AN EXPERIMENTAL APPROACH OF ENVIRONMENTAL MANAGEMENT PLAN FOR DESIGNING ASBESTOS CEMENT PIPES- A MODEL STUDY

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ABSTRACT

Asbestos is the commercial name given to a group of fibrous hydrated silicates that exists naturally in rock formations of earth crust. Based on the mineral composition it has been divided into two major groups as amphibole group which includes amosite, anthophy lite, crocidolite, actinolite, amosite, chrysotile and serpentine group which includes the most abundant variety of asbestos where chrysotile constitutes 98% of the world production. The major source of asbestos is through metamorphic rocks which enter in to atmosphere. Mixture of asbestos paste and cement which is compressed by steel rollers will be used to make asbestos cement pipes, they can be drilled and joined with other pipe at any part but threading like iron is not possible and if there is any leakage at threads it will be worse as time passes. While laying these pipes, good supporting soil bed and flexible joints at suitable points are recommended to prevent leakages as well as sustaining for long period of time. The physical properties such as low heat conductivity, flexibility, infusibility high resistance to sound and electricity, structural stability, anticorrosive and cost effective nature make asbestos most suitable substitute material for iron in water supply application. Now a days it has been practicing in many of the engineering applications for various requirements.
Key words: Earth crust, Cement, Asbestos paste, Structural stability, Substitute material.


1. INTRODUCTION
The total annual production of asbestos fiber in India is more than 37,000 tones of which more than 2,500 tones belongs to chrysotile variety and the remaining belongs to tremolite and anthophyllite category, these, are entirely used by the small scale sector of the Industry. Based on the experience of previous years and research on asbestos related works it was identified that with proper scientific methods the health impacts associated with asbestos can be reduced to minimum level. There are no exact scientific evidences that asbestos creates significant health impacts on the people who were exposed to it through various house hold applications, even asbestos which is releasing in to open atmosphere through brake liners of vehicles may not create significant health impact. The assessment of asbestos in urban areas is very difficult due to its minute quantity when compared with other pollutants. From the last few decades several researches are being done by spending billions of dollars on asbestos and developed man made organic and mineral industrial fibers to be used in many applications. Technically it was proven that there is no alternative material equal to asbestos pipes for irrigation, sewerage and supply of drinking water to urban and rural areas with high life period.

2. OBJECTIVES OF THE STUDY:
- Preparation of raw material for making asbestos cement pressure pipes
- Designing of pipes to be fit for various applications
- Testing of pipes durability to meet their purpose.
- Evaluation of environmental quality
- Preparation of environmental management plan.

3. METHODOLOGY
In this methodology there are five stages which gives comprehensive scope on manufacturing of asbestos cement pipes

3.1. Preparation of Raw Material
- The ingredients to manufacture asbestos cement pipes are, high grade asbestos fiber, Fly Ash and Port Land Cement.
- Different grades of asbestos fiber of required quantity is fed into hopper from where it will be conveyed to grinding machine through spoke rollers.
- In grinding machine the fiber bag gets opened up and is conveyed to mixer after getting weighed on the mechanical scale.
- To this, required amount of cement fly ash and water will be added.
- By mixing ingredients with the help of circulation pump slurry will be formed.
3.2. Designing of Pipes

- The slurry that is formed in stage 1 is taken into the pipe designing machine, it is then transferred to moulds which are placed between the rubber roller and formation roller, where, the layers are formed continuously to the required wall thickness.
- The pipes of required sizes are designed by using steel moulds of required sizes
- The hydraulic consolidated pressure will be applied to produce strong and durable pipes
- After the formation of pipe on steel moulds the moulds are removed and the pipes will be sent for curing

3.3. Processing of Pipes

- After curing of pipes they must be prepared and processed by cutting and trimming the edges of pipes at required length and diameter to meet their purpose.
- Each pipe should be examined clearly to find out any cracks or any possibilities of structural deformations.

3.4. Durability Test

- After final processing they must be tested for their durability
- The tests should be done individually or randomly by considering hydraulic properties
- The test must be conducted as per IS 1592.

![Flowchart of Designing A.C. Pressure Pipes]

**Figure 1** Step by step procedure of designing A.C. pressure pipes

4. EVALUATION OF ENVIRONMENTAL QUALITY

The quality of environment must be evaluated with pre specified environmental influencing parameters with respect to air, water, noise and fibrous concentration at site area.

4.1. Evaluation of Air Quality

The quality of air will be assessed periodically at site area and the results will be correlated with national ambient air quality standards, based on the results proper precautions should be suggested to concern authorities to maintain quality air at sit area.

4.2. Evaluation of Water Quality

Water quality must be checked out with standard water quality assessment procedures and the results will be correlated with IS 10562 standards if any alterations they must be treated with...
proper controlling measures. There should be a proper monitoring on amount of water discharging from various applications. Effluents must be checked out and they should be released after necessary treatment.

