



# MICROWHITE

NON-FORMALDEHYDE



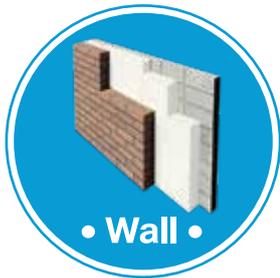
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# MicroWhite

**MicroFiber White Wool** is a **formaldehyde-free** glass wool insulation solution which guarantees the safety of its users and is a part of our breakthrough in achieving sustainable building standards in Thailand. The product is made from cutting-edge binder solution that is safe for health and is environmentally friendly.

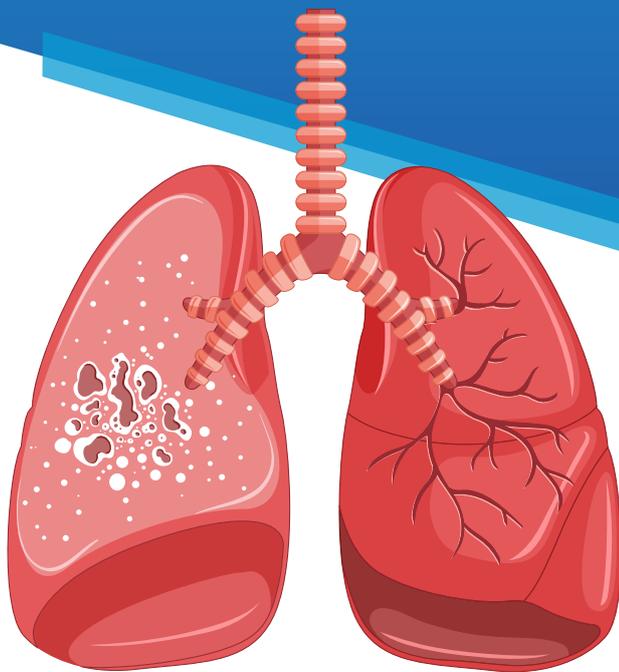


In developed countries, there are several regulations and **control measures** on formaldehyde emission in construction materials. People are fully aware of the long-term effect of formaldehyde exposure, leading to **over 40%** adoption rate in **formaldehyde-free** insulation product.



## What is Formaldehyde?

**Formaldehyde** is an organic compound used in the chemical and plastic production, it is a precursor for making various types of plastic pellets known as **Urea - Formaldehyde** and **Phenol - Formaldehyde**. It can be found in cabinetry, countertops, furniture, and other product with synthetic resin composition.



Headache



Throat irritation



Difficulty in breathing



Eye irritation

## Danger of Formaldehyde

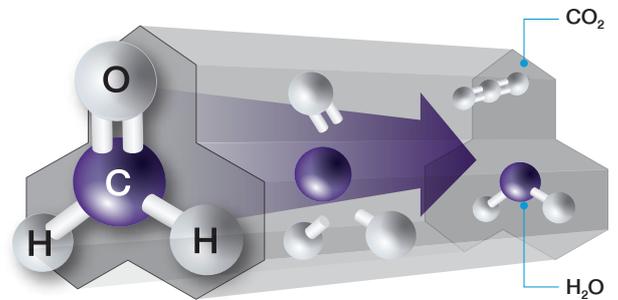
When formaldehyde is present in the air at level exceeding 0.1 ppm, individuals may experience adverse effects such as **eye irritation, nasal irritation, throat irritation, coughing, and difficulty in breathing**. The International Agency for Research on Cancer (IARC) has classified formaldehyde as a **group 1 human carcinogen** (highly dangerous), potentially causing various types of cancer including nasopharyngeal cancer, head and neck cancer, lung cancer, and etc.

Despite proper ventilation system installation, there is a chance that air in the room contains formaldehyde emission of up to **30 micro-grams per cubic meter**. Therefore, choosing formaldehyde - free construction material is an important factor in reducing the risk at that resident would develop those symptoms in the long run.



## Formaldehyde fading out

People in developed countries have been paying attention to the harmful effects of formaldehyde ever since the International Agency for Research on Cancer (IARC) classified formaldehyde as **Group 1 human carcinogen**. Formaldehyde can be harmful to human when continuously exposed for a long period of time. It is mostly found in material that we use in our daily lives such as **resins, paints, coatings, particleboards, furniture, and toys**.



