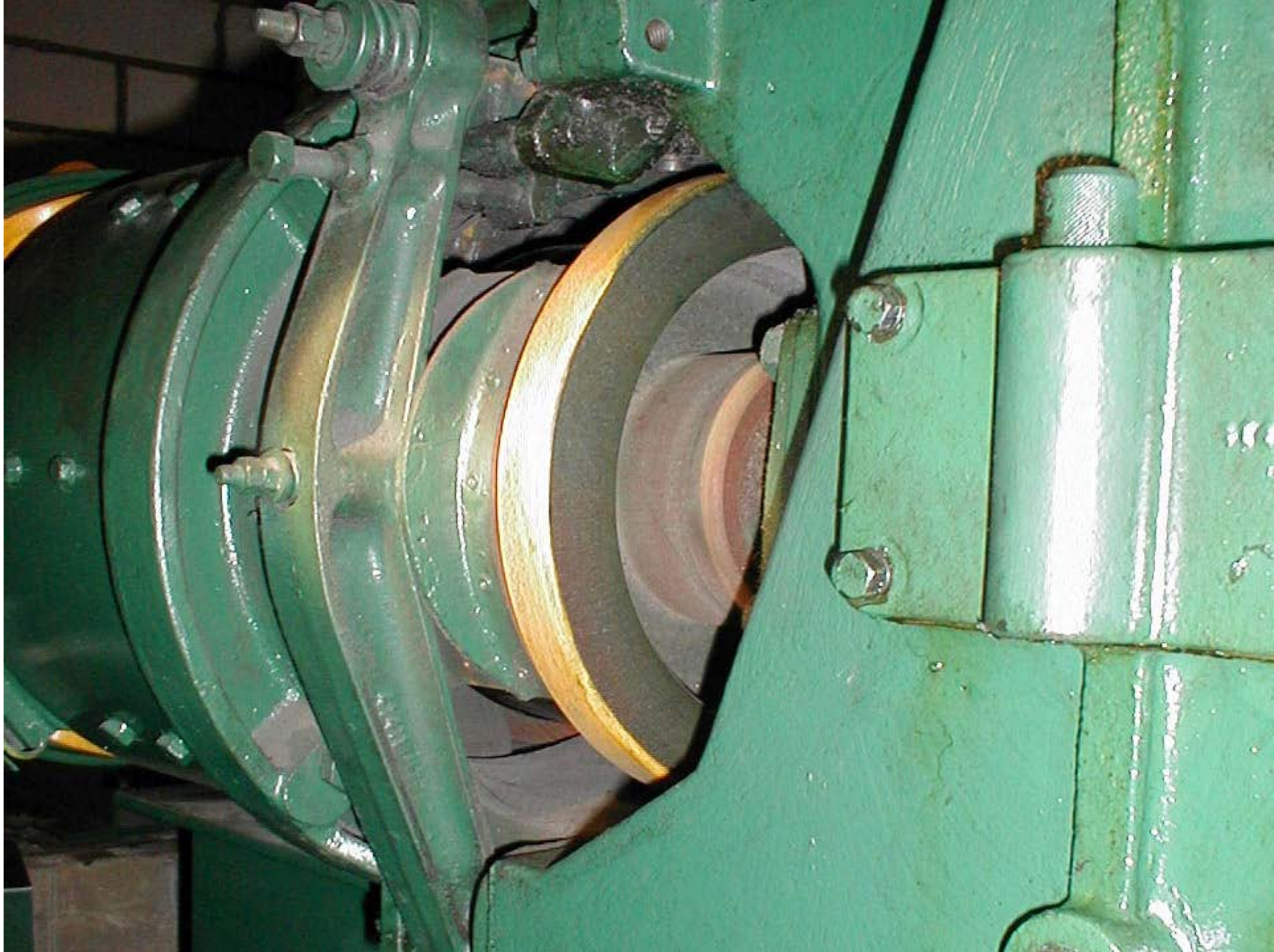
- Rope or cloth (approx 100% asbestos)
 - (usually white – sometimes blue)
- Gaskets
 - (usually white or blue depending on use)
- Roofing felt and damp courses
- Friction materials
- Floor tiles
- Textured coatings (e.g. ‘artex’)
- Mastics, sealants and putties
- Variable % asbestos









