EPA Sample List of Asbestos Containing Materials

http://www.epa.gov/Region06/6pf/asbestos/asbmatl.htm

NOTE: This list does not include every product/material that may contain asbestos. It is intended as a general guide to show which types of materials may contain asbestos.

Acoustical Plaster
Adhesives
Asphalt Floor Tile
Blown in Insulation
Base Flashing
Boiler Insulation
Breeching Insulation
Caulking
Ceiling Tiles/Lay-in Panels
Cement pipes
Cement Siding
Cement Wallboard
Chalkboards
Cooling Towers
Decorative Plaster
Ductwork flexible fabric connection
Electrical Cloth
Electrical Panel Partitions
Electric Wiring Insulation
Elevator Break Shoes
Elevator Equipment Panels
Fire Blankets
Fire Curtains
Fire Doors
Fireproofing materials (foam)
Flooring Backing
Heating and Electrical Ducts
HVAC Duct Insulation
High Temperature Gaskets
Joint Compounds
Laboratory Gloves
Laboratory Hoods/Table Tops
Mastic
Packing Materials (for wall/floor penetrations)
Pipe Insulation (corrugated air-cell, block, etc.)
Putty
Roofing Asphalt
Roofing Felt
Roofing Putty
Roofing Shingles
Skim Coats
Spackling Compounds
Spray Applied Insulation
Stucco
Taping Compounds (thermal)
Textured Paints/Coatings
Thermal Paper Products
Transite pipe
Vermiculite Insulation
Vinyl Floor Tile
Vinyl Sheet Flooring
Vinyl Wall Covering
Wallboard
Window Putty

TEM vs. PCM Sampling

The client should be aware that the two methods – TEM v PCM - are not readily comparable. An air sample could pass (clear) PCM but fail TEM clearance or vice versa. The reason for this discrepancy was simply the power of the TEM microscope. At a 20,000 power minimum magnification, the TEM method is able to see very thin fibers that will not even be detected by the PCM 400 power microscope. In addition, the TEM method counts any fibers greater than 0.5 micrometers in length with a 5:1 aspect ratio. It is seen in counting much smaller fibers than PCM. On the other hand, one could fail PCM but clear by TEM. This is usually the case when there are other interfering fibers besides asbestos. PCM will count these; TEM will not count them because they are not asbestos. No one said understanding asbestos testing is quick or easy. All personnel at American Air Testing have taken many lengthy courses and passed government required testing. Because of the complexity of asbestos, the testing choice is really best left to licensed professionals.

Asbestos Transmission Electron Microscopy (TEM) Air Sampling

TEM uses electrons to create images, fine crystal patterns, and analyze the chemical makeup of fibers or structures encountered in the air sample. The machinery required is not very mobile and is very sophisticated. It magnifies objects at least 20 times their actual size. This method also is asbestos-specific. So specific that it can indicate the type of asbestos fibers in the air sample. This method is

often used when there are interfering fibers which causes the PCM results to be very high but asbestos fibers are not suspected as the cause of their high-fiber count. **This method is most appropriate for final clearance samples either due to regulation (AHERA) or liability issues. By law, schools, etc., must use this method. This is also most appropriate for litigation and real estate transactions.**

Asbestos Phase Contrast Microscopy (PCM) Air Sampling

Phase Contract Microscopy (PCM) Asbestos Air Samples is a method that follows a prescribed standard methodology called the NIOSH 7400 Method. PCM uses a light microscope to visually detect fibers. The microscope can be hand carried; one of the advantages of this method is mobility. Samples can even be analyzed on-site, which decreases the turnaround time required for obtaining results. The microscope magnifies objects approximately 400 times their actual size. The main disadvantage of the Phase Contrast Microscopy methodology is that it is not asbestos specific. The analyst counts any fiber that falls into a field of view that is greater than or equal to 5 µm in length, with a 3:1 aspect ratio(three times longer than its width). **You need to be aware of this when requesting that we analyzing this type of sample. Items such as carpets, wood, fiberglass, and drywall can produce fibers that fall in this size range and will be counted along with asbestos fibers in determining exposure.** PCM is generally cheaper for the lab to process but there are multiple drawbacks as well as advantages of this method. Some projects may require both TEM and PCM sampling for valid clearance. American Air Testing uses TEM sampling methods for asbestos abatement clearance as the preferred method. This insures the client of more accurate sampling.

Strategies for Number of Samples

Surfacing Materials

Surfacing materials are the biggest concern of the AHERA regulation because of their friability and/or presence in public areas. The EPA funded the production of a guidance document for sampling friable asbestos-containing materials that was published in 1985. This was years prior to the AHERA regulation. This document was entitled: "Asbestos in Buildings: Simplified Sampling Scheme for Friable Surfacing Materials". This document is often referred to as the “Pink Book”. Many of the recommended practices in this document were adopted by the AHERA Final Rule as regulations. The main recommendation adopted by AHERA (and thus OSHA by reference) was the number of samples to be taken for surfacing materials. The procedure for determining the number of samples to be taken for surfacing materials is as follows:

Identify homogenous areas of suspect surfacing ACBM.

Quantify the area (square footage) of each homogenous area of suspect surfacing material.

