Asbestos in system buildings

Control of Asbestos Regulations 2006

Guidance for duty holders

Updated 18 September 2008

Purpose of this guidance

1. This guidance gives information about potential asbestos fibre release in all system buildings, based on investigations following an incident in a CLASP school building undergoing extensive refurbishment in the summer of 2006. It was found that asbestos fibres were released to air when the casings of the support columns were struck heavily. Background information to this incident is given in paragraphs 24-26. System buildings built from the 1950's to the early 1980's had there structural columns fireproofed with asbestos materials, which were in turn enclosed by metal casings. Asbestos fibres can escape from these casings if:

- There is damaged asbestos present under the casings; and
- The casings are vibrated in some way, e.g., by an adjacent door being slammed; and
- There are gaps or openings in the casings.

When these gaps and openings are sealed – asbestos fibres cannot escape into rooms.

2. System buildings are particularly widespread throughout the public sector, the majority of them are school buildings. See box below for some of the different types of system buildings. There is a likelihood that such buildings contain asbestos materials. The issues arise predominantly in system buildings but you should be aware that steel-clad columns with asbestos insulation may also have been incorporated into traditional buildings of the time.

Types of system building

CLASP	SEAC	ORLIT	
SCOLA	HILLS	SPOONER	
MACE	LAINGSPA	N	SIMMS SON AND COOK
ONWARD	VIC	HALLAM	PRATTEN
METHOD	CLAW		BRISTOL
ASC	AUSTIN-HALL		BOULTON&PAUL TIMBER
LESSER BS	STONERE SB		SWIFTPLAN LTD
TERRAPIN LTD	TRANSLINK LTD		WARNICK & SONS
YOUNGMAN SB			

This list is not exhaustive

3. Maintenance workers, cleaners and building occupants (including school staff and pupils) in the course of their normal activities, will have their potential for exposure to asbestos fibres minimised, if asbestos materials are being managed in accordance with this and other relevant guidance.

Duty to manage asbestos

4. Regulation 4 of the Control of Asbestos Regulations (CAR) 2006 requires duty holders who are responsible for the maintenance and repair of buildings in their control to manage the risks arising from asbestos. The 'duty to manage' requirement includes all types of system buildings. The 'duty to manage' requires duty holders to:

i. identify whether asbestos is present (or assume that it is);
ii. assess its condition and record that information;
iii. manage the risks to ensure that people are not exposed to asbestos fibres;
iv. provide information about its location and condition to every person who might be liable to disturb it to prevent exposure. This is particularly relevant to contractors and others who undertake maintenance and refurbishment work or other work that disturbs the fabric of the building e.g. cable installation.

Duty holder - Schools

5. In schools, the duty holder is the person in control of construction, refurbishment and maintenance activities in the premises. In educational establishments the duty holder will be the employer. Who the employer is can vary with the type of school:

- For community schools, community special schools, voluntary controlled schools, maintained nursery schools and pupil referral units the employer is the Local Authority.

- For foundation schools, foundation special schools and voluntary aided schools, the employer is usually the Governing Body

- For independent schools, the employer is usually the Governing Body or the proprietor.

Duty holder – other public sector services

6. In other parts of the public sector the duty holder will be the health or ambulance trust, National and Local Authorities, Fire and Rescue Authority (board in Scotland) or Police Authority in (board in Scotland).

Asbestos in system buildings

7. Asbestos containing materials (ACMs) were widely used in 'system' buildings constructed before the 1980's. The precise date from which ACMs

were no longer used will vary according to the building system followed, as well as the type of asbestos and ACMs installed. The use of Chrysotile "white" asbestos was formally prohibited at the end of 1999 and amosite "Brown" asbestos in 1985 although voluntary withdrawal often took place several years before. Crocidolite "Blue asbestos" is rarely encountered in buildings constructed after 1970. Within all buildings of the period, ACMs were used extensively for heat insulation and fireproofing, as well as in floor and ceiling tiles and wall panels (a more complete list is given in MDHS 100 and HSG227). Many of the system buildings used lightweight steel frames that required fire protection,particularly in ground floor locations of multi-storey buildings. One particular type of ACM, Asbestos insulating board (AIB) was often used for this purpose. Building systems developed over time and details were revised and specification of materials changed, also the project architect may have specified some alternative or additional uses of ACMs that may not necessarily be recorded or included in the basic building design. This has led to variation in the types and locations of ACMs within these buildings.

