

Health Issues with Building Materials During and After Construction

Building materials used in construction of building structures can welcome health issues subsequently for occupants or to workmen involved in building services, maintenances, demolition and refurbishment.

Even if the most green and benign materials are employed for the construction, the building siting, the original design as well as the any kind of conversion carried on it will bring the conditions of indoor environment to be imperfect.

This may be due to:

1. Vibration Effects
2. Poor acoustic characteristics of the building
3. Dysfunctional lighting
4. Extremes of relative humidity
5. The air exchange is inadequate
6. Toxicity mediated through soil

The above-mentioned issues will affect the durability of the building along with the health and comfort of the people residing in the respective building.

Building Materials to Hazardous Material Conversion Stage

The whole life of a construction material must be considered and audited into account to understand what are the human and environmental health hazard issues from these materials.

Other than this, the following mentioned stages must also be considered:

1. The health as well as environmental impacts during the procurement of raw materials and the final disposal of the by-product or the waste product must be considered.

The process of obtaining raw materials includes mining, synthesis, manufacture and quarrying. Disposal of mine or unwanted by products, quarry spoil is some of the disposed materials.

2. The hazards and health effects during the transportation of the materials must be considered.
3. The effects of manufacturing a building product: The harmful effects if exist will affect the production worker, the members involved in the process, the public and the environment around.
4. Improper handling of the product bringing harmful effects to the construction workers, the local residents and the environment.

5. The hazard effects from commissioned buildings that have installed product to the people residing.
6. The hazard effects from the works like maintenance, refurbishment and servicing to the professional workings, the decorators, plumbers, electricians and residents.
7. The health and hazard effects arising due to the disposal of discarded materials obtained through replacement or demolition to the residents, tradesman and the environment.

Identification of Hazards Within a Construction Material

The hazard in construction materials are explained by taking the practical examples of stock houses located in United Kingdom. These stock houses constitute a thousand-year history of construction techniques and materials.

The materials vary from rubble, timber, stone which were used in early constructions to concrete, steel, brick and breeze block.

During the time of construction, the surface skins and the connective tissues filling the gaps are largely composed of materials. By the end of 20th century as a concern of economy and safety thousands of construction materials of asbestos have been installed in UK for new and old buildings.

The variation in the use of water supply connection materials have also brought mitigation to leakage problems hence avoiding the possibilities leakage that will in turn cause cholera, typhoid and other health problems.

This was the time where less toxic materials were used for plumbing systems like copper, iron and polymers.

Different Mineral Based Construction Materials and Their Health Aspects

Care is necessary during the selection of constructional materials that are mineral based as their respective nomenclature is commonly imprecise. The use of a hazardous material or selecting a safer alternative for the design of buildings are determined by an informed specifier.

Hence the state of knowledge of the builders and the occupants will determine the methods of working with such hazardous materials and replacement products if any.

Some of the mineral construction materials and their respective health aspect is mentioned below:

Stone

The crystalline content and the amount of dust that is generated have the chances to be inhaled. This is the major health hazard caused by stone mineral used in construction works. Higher exposure to this will cause silicosis.

This is a health problem where the lungs will lose the normal elasticity, which will cause the act of breathing to become laboured. This will result in the impairment of blood circulation. This hence will result in the building up of waste carbon dioxide within the body and oxygen fails to enter the tissues. This will make the heart overburdened and final failure.

The excessive inhalation of stone dusts will result in increase of lung cancer as concluded from the studies. Based on the variation in the silica content of stones, their disease potential also varied.

Sandstone and true granite are notorious hazards for the masons. Sandstones are highly siliceous but granite can vary with their quartz content.

The hazard of these material lies in their quarrying and masonry work procedures also. To avoid risk, wet methods of blasting were introduced.

Slate Material

The slate material is also rich in silica content which bring the hazards of silicosis problems to the workers, the slate splitters and the engravers. The slate in the forms of slabs and tiles bring no form of harm to the occupants.

Concrete

Concrete patching will result the operatives to get irritation and become sensitive to the forms of cements and the additives used in the cement. The skin contact with the chromium ion present in cement is a problem. Withdrawal of contact with the cement faster will help in sooner recovery.