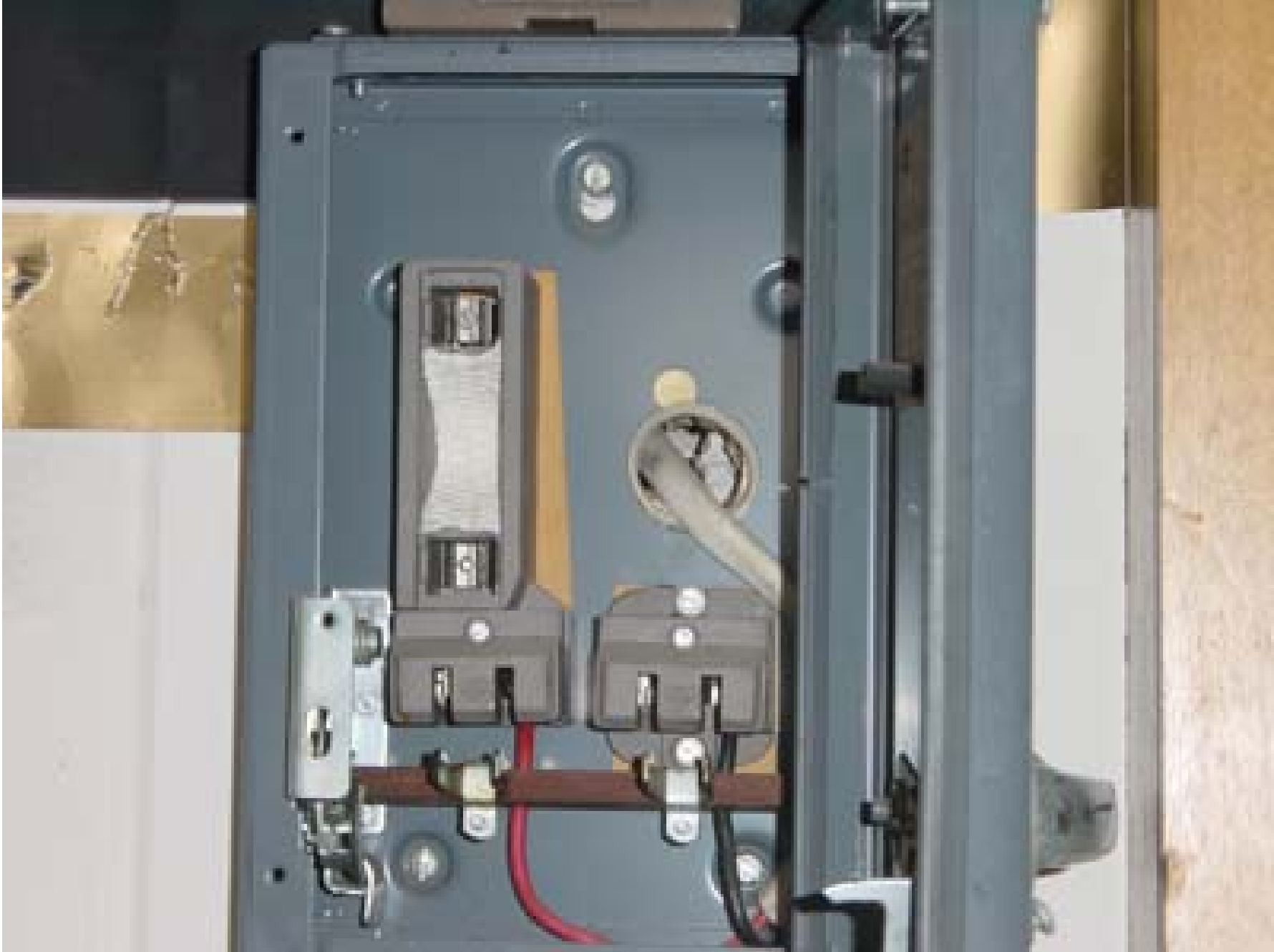












Asbestos products

- Use of asbestos has been phased out in many countries
 - In UK spraying of asbestos stopped in 1974, installation of asbestos insulating board banned in 1986 and asbestos cement products banned in 1999
 - These dates are specific to the UK, however, the pattern of the most hazardous types of asbestos and asbestos products being progressively phased out is common to many countries
- UK - amphiboles banned in 1986, chrysotile banned in 1999
- Australia - amphiboles banned in 1994, chrysotile banned in 2003
- USA - amphiboles banned in 1999, chrysotile not yet banned (2009)
- In some less developed countries asbestos substitutes are not yet considered to be an option in many cases

Surveys – what should they achieve?

- To control risk from asbestos containing materials an adequate asbestos management system must be in place.
 - The risks will vary depending on circumstances at the time
 - Risks during normal occupation will be very different from the risks during major building works or demolition
- To manage the risk from asbestos – you need to know
 - What asbestos products are present
 - Where the products are located
 - What condition they are in
 - How accessible they are
 - How likely they are to be disturbed

Surveys – what should they achieve?

- HSG 264 (2010) states: an asbestos survey has three main elements
 - Locate and record the **location**, **extent** and **product type** of any presumed or known asbestos containing material
 - Inspect and record information on the **accessibility**, **condition** and **surface treatment** of any presumed or known asbestos containing material
 - Determine and record the **asbestos type**, either by collecting representative samples of suspect materials for laboratory identification, or by making a presumption based on the product type and its appearance etc

Surveys – quality issues

- Person undertaking the survey should be appropriately qualified and trained
- Procedures for undertaking and recording the survey should be documented
- Suitable quality assurance procedures should be in place
- Organisations can demonstrate an adequate quality system by accreditation to ISO 17020
