

Asbestos

General Aspects

Asbestos is an acid-proof and fireproof natural fibrous mineral substance of different colors. It is a silicate of calcium and magnesium ($\text{CaSiO}_3 \cdot 3\text{MgSiO}_3$). It also contains small amounts of iron oxide and alumina.

The natural asbestos can be divided into the following two groups: **Acid-resistance** like amosite asbestos and **Non-acid-resistance** like chrysolite asbestos.

Properties of Asbestos

Following are the properties of asbestos:

- 1- Its color is white, grey, greenish or brown.
- 2- It is fibrous in structure.
- 3- It is smooth like glass and silk.
- 4- It is acid-proof and fireproof.
- 5- It can be cut into pieces.
- 6- It is flexible.
- 7- It is an excellent insulator for heat and electricity.
- 8- Its melting point varies from 1200°C to 1550°C .
- 9- It is in corrodible and also vermin-proof.
- 10- The holes can be drilled and screws can be fitted on its surface.
- 11- It is capable of being interwoven with webbing to produce flexible fire proof material.
- 12- Its specific gravity is 3.1.
- 13- Its molecules are strongly bound together only in one direction and that is why it possesses very high tensile strength along the fibers.
- 14- It can easily mix with binding materials like bitumen and cement; such a mix can be easily worked into various forms and shapes to manufacture different articles.

Uses of Asbestos

Following are the uses of asbestos:

- 1- The asbestos cement products-sheets and pipes are prepared by mixing asbestos fibres with cement. The sheets are used as roofing material and the pipes are used to convey rainwater, seepage water etc.
- 2- The asbestos felt (prepared by coating asbestos fibers with bitumen) is used as damp-proof layer.
- 3- Being an excellent heat insulator, It is widely employed in the form for insulating furnaces, steam pipes, boilers etc.
- 4- Asbestos, when powdered or in the form of fibers, is sometimes kneaded into a dough with water and used for stopping up holes and cracks in small muffles, furnace bearing metal, etc.
- 5- It is also frequently employed for making moulded shapes to withstand high temperatures.
- 6- Asbestos is supplied commercially in the form of twine, rope. wool or flake, thin paper mill board, and moulded shapes etc.
- 7- Asbestos, in the form of fibers, is used for cable insulation, and in the sheet form it is used in lining and partition in switches and fuse boxes.
- 8- Fire proof suits of asbestos cloth have been used successfully for man engaged in fighting fierce fire.
- 9- Asbestos paper is used as a cover for electric wires in electric motors and coils exposed to high temperature.
- 10- It is used to form asbestos paints.
- 11- Asbestos having small length fibers is used for sound insulation in different conditions.

Commercial Forms of Asbestos

Some of the commercial forms of asbestos are described below:

1- Asbestos boards and sheets:

It is a construction or insulating material in sheets made of asbestos fiber and Portland cement moulded under hydraulic pressure.

- **Asbestos board:** The ordinary board is in natural mottled grey color, but pigmented boards are also marketed. The boards are dense and rigid, but can be worked easily with carpenter's tool. The specific gravity of

asbestos board is about 2.0, and it can withstand temperature up to about 540°C.

- Asbestos cement building boards are categorized into two classes:

Class A: Thickness = 6.5 mm, width 1.2 m

Class B: Thickness 5.0 mm. width 1.2 m

The length ranges are 1.2 m, 1.8 m and 2.4 m.

Asbestos sheets:

- The flat asbestos sheets are classified as compressed and uncompressed according to minimum unit bending stress of 22 N/mm² and 16 kg/mm² and density exceeding 1600 kg/m³ and 1200 kg/m³ respectively.
- The corrugated asbestos used for roofing and sliding industrial buildings, has a thickness of 4.76 to 6.35 mm and the usual corrugation has a pitch of 10 cm, the weight being 145 N/m².

Uses of asbestos boards and sheets:

- 1- Wall-lining, paneling, and false-ceilings.
- 2- Toilet partitions, back up for wardrobes, cupboards and kitchen-pantry shelves.
- 3- Blackboards, hoardings and Signboards.
- 4- Window panes and door panels.

Asbestos boards claim the following advantages over other conventional material like plywood:

- 1- Economical; do not require any protective treatment and maintenance.
- 2- Completely incombustible and hence act as an effective fire barrier.
- 3- They can take on paint, wry shade. They consume less paint and retain paint effectively.
- 4- Easily workable (can be easily cut, drilled, nailed and screwed with ordinary wood working tools).
- 5- Highty durable (do not warp in the presence of moisture, not affected by saline conditions and vermin and moth).

2. Asbestos cement pipes:

- These pipes are made of asbestos cement which is a mixture of asbestos fibers (15-20%) and cement (80-85%) and the required quantity of water, These can be prepared to any shape and length. Various forms of rain-water and drainage asbestos pipes are available in the market.
- They can be easily cut and require no painting to maintain them.
- Asbestos-cement bends and junctions, taper pipes, etc., can also be manufactured of the required shape and size.

Advantages of asbestos cement pipes:

- 1- Adaptability.
- 2- Easy installation.
- 3- Light, yet strong enough to withstand normal handling.

3. Asbestos paper:

It is used as a cover for electric wires in electric motors and coils exposed to high temperature.

4. Asbestos paint:

- It is prepared by adding finely ground asbestos to an oil paint or a distemper.
- It is fire, heat, sound and vermin-proof.
- It also prevents corrosion of metals.

5. Asbestos fibers:

- Asbestos is also available in the market in the form of fibers.
- The fibers have adequate strength and flexibility.
- These fibers are used in making conveyor belts, boiler insulation, etc.

6. Asbestos felt:

- It is made of asbestos fibers impregnated with mineral bitumen.
- Asbestos felt is water-proof.