

Anti-Microbial Insulations

By R&D Division, Eastern Polymer Industry Co., Ltd

What are microorganisms (microbes)?

Microorganisms (tiny organisms) are the most diverse group of living things in the world for example bacteria, fungi, archaea.

“Mold” is a kind of microbes that usually causes problems in building and insulations. Although some of them are beneficial or no effect to lives, a number of commonly found molds are toxic. They can cause health problems to both humans and animals by several different biological mechanisms. For example, mycotoxins can penetrate and disrupt cellular processes which potentially cause serious health problem to human being. High level of mold can cause, for instance, allergies, asthma, bleeding lungs, cancer, central nervous system problems, dandruff, diarrhea, sudden hair loss, respiratory problem, etc. Furthermore, the presence of noxious molds growing in buildings is highly objectionable because they also create odors and damage materials around them.

Molds reproduce by spreading microscopic spores. Under appropriate conditions, the spores will start growing and spread over the place.

Microbial Growth Factors

- **Carbon Source :** Microorganisms need carbon source as food to promote their growth. The examples of carbon source are *PVC plasticizers* in NBR/PVC insulations, *binders and oil emulsion* applied in fibrous and particulate type insulations such as Fiber Glass and Rockwool.

[Plasticized PVC will be attacked by microorganisms. The microorganism will use the plasticizer as a carbon source, whereas favourable growth conditions, like water and oxygen, promote their growth –from Journal of Vinyl Technology Vol. 10, Page 3~6]

- **Moisture :** Microorganisms need water to grow and multiply. Generally, if there are no cold condensing surface and RH is lower than 60% indoor, there will be not enough water for mold to grow.
- **Crosslink Density :** The higher the crosslink density, the more difficult the microorganisms penetrate and digest.
- **Other factors such as temperature, pH, oxygen level and space.**

Why AEROFLEX EPDM Insulation Mold Protective?

- ✓ **Non-Polar:** EPDM is a Non-Polar material which does not induce and is not dissolved by polar solvent like water resulting in difficulties for mold to digest the material.

- ✓ **Closed-Cell Structure:** Closed-Cell Structure helps prevent ingressions of water even under deluge condition resulting in inhospitable condition for the microbes.
- ✓ **No PVC Plasticizer & Binders:** AEROFLEX/AEROCEL EPDM products contain No PVC Plasticizer and less than 1% of general purpose plasticizer while NBR/PVC elastomeric insulation needs PVC plasticizers such as DOP/DOA from 10~20%. Therefore, molds are likely to grow on NBR/PVC and other Fibrous type insulations rather than AEROFLEX / AEROCEL EPDM.
- ✓ **Highly Cross linked EPDM:** With special cross linking processes AEROFLEX/ AEROCEL products have higher crosslink density than NBR/PVC thermal insulations, so it is more difficult for molds to digest.
- ✓ **High Quality Grade Antimicrobial Agent Only:** Negligible Amount, Safe, and Very Effective.

As mentioned above, NBR/PVC and Glass Fiber Thermal insulation products potentially support mold growth as they are rich of PVC plasticizers and likely to induce and absorb water due to its polarity (NBR/PVC) and open-cell structure (Glass Fiber). Therefore, they need high amount and concentration of antimicrobial agent to protect themselves from molds.

AEROFLEX / AEROCEL products are originally used in tropical countries that have suitable condition for molds to grow. Therefore, we have been developing our products concerning mold problem from early stage of invention. This can be proved by our 30 year history that has never been complained on this issue.



Fig 1 : A brand of NBR/PVC insulation with Antimicrobial agent added.

[Picture from a grocery store in Florida]



Fig 2 : Fiber Glass Insulation

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"All molds have the potential to cause health effects. Molds can produce allergens that can trigger allergic reactions or even asthma attacks in people allergic to mold. Others are known to produce potent toxins and/or irritants," according to the US Environmental Protection Agency (EPA).