Apply the 3, 5, 7 Rule which indicates the minimum number of samples as follows:

<1000 square feet	**3 Samples**
>1000 square feet, but <5000 square feet	**5 Samples**
>5000 square feet	**7 Samples**

For example, homogenous area of suspect ceiling plaster measuring 3500 ft.^{2} would need to have five samples collected. These minimum number of samples required by AHERA and recommended by the “Pink Book” were created to minimize errors due to lack of uniformity in the distribution of asbestos throughout the material and laboratory error.

The “Simplified Sampling Scheme for Friable Surfacing Materials” actually recommends that the inspector take 9 samples for every homogenous area of suspect material. The AHERA regulation did not make this recommendation mandatory for schools, realizing the costs involved in taking that many samples.

In addition to the required number of samples for surfacing materials based on their area, the “Pink Book” recommends taking quality control samples. These samples are to check the consistency of the

results obtained from a laboratory. The inspector can obtain a quality control sample by taking two samples immediately adjacent to each other of the same homogenous material. These are given unique sample numbers so the laboratory analysts cannot readily identify the quality control sample. Any major discrepancy between the actual sample and the quality control sample will require additional quality assurance procedures – even more samples of the same material. The major discrepancy example would be a result of less than 1% on the actual sample and a result of 50% on the quality control sample. EPA's "Pink Book" recommends that the inspector take at least 1 quality control sample per building or one per 20 samples, whichever is larger. Because it is a laboratory check on the asbestos content of the material, it should be done per homogenous area of surfacing material.

Thermal System Insulation
The AHERA/OSHA protocol for required number of samples for thermal system installation is as follows:

Take a minimum of 3 samples from much of this area of thermal system installation.

Take one sample for patched sections of thermal system installation if the patched section is less than 6 linear feet or 6 ft.^{2}.

In order for the inspector to detect a patched section, there must be some difference in color or texture from the rest of the thermal system installation. It is not homogenous with the rest of the material. Therefore, if the patched section is greater than 6 linear feet or 6 ft.^{2}, it is a separate homogenous area of TSI and would require a minimum of 3 samples. This would be true even if the patched section was 8 ft.^{2}.

Take samples "in a manner sufficient to determine" of mudded fittings "per mechanical system".

Asbestos-containing mudded fittings (elbows, tees, valves, etc.) were on-site mixtures. Asbestos was mixed with other substances in water to make a mud. This was applied around the fittings and allowed to set. Since the process of making the asbestos-containing mud was not rigidly controlled by a manufacturing process, the percentage of asbestos in mudded fittings can vary from even fitting to fitting on the same system. Mudded valves are also a high maintenance item. They are continually being fixed or replaced in older systems. These two facts necessitates that in order for the inspector to "sufficiently determine" if a homogenous area of mudded joints are asbestos-containing or not, more than one sitting should be sampled.

The Industry Standard (common way of conducting sampling versus regulatory compliance) is to take 3 samples at a minimum of any homogenous area of suspect ACBM. A minimum of three samples was required by the 1982 Friable Asbestos in Schools Rule, it is the minimum for surfacing and TSI, in general, and was espoused in EPA's Asbestos Sampling Bulletin of September 1994 when discussing sampling of taping mud on drywall systems.

Sampling of mudded fittings is required to be conducted per mechanical system. The inspector or inspection company must arrive at a consistent definition of a "mechanical system". Some companies define the mechanical system as the entire HVAC system or plumbing system. Most companies will, at a minimum, divide the HVAC system into sub-systems. These are (1) Heat or cold source (Boiler/Chiller), (2) distribution lines, (3) heat/cold exchangers, and (4) return lines. Sampling will be done per sub-system for the mudded joints and the pipe insulation. The rationale for sampling in this method is that each sub-system would have different insulation needs. For example, in a steam heated system, the distribution lines would need a high insulation factor to ensure the steam reaches the heat exchangers before cooling and condensing. The return lines do not meet the same insulation factor so the inspector might expect a different type of pipe insulation or different percentages of asbestos in the materials. Other companies will further divide the system and conduct sampling per pipe function.

No samples need to be collected from any homogenous area of thermal system installation if

the accredited inspector determines that the TSI is fiberglass, foam, rubber, or other non-ACBM.

The inspector must determine that the insulation is non-ACBM. The burden of proof lies with the accredited inspector so he/she must be confident with his/her method of determination. Non-ACBM insulation on ductwork and pipes has been found to have asbestos-containing paper underneath the non-ACBM insulation. Some of the jackets or mud applied over non-ACBM insulation has been found to contain asbestos. Therefore, when in doubt, sample the material.

Miscellaneous Material

AHERA/OSHA required the miscellaneous suspect ACBM be sampled "in a manner sufficient to determine" per homogenous area of material. Floor tiles should be sampled per tile color and size. Ceiling tiles should be sampled by color, dot pattern, and size. If the inspector goes by the industry-standard, he/she will take three samples of each material.

Resilient Flooring Materials

The inspector should remember that non-friable material could be assumed to contain asbestos. If the inspector opts to sample the floor tile, mastic, or vinyl floor sheeting, he/she should be aware of the following in order to sample "in a manner sufficient to determine":

If the floor tiles are in a symmetrical pattern, (e.g. checkerboard pattern) the inspector could assume that they were all laid in at the same time so the mastic underneath the tiles is homogenous. It is always best to visually check this. If the floor tiles are in a non-symmetrical pattern, the inspector could surmise that these tiles are patches were laid down at different times. In this case, the inspector must assume that the mastic underneath these different colors was applied at different times so the mastic might not be homogenous material.