

AirRenew™ Gypsum Board - Frequently Asked Questions

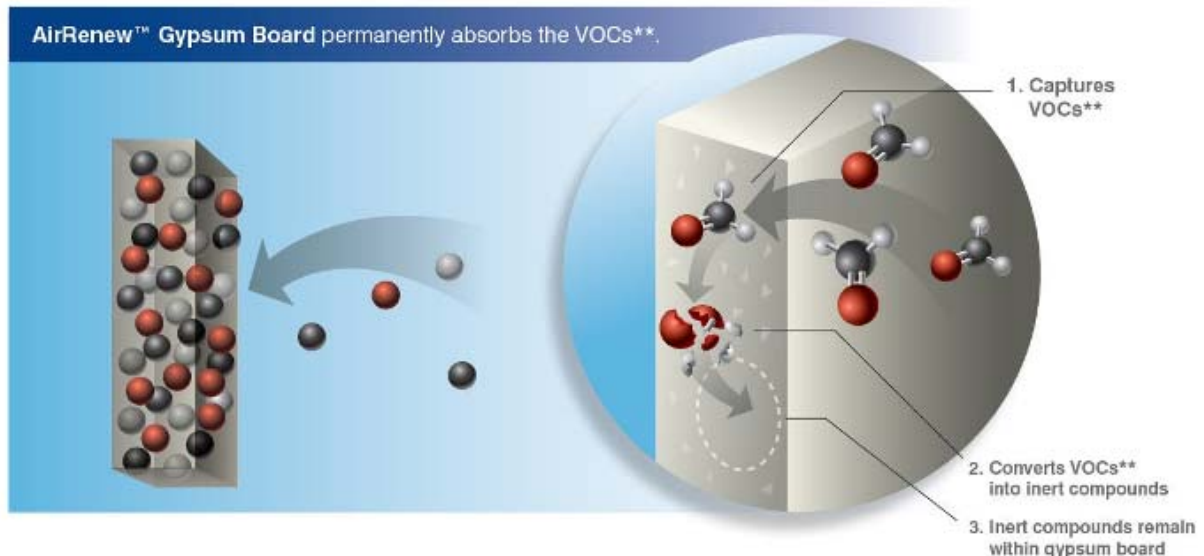
What is AirRenew?

AirRenew is an innovative gypsum board that helps clean the air and improve indoor air quality. The gypsum board permanently removes specific volatile organic compounds (VOC's) circulating indoors, while offering superior protection against moisture and mold.

How does AirRenew work?

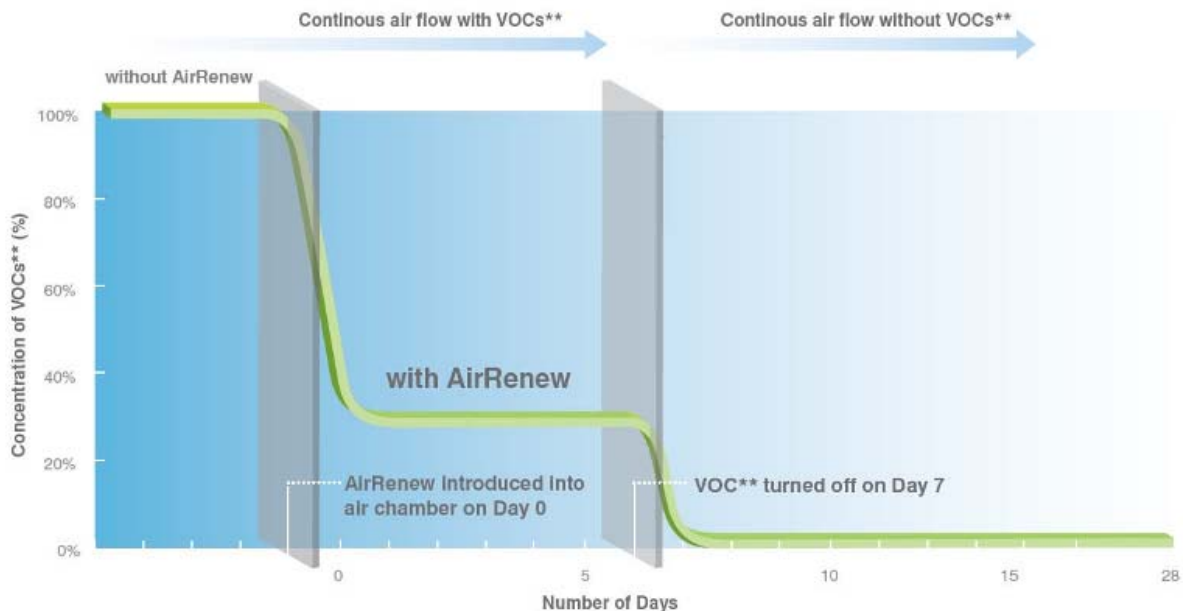
- AirRenew utilizes new proprietary, ground-breaking technology.
- Our patent-pending technology absorbs specific VOC's out of the air and permanently converts them into safe, inert compounds.
- The VOC's circulating in indoor air comes into contact with the surface of AirRenew through typical airflow movement in the building and are absorbed through the surface and into the gypsum core of AirRenew.
- The specific VOC's chemically react with a special additive in the gypsum core that breaks down the formaldehyde and forms a new safe, inert compound. This would be analogous to having two materials such as Sodium and Chlorine, which you would certainly not eat, but chemically combine them and you have a common safe compound - salt.
- Once the new compound is formed and captured in the board, it is never released back into the air.
- Additionally, our M2Tech® technology provides enhanced moisture and mold resistance for AirRenew.