4.3. Evaluation of Fiber Material

Normally the asbestos dust will enter into atmosphere at the following operations:
1. While cutting asbestos bags both manually and mechanically.
2. While feeding asbestos dust in to the charger of the mill.
3. While milling the fiber.

Air sampling data of asbestos fibers will be collected during all the stages of manufacturing procedure especially while handling fibrous materials at site area to assess the quantity of fibers that are released in to the atmosphere. Based on this data proper fiber handling precautions will be suggested to workers to bring down the quantity of fibers releasing in to the atmosphere.

4.4. Evaluation of Noise Quality

Noise is one of the influencing parameter for the efficiency of work, it shows its impacts on health of the human beings as well as on structures, animals and also on ecological systems. Due to this noise evaluation of both morning and night times must be carried out at various locations within the site by using noise measuring meter.

For all the above parameters the following check list is prepared with level of contamination i.e. Normal, Increased, and Decreased, which will be represented as X, √ symbols at respective columns to monitor the changes monthly and seasonally as part of the environmental management plan.

Table 1 Check list of Environmental parameters

<table>
<thead>
<tr>
<th>S.NO</th>
<th>Name</th>
<th>LEVEL</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>NORMAL</td>
</tr>
<tr>
<td>A.AMBIENT AIR QUALITY</td>
<td>√</td>
<td>X</td>
</tr>
<tr>
<td>1</td>
<td>SPM Concentration at main gate</td>
<td>√</td>
</tr>
<tr>
<td>2</td>
<td>SO2 Concentration at main gate</td>
<td>√</td>
</tr>
<tr>
<td>3</td>
<td>NOx Concentration at main gate</td>
<td>√</td>
</tr>
<tr>
<td>4</td>
<td>SPM Concentration at working place</td>
<td>√</td>
</tr>
<tr>
<td>5</td>
<td>SO2 Concentration at working place</td>
<td>√</td>
</tr>
<tr>
<td>6</td>
<td>NOx Concentration at working place</td>
<td>√</td>
</tr>
<tr>
<td>7</td>
<td>SPM Concentration at Work shop</td>
<td>√</td>
</tr>
<tr>
<td>8</td>
<td>SO2 Concentration at Work shop</td>
<td>√</td>
</tr>
<tr>
<td>9</td>
<td>NOx Concentration at Work shop</td>
<td>√</td>
</tr>
<tr>
<td>B.PERSONAL /STATIC AIR SAMPLING DATA</td>
<td>√</td>
<td>X</td>
</tr>
<tr>
<td>1</td>
<td>Concentration of fiber at working area</td>
<td>√</td>
</tr>
<tr>
<td>2</td>
<td>Concentration of fiber at storage area</td>
<td>√</td>
</tr>
<tr>
<td>C.NOISE LEVELS</td>
<td>√</td>
<td>X</td>
</tr>
<tr>
<td>D.WATER QUALITY</td>
<td>√</td>
<td>X</td>
</tr>
<tr>
<td>E.WASTE WATER DISCHARGE</td>
<td>√</td>
<td>X</td>
</tr>
<tr>
<td>F.SOLID WASTE DISPOSAL</td>
<td>√</td>
<td>X</td>
</tr>
</tbody>
</table>
An Experimental Approach of Environmental Management Plan for Designing Asbestos Cement Pipes - A Model Study

5. ENVIRONMENTAL MANAGEMENT PLAN

An environmental management plan (EMP) is prepared to minimize all possible adverse impacts of proposed project on the people, their home land, their livelihoods, and also on other nearby development activities with following measures

5.1. Construction Stage

At construction stage the intensity of environmental pollution is more and control of pollution is most important at this stage. The following factors are most considerable during the stage of construction

5.1.1. Site Preparation

The clearance of site, disturbs soil structure, there is no major leveling operations are required for this type of projects. During dry weather conditions it is necessary to control dust created by excavations and transportation, it will be controlled by sprinkling water on soil.

5.1.2. Sanitation

The construction site should be equipped with proper toilet facilities for workers to allow hygienic conditions at site area.

5.1.3. Construction Equipment & Waste

Proper maintenance of vehicles is encouraged to minimize smoke from the exhaust emissions. The vehicle maintenance area should be free from contamination of surface and ground water source by accidental spillage of oils at site area.

5.2. Post Construction Stage

- Proper precautions should be taken to maintain ambient air quality standards within the working area.
- Proper set up should be established at site area to assess the wind speed direction rainfall humidity and temperature at site area.
- Every Month stack emission should be assessed to promote quality air condition at site area It is advisable to measure indoor air quality and count of asbestos fiber as per the occupational health standards.
- Monitoring of noise levels to assess the sound levels and also to suggest noise protection measures to workers.
- Environment health and safety (EHS) department must be established at site area to monitor quality of the environment as well as the health and safety of workers at site area.

5.3. Green Belt Development

The development of greenbelt should be based on the optimum usage of available water and land resource, the climatic conditions of the area, nature of possible pollutants, their rate of dispersion, and the properties of soil must be considered. In addition to the green-belt planted at site area roadside plantation in and around the project is required.

REFERENCES