 - UKAS accreditation in UK
 - NATA accreditation in Australia etc

Types of asbestos surveys

- Historically no standard protocol for conducting asbestos surveys or for interpreting and reporting the findings
 - Often considerable variation in level of survey and documentation from different ‘surveyors’ – particularly for surveys conducted more than a few years ago
 - Now becoming more consistent with accreditation to ISO 17020 more common and publication of ‘standard’ methods such as MDHS 100 – replaced in 2010 by HSG 264 (UK HSE)

MDHS 100 (2001)

- Surveying, sampling and assessment of asbestos containing materials in premises for management plans
- Types of survey described in MDHS100
 - Type 1 - Location and assessment (presumptive)
 - Type 2 - Standard sampling, identification and assessment survey (sampling)
 - Type 3 - Full access sampling and identification survey (pre-demolition / major refurbishment)

MDHS 100

- Survey Type 1 - Presumptive
 - No sampling – all materials that could be asbestos-based are presumed to be asbestos and risk assessed and managed as such
 - All areas inspected - areas not accessed recorded
 - Presence of asbestos in areas not accessed assumed
 - Requires lowest initial time and cost commitment and avoids need to disturb the asbestos containing material
 - May lead to ‘non-asbestos’ being managed as asbestos

MDHS 100

Survey Type 2 - Sampling

- Samples taken to confirm presence of asbestos
 - Precautions need to be in place to prevent release of asbestos during sampling
- Should enable only asbestos containing materials to be risk assessed and managed
- Inaccessible areas/materials recorded and presumed to be asbestos

MDHS 100

Survey Type 3 - Full Access - (Pre-demolition/Major Refurbishment)

- Should locate all asbestos-containing materials in plant, equipment and buildings
- May involve destructive inspection of partitions, cladding, risers etc – difficult or impracticable to undertake in an occupied building
- Purpose is to enable a specification for asbestos removal work to be prepared so should include estimates of volume or surface area
- No material risk assessment

