



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.

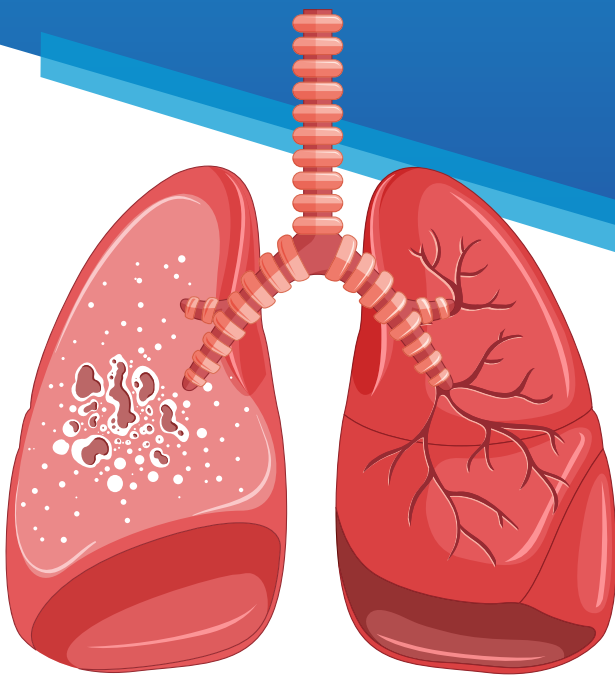


In developed countries, there are several regulations and **control measures** on formaldehyde emission in construction materials. People are fully aware of the long-term effect of formaldehyde exposure, leading to **over 40%** adoption rate in **formaldehyde-free** insulation product.



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.



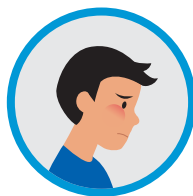
Headache



Throat irritation



Difficulty in breathing



Eye irritation

Danger of Formaldehyde

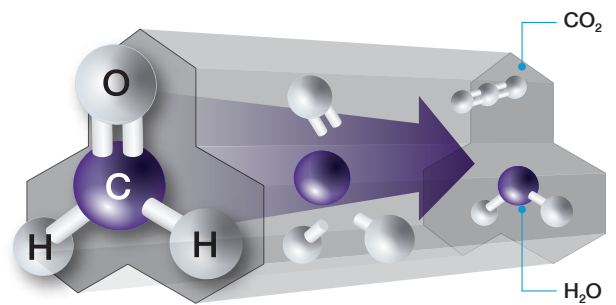
When formaldehyde is present in the air at level exceeding 0.1 ppm, individuals may experience adverse effects such as **eye irritation, nasal irritation, throat irritation, coughing, and difficulty in breathing**. The International Agency for Research on Cancer (IARC) has classified formaldehyde as 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 m³ 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 m³ 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 ³	Strictly Prohibited
Type 2 formaldehyde emitting building materials	Between 20-120 micrograms/m ³	Limit At Certain Area
Type 3 formaldehyde emitting building materials	Between 5-20 micrograms/m ³	
Not classify as formaldehyde emitting building materials	Below 5 micrograms/m ³	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