Clay Products

The clay is fired and later used for decorative purpose by glazing it. It is employed in the production of roof, sanitary piping, floor tiles and material structural decorative bricks.

Large silicate clay having a lesser hazard effect to health is transmuted during the clay firing into crystalline silica which are especially hazardous in nature.

This hazard effect is till the manufacturing process. This won't affect the construction workers or the occupants that are residing.

Vermiculite

This product is used in block form. It is used as a non-combustible thermal insulation between the joists. These brought problems for the carcinogenic potential.

This was determined by the observation of asbestos and vermiculite fibers in many specimens. A health study on a group of miners helped to find this health hazard.

The trapping of dust through the gaps of the ceiling and entering the room is a big cancer threat. If the material is very much needed, a fiber free material can be specified by the designer.

Calcium Silicate

A variety of chemical compounds in physical forms either of natural or synthetic origin have these calcium silicates. Some have fibrous forms while some have discrete particulates.

The test for carcinogenicity is determined by finding the calcium silicate content. Here too it is better to suggest non-fibrous products.

Gypsum in Construction

The gypsum material shows no health hazard. But it has accounted for 10 to 50 percent of radon in the soil due to the manufacture of plasters and plasterboards.

Asbestos

Fibrous form of serpentine and amphibole minerals form the asbestos. These materials were a concern behind the risks of asbestosis, lung cancer and mesothelioma. Many new materials out of cement and polymer matrix were developed to mitigate this problem and replace the asbestos material.

Non-Asbestos Mineral Fibers

WHO considered that there are materials to replace asbestos by materials like glass, slag wool, ceramic and refractory fibers. Complete removal of fibers products from the construction field is not possible but the most hazardous one can be removed.

Metals That are Used in Construction and their Health Effects

The different metals that are used in different construction application and their respective health effects are described briefly:

Lead

The lead toxicity has resulted in problems like paralysis, anemia, malaise, severe colic, convulsion etc. These can result in frank disease during their intake. This brought a decision on the replacement of lead as a construction material.

In olden days, the principal sources of environmental lead contamination were the solders, paints and the water pipes.

Adults intake the lead through drinking water while the children intake is through licking the wall with paint, chewing paintwork and house dust.

The use of copper in contemporary building have helped to eradicate the source of lead. The reformulation of the paint and the use of linseed putty help the lead entering the children tastes.

The harmful effects of leads have made the use of inorganic lead in paint and the use of organic lead in petrol by the government.

Chromium

The chromium does not bring any sort of hazard effect, whether if it is used as a decorative material or as a protective material in construction. This can be used as a corrosion resistant alloys.

The salts of chromium are used in cement additives. This may cause skin irritation on contact. This may sometimes lead to the persistent dermatitis. These metals also bring concerns about carcinogens.

Copper

Copper used in construction either in the form of metal or alloyed in brass bring no kind of health problems for the occupants. The workers engaged in industrial activities are more exposed to the heavy copper metal fume in large extent.

Cadmium

Acute and chronic effects are caused on the lung, kidney and bone by the entry of cadmium. Hence cadmium is a toxic element. These metals are used to coat steel, where they act as a protection against corrosion. This protective layer brings no form of harm to the occupants.

The redevelopment or demolition process will employ flame-cutting of the metal. This have resulted in attacks due to metal-fume fever. Some of these cases have been found fatal.

The cadmium metal will liberate a toxic fume, when they are overheated. This is hence categorized under hard solder. This is employed in the installation of certain domestic apparatus. But they bring no harm to the occupants. This can bring harmful effects for the engineers who carry out soldering and disassembling of the same.

The paints and plastic make use of cadmium as a pigment. In areas wherever there is possibility of leaching out or have chances of being ingested by infants, the same has to be excluded and a better alternative have to be suggested.

Iron, Stainless steel, steel and Aluminium Metals

The mentioned metal brings some sort of adverse effects in certain situations. But their use has never been foreseen to offer any form of risks to the occupants.