HSG 264 – ‘The Survey Guide’ (2010)

- MDHS 100 improved consistency of surveys in UK, however, a number of concerns remained, including:
 - Survey quality
 - Report usability and suitability
 - Surveyor competency
 - What areas were considered reasonably accessible
 - Extent of investigation in Type 3 surveys
- These concerns led to the publication by the HSE in 2010 of HSG 264

HSG 264 – ‘The Survey Guide’ (2010)

- Introduced two types of survey
 - Management survey
 - Refurbishment and demolition survey
- These terms were thought to be more descriptive of the purpose of the surveys

HSG 264 - Management survey

- Undertaken to provide information to enable safe management of asbestos on the site
 - Should locate as far as reasonably practicable, any asbestos containing materials and assess their condition
 - Should inspect all reasonably accessible areas including inside ceiling voids, ducts, riser and lift shafts etc
 - With these types of survey, there is a limit to how intrusive the survey can be
 - Therefore, further sampling may be required (in hidden voids etc) prior to major building works or demolition

HSG 264 – Main changes from MDHS 100

- Gives much clearer guidance on areas that would normally be considered reasonably accessible
 - Where this is not achieved the reasons for the area not being accessed must be documented
- Good survey planning and liaison with the building owner should ensure that the number of ‘inaccessible’ areas is minimised
- Any areas not accessed must be presumed to contain asbestos, and clearly identified on the report

HSG 264 - Refurbishment and demolition survey

- Survey undertaken to provide information to enable safe removal of asbestos on the site
 - Essential to provide full access to all areas, involving destructive inspection as necessary
 - Still possible that some asbestos may remain concealed within the structure, and will not be revealed until the works are underway
 - In such cases the survey could be carried out in stages
 - In any event, emergency plans should be in place to deal with any subsequent unexpected discovery of asbestos containing materials

HSG 264 – The survey guide – 'Refurbishment and demolition survey'

- Fully intrusive - involves destructive inspection
 - Will normally require the area / building to be unoccupied
 - May require construction of temporary enclosures to access some areas
- Includes accessing:
 - Structural areas, between floors and underground services
 - Inside cavity walls and partition walls
 - Above ceilings (including above 'screw-fixed' AIB)
 - Apertures around window and door frames
 - Floor coverings and floor boards lifted etc









Mixed survey types

- Often a mix of survey types is appropriate on a site e.g. in a large hospital
 - Most areas surveyed as a ‘management survey’ with samples taken
 - Areas where damage is not acceptable e.g. operating theatres may not be sampled (and therefore assumed to be asbestos)
 - For areas identified to be demolished or undergo major refurbishment, then a ‘refurbishment and demolition’ survey could be undertaken in these areas
- Ensure all parties are aware of the differences in survey approach and the implications of each type of survey

US Environmental Protection Agency (EPA) approach (ASTM E2356)

- Two types of survey
 - Baseline Surveys
 - Project Design Surveys
- For each type the document discusses
 - Planning the survey
 - Obtaining and reviewing existing information
 - Conducting inspection and collecting samples
 - Analysing bulk samples
 - Assessing current condition and potential for disturbance
 - Preparing report

Asbestos surveys

- Whatever guidance is available in different countries regarding surveys, the following principles apply i.e.
 - Scope and type of survey depends on the purpose of the survey
 - Aim of any survey is to locate and report as far as practicable on any asbestos containing material in the area
 - Not all asbestos materials are readily accessible and extent of the survey in terms of how intrusive or destructive it is should be established
 - Possibility of further asbestos containing materials being 'hidden' in areas not accessed must be taken into account

Planning asbestos surveys

- Desk top study
 - Take into account any building specifications or plans, age and type of building or plant
 - Will vary between countries
- Examine any original / current plans / surveys
 - Asbestos may have been removed (or installed subsequently)
 - Residues from previous poor removal may be present



