Breathing walls technology

Technology

In developed countries, people spend 90% of their lives inside buildings. During this time, the nature of the enclosedenvironmenthas direct impact on the lives of the occupants. It is therefore imperative that the buildings have conducive environment where this will impact the lives of the occupants. The buildings that are there today have serious problems about the indoor air quality. The US Environment Protection Agency (EPA) agrees to the fact that 30% of new or buildings which have been renovated have IAQ problems.

This has been ranked as the most prominent problem. In regions where there is high climates like Japan, there has been need to utilize breathing wallstechnology; this has been achieved easily with the use of passive ventilation done at the surfaces of walls, an approach which has been deemed as a success. The installations of systems such as these have been seen to be effective and provide an easy way of providing a healthy and comfortable environment with higher energy efficiency.

With this in mind, this paper will therefore look at the development of " Breathing Wall" technology which is constructed using Aluminum sheets that form a multiple air-layered architecture. Studies that have been done in the past allude to the fact that passive ventilation systems can provide sufficient thermal insulation and provide a way where moisture can be transmitted for temperature-climate regions even when the amount of air being infiltrated increases as a result of strong wind in the outside. In this study, there is a practical passive ventilation system which is being considered.

In this study, breathing walls were installed on the opposite sides of a scale mock-up house constructed outdoors and the properties of natural ventilation, thermal insulation, moisture transmission and indoor climate in

natural weather conditions were analyzed extreme. Literature review There have been a lot of strategies that have been embraced so that the removal of air pollutants can be achieved. All in all, there are design strategies that have been employed from time immemorial in the quest to get conducive working and living environments for buildings.

The first line of attack was the use of avoidance of products that contain solvents, glues and plastics. There is an increasing production of commercial products like paint, glues, materials, and systems. Exclusion is also another strategy that has been used in the past to eradicate corrosive elements from the walls of the buildings. Exclusion is another strategy that can be used to provide IAQ. The control of radon, as an example, requires that there be an airtight floor and basement system. The exclusion of radon from the interior environment must be a serious consideration for the design of an IAQ.

The ventilation of living areas does aid radon control, but is important to have a design and build the ground floor or basement as airtight as possible so that penetration to the building can be avoided. The use of systems approach is another strategy that can be used to provide IAQ. The problem with this is the fact that these strategies cannot be used on their own. There is need to have a holistic approach in the provision of internal air quality. In the past there has been the approach of using offgas material and this has been a necessary approach.

However, ventilation, air barriers, humidity control, and high surface temperatures can work together so that better IAQ can be achieved. This is better than using either approach independently. The use of “ atmungsfaehig” or breathable walls then promised to be a better approach

towards the getting of internal air quality. This was recommended by designers of healthy housing. This was especially recommended by the Baubiologie; the term is itself used in an imprecise manner in the English language (George, & Ritz, 1994). There has been confusion in the use of the term.

A review of the literature shows that what constitutes a “ breathing wall” is still not clear. Although breathing wall implies good flow of air, this is not always the case. When used scientifically, this term means that there is an open flow of vapor diffusion. This combination of properties makes it possible for a large amount of water vapor to be absorbed quickly. This regulates room climate and hence indoor air quality. Although other gases are also capable of diffusing through walls, water vapor is one of the very important determinants of air quality in a room. They determine the healthy of a room.

In the design of healthy houses, the design of interior partitions and internal design is based on making sure that water vapor breathability is achieved. Breathing wall infrastructure The breathing wall is composed of a component which is core and is constructed using aluminum foils, and interior/exterior materials. The use of aluminum foils is chosen because they have high reflectance and low remittance thus they can counteract the loss of thermal insulation capability due to the presence of several air layers. There are factors which must be considered in the construction of the breathing wall.

These factors include: i. The number of internal fouls that should be included in the wall ii. The thickness of the wall is of paramount importance iii. The rate of flow of air through the wall should also be considered. This is important because it influences the thermal insulation capability. iv. The

diameter of the hole and the spacing of each of the foil sheet is also important consideration as it influences the air flow rate and the transmission of the moisture (Jonathan, & Woodha, 1997). Design constraints There are design constraints which are used in the construction of the breathing wall technology.

They are as follows: i. Continual indoor ventilation under natural conditions using no air-conditioning equipment. ii. The entire surface of the wall should be able to give proper ventilation (air infiltration), which is controlled by heat recovery inside the wall in order to lower heat losses. iii. High thermal insulation capability iv. There should be no disturbance of the indoor air distribution v. There should be prevention of internal condensation by controlling the amount of moisture passing through the inner structure of the wall.