8. CLASP[1] and SCOLA[2] system buildings and others where similar construction techniques have been used, built between 1945 and 1980, normally have amosite containing AIB around the steel columns (although other types of ACMs and non-asbestos materials are also found). The ACMs may be fixed directly to the column or glued to the metal casing that encloses the steel column and ACM. ACMs may also have been used as column packing and may be found in blind boxes to the window frames.

Footnote:

[1]CLASP (Consortium of Local Authorities Special Programme) was formed with the purpose of developing a method of building, which did not rely on traditional building skills, to provide fast and efficient permanent buildings. The systems were developed as either proprietary contractor owned products or Local Authority Consortia designs. Of a total number of 3134 CLASP contracts in the UK there are more than 1400 sites with CLASP built schools (some comprising more than one contract), distributed among 81 LEA/Children's Services Departments/Scottish Local Authorities. Independent schools own a small number of CLASP buildings. There are also small numbers of CLASP buildings across other areas of the public sector including local government, police, fire, MOD, health and railways.

[2]SCOLA – (Second Consortium of Local Authorities) was a voluntary association of authorities formed to share resources and expertise in the design and construction of structural steel frame building projects. A central development group comprising a team of advisors providing technical and cost guidance now operates under the name of Pillar Consultancy.

9. ACMs may also have been used in these buildings as unrecorded substitute items where there were material shortages and/or poor supervision. In addition excess or waste ACMs may have been left hidden inside columns or panels and ceiling voids. Consequently, asbestos may be found in some unexpected locations and the presumption should be that ACMs would be present in other concealed areas.

10. There is potential for asbestos fibre release from damaged column casings in system buildings. Gaps in the column casings can occur as a result of previous alteration, removal or direct physical impact on the casing as highlighted by the incident in the CLASP school referred to in paragraph 1. In light of this incident, HSE asked the duty holders for schools to take immediate action to identify and seal any gaps in damaged column casings. School buildings were considered to be a priority due to the nature of the school environment, the age of the occupants potentially exposed and because schools make up the largest stock of system buildings.

Summary of findings from airborne monitoring in clasp buildings

11. ACMs pose minimal risk to health if undamaged, undisturbed and maintained – in this case by sealing any column casing gaps. Under these circumstances there will be little or no measurable release of airborne asbestos fibres from the ACMs. This is supported by the results of fibre sampling in CLASP buildings using two techniques – see Annex 1.

12. This work showed:

- Columns in poor condition (i.e. gaps in the casing) – repeated striking released asbestos fibres into the classroom significantly above background levels;

- Columns where gaps in the casing had been sealed but the column tops within the ceiling void were unsealed – repeated striking did not release asbestos fibres into the classroom significantly above background levels;

- Columns in good condition (i.e. no gaps in the casing), column tops within ceiling void unsealed – repeated striking did not release asbestos fibres into the classroom significantly above background levels;

- Entry into and disturbance of ceiling voids – this resulted in asbestos fibre levels within the void significantly above background levels;

- Background sampling at room level in a large office and a school where no column sealing had been done – using a technique that could distinguish asbestos from other fibres, over five weeks the asbestos fibre levels were found to be significantly lower than the UK

background average for ACMs in buildings in the office. The school was found to have chrysotile board (asbestos cement) and the fibre concentration did not exceed the expected background;

- Background sampling at room level in occupied schools with full and partial sealing of casing gaps – using a technique that could distinguish asbestos from other fibres, the asbestos fibre levels were found to be significantly lower than the UK background average for ACMs in buildings.

13. Personnel who carry out activities such as sealing the tops of the columns would be subject to a heightened level of exposure requiring respiratory and other personal protective equipment along with precautions to prevent the spread of dust. Overall, the risk of exposure is less if entry into the ceiling voids can be avoided. Unless there is some other reason to enter the void or replace ceiling tiles when it could be done at the same time, sealing of the column tops is not therefore a priority.