Planning asbestos surveys

- Preliminary site meeting
 - Identify scope of survey
 - Identify any access issues
 - Risk assess survey identifying any site-specific issues
- Client or person commissioning survey must
 - Understand range of survey types
 - Potential limitations of each type
- Survey parameters agreed and documented
 - Clear and unambiguous brief prepared

Survey planning

- Issues to be clarified prior to survey
 - Buildings / areas to be surveyed
 - What type of survey
 - What plans are available
 - What areas are to be accessed / not accessed
 - What voids / ducts etc are reasonably accessible
 - Sampling protocol
 - What risk assessment system is to be used
 - Report format
 - Type of marked-up plans required

Health and safety during asbestos surveys

- A risk assessment must be carried out before starting survey covering not only the risks from disturbing asbestos but also other issues such as
 - Working at heights or in ceiling voids
 - Working on or near operable machinery
 - Any chemical, physical or biological hazards
 - Electrical hazards
 - Working in confined spaces
 - Working in remote locations / lone working
- To reduce risks, in most cases surveys would be undertaken by a team of at least two people

Health and safety during asbestos surveys

- Fibre release from sampling controlled by sampling techniques such as pre-wetting, minimising breakage and shadow-vacuuming
- As far as possible, sampling should take place in unoccupied areas by sampling outside of normal work hours or by arranging for occupants to vacate area
- Personal protective equipment usually required. In many situations the following would be appropriate (depending on risk assessment)
 - Disposable coveralls with hood
 - Half-mask respirator with P3 filter
 - Shoes that can be easily cleaned
 - (A full face mask may be required when sampling high-risk material such as sprayed insulation)

Undertaking asbestos surveys

- Asbestos surveys vary widely in size and complexity from a single sample to a full survey of a whole site
- Quality and success of a survey optimised by
 - Careful planning and information gathering
 - Using suitably qualified and experienced staff
 - Undertaking survey in accordance with documented procedures with appropriate quality assurance
 - Undertaking survey in a structured, consistent and logical way to minimise the possibility of missing an area or asbestos containing material

Identification or presumption of asbestos

- Positive identification of asbestos in a material can only be confirmed by analysis of a sample
 - However, an experienced surveyor may make a presumption that a material contains asbestos or not.
 - This is based on their knowledge of likely asbestos containing materials as well as other indications such as surface texture, appearance, hardness etc
- A material can be ‘strongly presumed’ to contain asbestos where there is good reason to believe it contains asbestos or
- Can be ‘presumed’ to contain asbestos when there is insufficient evidence to be sure that a material does not contain asbestos

Surveys – information recorded

- Amount of information recorded during the survey should be sufficient to make appropriate decisions on future management of asbestos
- Information relates to
 - Where the asbestos materials are
 - The condition of the material
 - Potential to release fibres
- Use of photographs strongly recommended
 - Depending on local site rules

Surveys – information recorded

- Location
 - Unambiguous description
- Extent
 - Area, length, volume, number etc
- Product type
 - Spray coating, insulation, insulating board, cement etc
- Level of identification
 - Tested, strongly presumed, presumed
- Asbestos type
 - Chrysotile, amosite, crocidolite etc

Surveys – information recorded (continued)

- The information on the previous slide is required for all surveys
 - For surveys to develop a management plan additional information is also recorded to enable a risk assessment of the asbestos containing material to be completed
- Accessibility
 - Easily accessible, usually inaccessible etc
- Condition
 - What is the extent of any damage or deterioration
- Surface treatment / sealing
 - Is the surface unsealed, painted, encapsulated

Surveys – information recorded (continued)

- Large amount of information needs to be recorded in a clear and logical manner
 - Pro-forma or
 - Hand-held data logging systems
- Photographs of all identified or presumed asbestos containing materials
- Plans marked up
 - Schematic
 - Simple scale plans
 - Computer aided design (CAD) plans

Bulk sampling strategy

- Area isolated
- Warning signs to keep others away from area
- Protect floor / adjacent surfaces with plastic sheet if necessary to prevent spread of contamination and for ease of clean-up
- Fibre release should be minimised
 - Wetting / damping of material
 - Shadow vacuuming
 - Minimise breakage
- Samples should be
 - Representative of the material being sampled
 - Sufficient size to enable (trace amounts of) asbestos to be detected

