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Hazardous Materials

How the design and application of some materials can create serious health hazards is reported by the Chief Specifications Writer of Skidmore, Owings & Merrill, New York.

Last February this column pointed out the hazards in the use of sprayed-asbestos insulation. The New York City Air Resources Commission has since instituted strict controls in the application of sprayed-asbestos fire protection to protect both the installers and the unsuspecting public.

These new ordinances require the complete sealing off of the area in which the work is to be performed by means of tarpaulins or temporary enclosures; use of approved Bureau of Mines masks; warning signs; cleaning up operations after installation; vacuuming of droppings into sealed containers and disposal in approved sanitary fills.

Awareness of this hazard should prompt us to examine all of the building materials that are currently employed, and especially the man-made products of chemistry in order to learn about their potential danger. If we can recognize the problem areas we should be able to minimize their hazards. Some materials pose certain problems during installation. Other materials can present certain problems as a result of their exposure in the completed design.

During application, there are countless materials that require special precautions. Spray fibers for thermal insulation, fireproofing, and sound isolation, whether they contain asbestos, mineral wool, or similar fibers, can pollute the atmosphere with irritants that may be harmful upon inhalation. Enclosure of the areas where these operations occur may be necessary. Mixing of volatile paints and coatings that may cause explosive reactions must be carried on under controlled conditions. Tar products have been known to produce skin irritations and rashes. Some sealants have acrid fumes that may be harmful to people who are sensitive and allergic to these properties. It is essential that manufacturers recognize these problems and develop precautionary programs to reduce and minimize these hazards in the mixing, preparation, and installation stages. Contractors and installers should be cautioned and they should introduce safety measures for the protection of personnel involved in these applications.

For many years architects and engineers have designed buildings with components that are now being recognized as having a deleterious effect upon the inhabitants. For example, ducts, air shafts, and ceiling plenums utilized for the movement of supply or return air are sometimes lined with fiber-like materials such as asbestos, mineral wool, and fiberglass. These materials are used for either fire-resistive properties in the plenum areas or for sound isolation or thermal insulation in ducts and air shafts. They are constantly being eroded by air movement and the particles are carried into the air supplied in the habitable areas. Studies being conducted by some medical authorities indicate possible contamination of the air supply that may cause irritation, at the least, and serious health hazards at the worst. Details of designs should be reexamined to place these materials externally if possible, out of the air stream, or by coating and sealing these surfaces when there is no other solution. Some municipal bodies are studying these problems and are considering ordinances which may preclude the use of such materials when they are exposed in air handling designs. A recent New York City ordinance requires the sealing or coating of these fibrous materials in ceiling plenum areas.

Some materials, such as urethane foams, have been known to give off noxious gases when exposed to fire and are presumed to have lethal effects upon individuals exposed to these fumes. The new New York City Building Code, enacted in 1968, contains a provision against the use of materials for interior use that emit gases upon incineration that are more toxic than those produced by the burning of wood or paper. While no standard test method has been promulgated to evaluate the degree of toxicity of burning wood or paper as compared to other materials, one must begin to take cognizance of these materials as possible health hazards when subjected to fire. It is a well known fact that more fatalities occur from smoke and gas inhalation than from fire itself. In the disastrous Boston Cocoanut Grove fire, in the early hours, numerous persons died from the effects of smoke and fumes developed by the burning of coated decorations, than from flames produced by the fire.

Many plastics used in building construction should be tested for smoke development and fuel contribution, as well as flame spread characteristics, to determine whether, in the event of fire, the effects of smoke will be a contributory cause for fatalities. In addition, a meaningful standard test procedure should be developed to measure the toxicity resulting from the burning of materials to ascertain the level at which certain of these materials might be considered detrimental to the health and safety of the inhabitants.