14. Full details of the sampling work are available in HSL reports 'Summary of fibre concentrations in CLASP construction schools containing asbestos' (HSL 2007/12) and 'Further measurements of fibre concentrations in CLASP construction buildings' (HSL RR624). These are available to download from the HSE website at http://www.hse.gov.uk/asbestos/information.htm

Action required by dutyholders

15. Duty holders should take the following action to manage asbestos in their system buildings. This is summarised in the checklist at Annex 2.

i) Identify all system buildings from the period 1945 and 1980 in their control and particularly CLASP and SCOLA (pre-1980) as a priority. Assistance on identifying CLASP buildings can be obtained from SCAPE (see paragraph 27). Carrying out a desktop survey of building plans can help with identification but note that these plans may not always be wholly accurate (see paragraph 7). Consider also traditionally built schools of the time with 'system-type' columns and cladding.

ii) Visually inspect each of the column casings in the building as follows:

- the full lengths of all the column casings visible in the room for cracks, gaps, presence of screws, dents, damage and movement

- the back of the casings as there is potential for gaps to occur here

- the bottom of the column casings, where it meets the skirting board or floor, for cracks and gaps.

- check also for signs of maintenance work after installation e.g. fixtures and fittings attached to casings,.

iii) Priority for sealing any gaps should be given to:

- all buildings constructed prior to 1980 for CLASP and SCOLA and up to 1985 for other system buildings unless knowledge of asbestos use in the design is available.

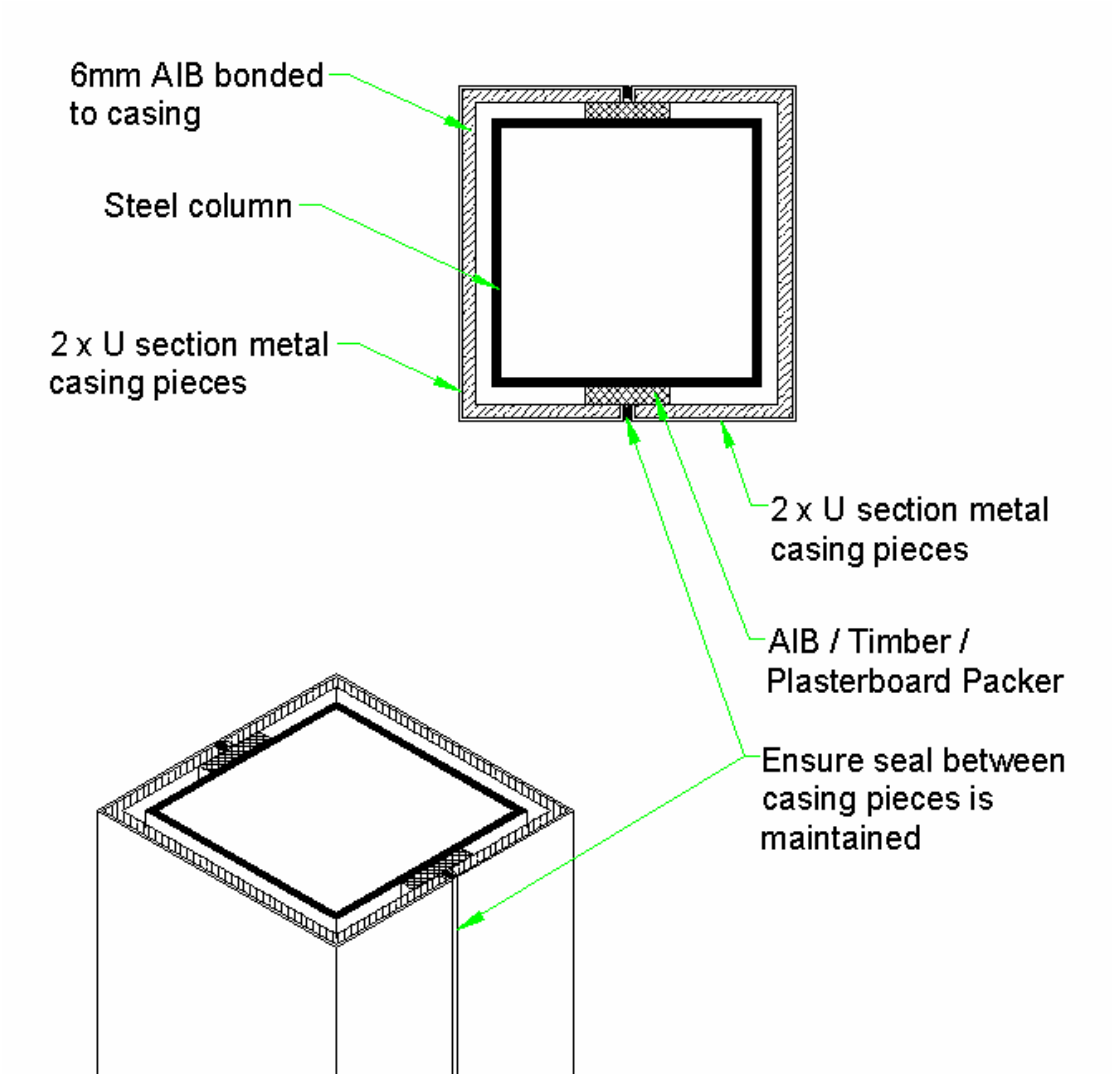
- ground floor columns, as they are the most likely to have AIB fire protection on the steel work