Bulk sampling strategy

- Sampling procedures
 - Sampling equipment cleaned between samples to prevent cross-contaminated
 - Samples taken from less conspicuous areas or where it causes less damage
 - Sample point repaired / sealed
 - Sample location accurately recorded and labelled
 - Samples uniquely identified
- Appropriate personal protective equipment used
 - Decontaminated or disposed after use as asbestos waste

Bulk sampling strategy

- Number of samples to be taken cannot be specified exactly
 - The number of samples is to some extent a matter of judgement
 - Balance between taking sufficient to samples to be confident that asbestos products have been identified and taking excessive numbers of samples with additional costs and increased potential for fibre release
- Sample numbers should reflect the extent of variation noted.
 - Fewer samples will be needed when the items are clearly identical, particularly where samples are found to contain asbestos

Bulk sampling – pipe / thermal insulation

- Number of samples
 - Often very variable in composition. Particular attention given to areas that are different in size, colour or texture.
 - Also, insulation on pipe elbows, joints and near valves may be different from that on main pipe lengths
- Sampling technique
 - Wet / damp material by injection or spray techniques
 - Use core sampler to ensure sample taken to full depth
 - Shadow vacuuming may be required
 - ‘Wet wipes’ around core sampler to clean it on removal
 - Sample point filled with inert filler and tape



Bulk sampling – spray coatings

- Number of samples
 - Usually homogeneous – so unless the installation is particularly large, or shows areas of repairs or alterations, two samples (one at each end) are usually sufficient
- Sampling technique
 - Wet / damp material by injection or spray techniques
 - If spray coating sealed / painted a small area can be cut with sharp scalpel or knife and peeled back
 - Small sample taken with core cutter or tweezers
 - Shadow vacuuming may be required

Bulk sampling – insulating board

- Number of samples
 - Usually homogeneous but replacements may have been made.
 - Each type sampled, usually one of each type per room is sufficient. If many rooms have similar boards fewer samples may be appropriate.
- Sampling technique
 - Wet / damp material by spray techniques
 - Shadow vacuuming may be required
 - Sample from damaged area if possible, or lever / break off sample at corner or edge with sharp knife or chisel
 - Exposed edges sealed / painted after sampling

Bulk sampling – cement products

- Number of samples
 - Homogeneous materials widely used as exterior sheets and roofing.
 - Limited numbers of samples required to confirm presence of asbestos.
 - For installations that are difficult to access or where sampling presents other risks such as from a cement flue it is reasonable to strongly presume the presence of asbestos.
- Sampling technique
 - Sample from damaged area if possible, or
 - break off sample at corner or edge with flat-jawed pliers or lever off with screwdriver blade
 - Care must be taken to prevent risk of falls from or through roof

Bulk sampling – textured (decorative) coatings

- Number of samples
 - Samples may need to be taken from each room or area
 - If large number of rooms / areas of similar appearance, a proportion of these may be sampled
- Sampling technique
 - Scrape off using sharp chisel
 - Area of about 10 – 20 cm² to obtain sufficient sample to detect trace amounts

Bulk sampling – other products

- Thermoplastic floor tiles / floor coverings
 - One sample per type or colour of tile
 - Small section or corner cut off with sharp knife
- Textiles, ropes, roofing felts etc
 - One or two samples for each distinct type of product
 - Usually obtained with sharp knife or scissors
- Dust and debris
 - Samples taken of fragments that appear to be consistent with asbestos products or contain visible fibres
 - Alternatively, samples of accumulated dust taken
 - Usually obtained with tweezers

Sample handling

- Samples adequately labelled
- Unique reference numbers to ensure traceability
- All samples placed inside an impervious bag or container which is then placed inside a second bag or container i.e. ‘double bagged’
- Bulk container for transporting all samples should be adequately marked with suitable asbestos warning labels