**Auditorium**



**Office**



**Home**



People, on average, spend **approximately 90%** of their time indoors. Research has shown that many types of harmful toxins are found in the air in different types of buildings such as **residential building, school, hospital, office building and etc.** These toxins are excreted from interior materials such as wood, carpets, furniture and by activities such as cooking, ironing, chores, etc.

**United States, Europe, and Asia** all have **imposed several regulations** to limit formaldehyde concentration in building materials.

# MARKET TREND

## USA

- In the United States, regulation that limits formaldehyde emission is applied to only some wood products especially composite wood.
- The emission rate must be below the legal limit and must be granted the certificate of compliance from the EPA TSCA Title VI TPC (Recognized Third-Party Certifiers under the Formaldehyde Emission Standards for Composite Wood Products Rule)

## Europe

- Formaldehyde is strictly regulated in the European Union. The regulation covers many types of products such as construction materials, textile, food packaging, and cosmetics
- Product which has higher level of formaldehyde emission than the legal limit is strictly prohibited and cannot be sold or even imported to the EU.
- Products that are allowed to be sold or imported must be certified through a standardized lab test in order to apply for EU ecolabels such as AgBB, ECA, ANSES, M1, and Blauer Engel.

## Asia

- Japanese government has imposed regulations to control 17 categories of construction material according to formaldehyde concentration rate. Material that has formaldehyde concentration exceeding 120 micro-grams per m<sup>3</sup> will not be allowed to be sold and installed indoor. F2 star or F3 star products are limited to certain area and usage, while material with less than 5 micrograms per m<sup>3</sup> considered as formaldehyde-free product.
- In China, Green Label could only be issued for environmental - friendly product. There are also control measures through taxes on home paints, binders, and other VOC- containing chemical product.



## Sick house syndrome

In 2003, Japan discovered “Sick House Syndrome,” where excessive off-gassing of formaldehyde from construction material used in residential properties triggered sicknesses. This results in a large number of home owners having to leave their home. Consequently, the Japanese government raises the standard by grouping construction material such as plywood, particleboards, value-added wood products, and insulation into groups according to formaldehyde concentration rate. This drives con - mat manufacturers to develop formaldehyde-free alternatives.



Classification	Formaldehyde Emission	Control Measure
Type 1 formaldehyde emitting building materials	Exceed 120 micrograms/m <sup>3</sup>	Strictly Prohibited
Type 2 formaldehyde emitting building materials	Between 20-120 micrograms/m <sup>3</sup>	Limit At Certain Area
Type 3 formaldehyde emitting building materials	Between 5-20 micrograms/m <sup>3</sup>	
Not classify as formaldehyde emitting building materials	Below 5 micrograms/m <sup>3</sup>	Exempt from Restriction

In 2007, one of the leading glass wool insulation manufacturer in Japan launched formaldehyde - free insulation product which is considered to be the **first formaldehyde-free insulation** product in Japan and Asia. In Japan, adoption rate in formaldehyde-free insulation is **above 40%** of total insulation use. Currently residents, architects and contractors in Thailand have started to focus on the use of construction materials that are safe for health and environment.

# OUR PRODUCT MICROWHITE



MicroFiber Industries has always strived to develop glass wool insulation. We optimize the use of resources as the main raw material. Recently, we have co-developed a **cutting-edge binder solution** with a world renowned multinational chemical corporation. Our new binder solution is environmentally-friendly, while maintaining MicroFiber's superior thermal and sound absorption performance.

**environmentally-friendly**  
by using **recycled glass cullet**

Our new product "**MicroFiber White Wool**" is **formaldehyde-free** glass wool insulation made of bio-based material, which guarantees safety for its users, as well as the environment. The product have been tested and is certified by Intertek, an internationally-recognized research institute.

## 24-h and 48-h chamber concentrations and emission factors

Parameter	CAS no.	Chamber concentration ( $\mu\text{g}/\text{m}^3$ )		Emission factor ( $\mu\text{g}/\text{m}^2\text{h}$ )	
		24h	48h	24h	48h
TVOC	-	n.d.	n.d.	n.d.	n.d.
Formaldehyde	50-00-0	n.d.	n.d.	n.d.	n.d.

## 96-h chamber concentrations and emission factors of all target VOCs and most abundant – Only detected compounds have been listed

Compound Name	CAS no.	Chamber concentration ( $\mu\text{g}/\text{m}^3$ )	Emission factor ( $\mu\text{g}/\text{m}^2\text{h}$ )	Remark CREL/ C/ TAC
TVOC	-	n.d.	n.d.	-
Formaldehyde	50-00-0	n.d.	n.d.	CREL/C/TAC