- where refurbishment/installation works have disturbed the column casings and the internal lining to the external wall.

- where cables or wires have been threaded inside the column casings possibly disturbing the ACM.

- where items have been fixed to the column casings e.g. fire extinguishers hanging brackets.

Figure 1 - Diagram of casing around columns



iv) Seal all gaps in the joints between:

- column casing to casing
- column casing to skirting
- column casing to walls/window frame

using a silicone based sealant (conforming to BS5889:1989) to enclose any dust and debris within the casing. UPVC strips can be used as finishing over the top of the sealed gaps using the same sealant. The seal should be made as flush as possible to the surface to prevent people pulling the sealant out at a later date. Larger gaps e.g. by window frames may need alternative sealing methods such as timber beading. Gaps at the rear of columns that are difficult to access should be sealed using batons between the wall and the column.

v) Check for gaps seal around any items that have been fixed to the column casing e.g. fire extinguisher hanging brackets.

vi) Visually check to ensure that the sealing is complete and intact.

vii) If the casings are loose they should be re-secured using the fixings that are normally at high (above ceiling) and low (behind skirting board) level and comprise either a locking rod or screwed/nailed in. Any work undertaken to re-secure loose casings should be carried out in line with the procedures given in the Asbestos Essentials Task Sheets for minor drilling work - see http://www.hse.gov.uk/asbestos/essentials/index.htm

viii) Note and record the action taken.

16. As the above action does not involve disturbance of ACMs (in most cases) it can be considered routine maintenance work and can be carried out by suitably trained maintenance personnel, rather than a licensed asbestos contractor. The Control of Asbestos Regulations 2006, (CAR) Approved Code of Practice and guidance L143 (see http://www.hse.gov.uk/asbestos/regulations.htm) contains specific obligations for the provision of asbestos awareness training to all employees who could foreseeably disturb and be exposed to asbestos. This includes caretakers and other maintenance staff.

17. Teachers and other building users are not required to have specific training as they are not liable to disturb asbestos. However, as part of the required asbestos management plan they should have been told about the presence of asbestos and instructed not to lift ceiling tiles. They should also have been made aware of the need to report damage to column cladding, ceiling tiles etc. If serious damage to a column and resulting suspected exposed asbestos material is reported, advice should be sought on what action may be needed from a competent person such as a licensed asbestos contractor.

18. Ceiling voids have the potential to be contaminated as the tops of columns in the ceiling void are usually open and/or asbestos debris may have been left nearby in the void. If maintenance or other work requires staff to access the area they should be aware of the potential for contamination and be suitably protected – see paras 20-23 below.

19. Any missing or broken ceiling tiles should be replaced to reduce the amount of air exchange between the ceiling void and room below. Minor work involving contact with ceiling tiles which may have contamination on their upper surface should be carried out in accordance with the guidance given in Asbestos Essentials – see http://www.hse.gov.uk/asbestos/essentials/index.htm

Training

20. Any work that may disturb the column casing should be properly assessed to determine the potential for ACM disturbance and carried out in accordance with CAR 2006. Mechanical fixing of items of plant equipment, accessories or fixtures should be avoided, but if this is not possible the process must be fully risk assessed and precautions taken in accordance with CAR 2006 including the appropriate level of training.

21. Anyone entering a potentially contaminated area or involved in work with asbestos must be trained and suitably equipped to deal with it. There are three levels of asbestos training required by CAR 2006 (Regulation 10):

i. Asbestos awareness training is for employees who are likely to disturb asbestos while they are carrying out their normal everyday work, and employees who may influence how work is carried out. This includes caretakers, maintenance contractors and similar groups. The training should cover the properties of asbestos and its effects on health; the types, uses and likely occurrence of asbestos and ACMs in buildings and plant; the general procedures to be followed to deal with an emergency; and how to avoid the risks from asbestos.

ii. Training for non-licensable asbestos work is for employees who will knowingly disturb ACMs such as maintenance workers and their supervisors, and those who carry out asbestos sampling and analysis. This training should be in addition to the asbestos awareness training and includes how to assess the risk; how to undertake the job safety; how to correctly use RPE and PPE; hygiene requirements; decontamination procedures; waste handling procedures; and emergency procedures. Procedures for carrying out specific asbestos related jobs and detailed guidance on PPE and decontamination is available from Asbestos Essentials which can be downloaded from the HSE website at http://www.hse.gov.uk/asbestos/essentials/index.htm

iii. Training for licensable asbestos work – see CAR 2006 Approved Code of Practice and Guidance, L143 for detail.

22. Suitable personal protective equipment (PPE) includes:

- Disposable overalls (type 5) fitted with a hood
- Suitable ‘fit-tested’ particulate respirator e.g. a disposable FFP3 mask (to be worn under the hood of the overall)
- Cover shoes or boots without laces (laced boots can be difficult to decontaminate.

23. Duty holders are reminded that CAR 2006 applies to all property maintenance and refurbishment projects. It is known that the current ‘Building Schools for the Future’ programme will involve extensive refurbishment and remodelling of existing school buildings therefore under the ‘duty to manage’ the duty holder must ensure all persons involved in planning and carrying out the work are made aware that asbestos is likely to be encountered.

Background

24. In September 2006 it was reported to HSE that following window replacement and associated asbestos removal work at a Mark 4/4b CLASP school earlier in the summer, contractors failed to obtain levels of fibre in air below 'clearance levels' when as part of deliberate disturbance they struck parts of the metal casing around columns in the room. The measured concentrations inside the tented enclosure suggested that there was release of fibres from within the columns. The standard method used to count the fibres (phase contract microscopy) did not discriminate between asbestos and non-asbestos fibres.

25. An assessment of the cause of the release found that a particular set of circumstances was needed for there to be a release of fibres. These were:

(i) damaged asbestos insulating board and debris lying within the columns, for example, if the AIB has been damaged by earlier maintenance or installation work such as window replacement that has broken into the columns (this method of work is contrary to advice from SCAPE System Build Ltd, which is the trading company for CLASP)

(ii) significant impact on the casings, i.e. casings being forcibly struck by furniture or people causing fibres to come off the exposed edges of the damaged AIB, and vibration caused by closure of windows and doors.

(iii) a poor seal in some of the metal column casings that are meant to enclose the AIB, causing gaps through which fibres can escape into the room. Gaps are most likely to occur between joints in the metal casing around the columns, between the casing and skirting or wall (see figures 1-4). They are most likely to be present if the metal casing has been cut in some way, for example, by maintenance and installation work or if the casing has been removed and then repositioned. However, even where none of these activities have occurred, gaps may still be found along the 2 joints to the column casings or at the bottom of the casing.

26. Further investigations showed that there were a number of other factors that would have contributed to the incident:

- During the original construction of the school, waste material, including AIB and asbestos cement sheet, had been discarded within the external wall cavities. This was particularly poor practice and could occur in other system-buildings.

- The metal column casings had been disturbed over the years during cabling and other minor work. These activities had caused damage to the concealed AIB.

- Replacement windows had been fitted in a manner that had also caused disturbance of the metal column casings and damage to the AIB. Window replacement work was not carried out in accordance with CLASP's standard recommended fixing methods.

- Debris from previous asbestos installation or removal works in the column casings behind panels, walls skirting board etc. Again this was particularly poor practice in this school and may or may not be common to other system buildings.

Figure 2: Metal clad column showing gap at front of column where the two halves of the cladding meet

Figure 3: Window column with half the section of casing removed – revealing the column and AIB

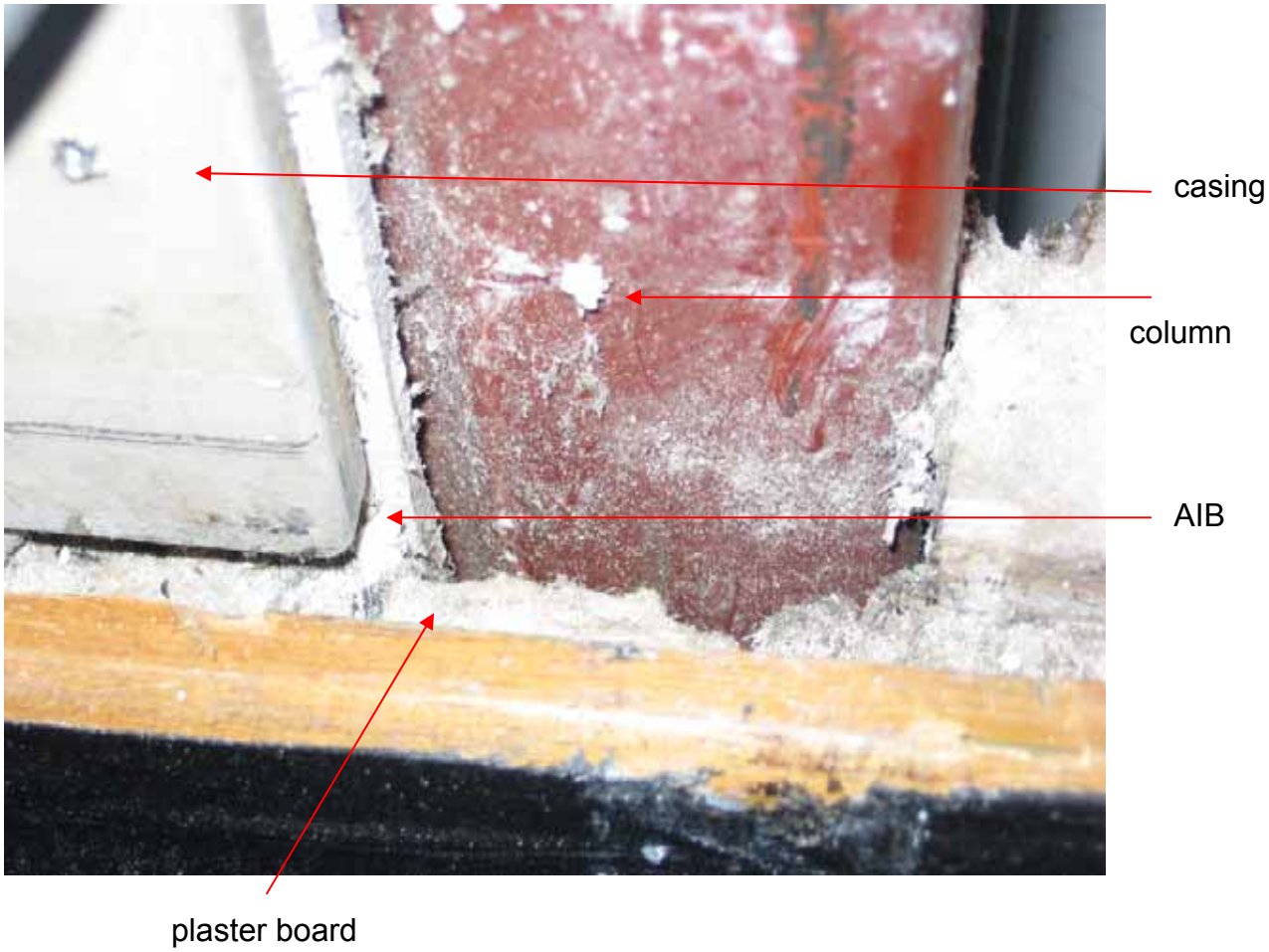


Figure 4: Example of a gap in the casing

Further information

27. For information on CLASP buildings see the Scape Asbestos Awareness Handbook which can be down loaded from http://www.scapebuild.co.uk/NetBuildPro/process/29/BuildingSystems.html. The handbook is not a substitute for the correct application of the procedures and need for a survey as set out in the HSE Regulations. It does however, provide guidance as to where asbestos was typically specified in the CLASP standard details. (SCAPE System Build Limited is a Local Authority Controlled Company. It commenced business in April 2006 and is the trading company for the CLASP Consortium. For more detail consult the Scape web site www.scapebuild.co.uk and the CLASP web site www.clasp.gov.uk.)

28. For information on SCOLA building designs see Pillar Consultancy at http://www.pillar.saqnet.co.uk/

29. For information and guidance on all aspects of asbestos including regulations, duty to manage and licensing see HSE website at http://www.hse.gov.uk/asbestos/index.htm

ANNEX 1

Overview of results of HSL disturbance testing in system-built school premises

Summary of Airborne Monitoring in CLASP Buildings

Air monitoring was carried out by the Health and Safety Laboratory (HSL) in a series of CLASP schools in 2006 and 2007. Data was also sought from a number of Local Education Authorities who had monitoring data collected by asbestos analysis laboratories with United Kingdom Accreditation Service (UKAS) certification. Over three hundred measurements of the airborne fibre concentrations were summarised in the first report dealing with schools - HSL 2007/12 - 'Summary of fibre concentrations in CLASP construction schools containing asbestos' The findings of further sampling work are contained in the second report - HSL RR624 –'Further measurements of fibre concentrations in CLASP construction buildings'.

These results are summarised as follows:

- **Disturbance testing of columns containing AIB that were generally in poor condition with evidence of poor seals and visible damage to the cladding –**

  It was shown conclusively that repeated striking or similar disturbance can give rise to short-term airborne asbestos fibre release into the classroom. The magnitude of the airborne release was likely to increase with the degree of disturbance and the extent of damage to the ACM inside the column, and the number of unsealed gaps and holes in the column cladding.

- **Disturbance testing of columns after remediation i.e. when gaps had been partially or fully sealed -**

  Some of the columns giving rise to the airborne releases above were sealed with silicone and retested. Other columns were also sealed and disturbance tested for release. A result showing fibres slightly above background levels and within acceptable limits was achieved by sealing the columns.

- **Disturbance testing of columns in schools in good condition -**

  A limited number of columns judged to be in reasonable or good condition were subject to disturbance testing i.e. sampling while the cladding was subject to physical striking, and showed that peak releases from this disturbance of columns in good condition with good seals were low even though the tops were unsealed.

- **Entry and disturbance of ceiling voids -**

Direct measurement in the ceiling void above the unsealed column showed that all-fibre levels emitted were around 0.01 f/ml. However, presence of unsealed columns did not readily increase levels in the room below. Other types of disturbance of the ceiling area such as taking down tiles to gain access to the void and disturbing settled dust gave airborne fibre concentrations a factor of 10 or more higher.

The findings above were based on limited dilution and no air circulation within the column enclosures, and from a count of all fibres found in the air samples – not just asbestos fibres. Therefore this provides an upper estimate of asbestos fibre levels. Analysis and tests were carried out at other sites to estimate airborne levels of fibres likely to be asbestos.

- **Unremediated occupied offices and schools – room level**
  Five weeks of daytime sampling was conducted in two locations in a large office building where the double swing doors and frames were attached close to columns. The doors were in regular use but monitored airborne fibre concentrations by TEM did not exceed the limit of quantification. Overall the upper 95% confidence limit for airborne asbestos fibres was ten times lower that the previously measured average UK background for ACMs in buildings. Only one unremediated school was monitored while occupied but this was found to have chrysotile board (asbestos cement) in the column. The limited sampling time (1 day) showed that the concentration did not exceed the expected background.

- **Fully and partially remediated re-occupied schools – room level**
  28 samples from 7 schools (5 partially remediated and 2 fully remediated) were reported after re-occupation. No asbestos fibres were detected during TEM analysis and taken as a whole represented a combined average ten times lower that the expected background found in UK asbestos containing buildings. One further school tested by TEM in the first report where damaged columns with swing doors were only partially remediated reported one fibre found but the combined average did not exceed the expected background.

Detailed information can be found in - HSL 2007/12 - ‘Summary of fibre concentrations in CLASP construction schools containing asbestos’ The findings of further sampling work are contained in the second report - HSL RR624 –‘Further measurements of fibre concentrations in CLASP construction buildings’.

ANNEX 2

Asbestos in system buildings - Duty holder checklist

Certain school buildings are called "system buildings" and have their structural columns fire-proofed with asbestos materials, which in turn are enclosed by metal casings or cladding. In 2006, HSE identified that asbestos fibres could escape from these metal casings if:

- there was damaged asbestos beneath the casing; and
- the column casing was vibrated in some way, e.g. by an adjacent door being slammed; and
- there were gaps or other openings in the casings.

When these gaps and openings are sealed - asbestos fibres cannot escape into classrooms.

If you have responsibility for the maintenance and/or repair of non-domestic premises such as schools, then you have duties as a ‘dutyholder’ under the Control of Asbestos Regulations 2006.

This means that you should know whether your premises, including system buildings, contain asbestos, where it is, what condition it’s in and then ensure that you manage it properly which includes telling those people who may disturb it that its there. Even if you are not the building owner but have some responsibility for the premises or its inhabitants you should be able to answer the questions in the checklist below.

In system buildings you should assume that asbestos materials are present around structural columns and beneath casings and claddings unless you know for certain that no asbestos materials are present. You should also be aware that steel-clad columns with asbestos insulation may have been incorporated into traditionally-built schools of the time.

Answering these questions will help you determine whether you are taking the necessary action or need to do more to manage the risks from asbestos in system buildings such as CLASP, SCOLA etc.

System Buildings

- Are you aware of the types of system building where asbestos-containing materials may be present within metal-encased columns and related areas?
- Do you know how many of these buildings you have and where they are (including traditional buildings of the time with the ‘system-type’ columns and cladding)?
- Have you visually inspected the buildings and identified where there are gaps in the column casing?
- Where windows have been replaced have you checked for any cuts that may have been made into adjacent column casings?

- Have you taken action to seal all gaps in the column casing, including as above and where items such as fire extinguishers have been fixed?
- Is further action still needed and, if so, when will it be completed?
- Have you replaced all broken or missing ceiling tiles in these buildings?
- Have you informed* all relevant staff where asbestos is likely to be present including potential contamination of ceiling voids, and have you provided them with instructions not to disturb such materials, lift ceiling tiles or access voids without appropriate protective measures?
- Have you recorded all action taken?
- Do you have arrangements for ongoing inspection, maintenance and repair of the seals and ceiling tiles as necessary?
- Have you advised school and other relevant staff of action to take if they find or suspect damage to column seals or ceiling tiles?
- Do you have arrangements in place to ensure an effective response to rectify any damage notified?
- How do you ensure that all persons, including visiting workers, who might disturb asbestos-containing materials e.g. wiring contractors, caretakers, etc are advised* of its presence?

General asbestos management arrangements

- Do you have an asbestos register for all premises containing asbestos-containing materials?
- Do you know the condition of asbestos-containing materials in all your buildings?
- Do you have a plan for managing the risks from asbestos and is this reviewed periodically?

*As part of your information sharing it may be appropriate to consider labeling areas where asbestos-containing materials are known or suspected to be present at your premises.