How AirRenew™ cleans the air



How do I know it will work? What's the proof?

- AirRenew has been tested per the ISO 16000-23 method, "Indoor air – Part 23: Performance test for evaluating the reduction of formaldehyde concentrations by sorptive building materials". This test method evaluates the ability of a material to reduce the concentration of formaldehyde inside a test chamber. In the test method, formaldehyde-spiked air is continuously supplied to the test chamber containing a sample of the material with the performance determined by monitoring the difference in concentration of formaldehyde at the inlet and outlet of the test chamber. For our testing, a sample of AirRenew was placed in the test chamber with a formaldehyde concentration of $150 \mu\text{g}/\text{m}^3$ (122 ppb) continuously injected into the test chamber at an air change per hour rate of 0.5 during the first 7 days. The AirRenew sample absorbed approximately 70% of the formaldehyde flowing through the test chamber. At the end of 7 days the formaldehyde supply was stopped while the air flow into the test chamber continued. The formaldehyde concentration at the chamber outlet continued to be monitored. Almost immediately the formaldehyde concentration in the test chamber was reduced to 0 and remained at 0 for an additional 21 days until the test was terminated.
- This testing validated the performance of AirRenew to permanently capture and convert formaldehyde circulating in the air without releasing any formaldehyde back into the air.
- The following graph illustrates the results of the test.



How long will it work – how long will it capture VOC's?

AirRenew has been engineered for an average service life of 75 years. Calculations were performed using data for typical formaldehyde concentrations and standard air change rates for various applications such as education, healthcare and residential buildings. Based on a walls only installation of AirRenew, it was calculated that AirRenew would continue to capture formaldehyde in the building for a period of up to 75 years.

The 75 year period was selected as it is cited as the gypsum board service life in programs such as the National Institute of Standards and Technology (NIST) Building for Environmental and Economic Sustainability (BEES[®] 4.0) life-cycle assessment program. The 75 year service life also exceeds the minimum service life referenced in the current draft of the ICC International green Construction Code (IgCC). At the end of the 75 year period AirRenew would continue to perform as a gypsum board product, but may not continue to capture VOC's.

Can AirRenew be repainted or redecorated during future remodeling?

Yes, formaldehyde absorption studies were conducted with various paints and the number of coats to simulate multiple remodeling projects with no effect on the efficiency of AirRenew to capture formaldehyde. The conclusion is that AirRenew continues to perform with primer plus up to 7 coats of latex acrylic and epoxy paints. The following is a summary table of the painting study results:

<u>Paint Application</u>	<u>Number of Coats</u>	<u>Formaldehyde Absorption</u>
Skim coat / Primer / Latex Acrylic	1 Primer + 2 Latex Acrylic	Yes
Primer / Latex Acrylic	1 Primer + 2 Latex Acrylic	Yes
Primer / Latex Acrylic	1 Primer + 4 Latex Acrylic	Yes
Primer / Latex Acrylic	1 Primer + 7 Latex Acrylic	Yes
Skim coat / Primer / Latex Epoxy	1 Primer + 2 Latex Epoxy	Yes
Primer / Latex Epoxy	1 Primer + 2 Latex Epoxy	Yes
Primer / Latex Epoxy	1 Primer + 4 Latex Epoxy	Yes
Primer / Latex Epoxy	1 Primer + 7 Latex Epoxy	Yes

Are there special requirements for disposal at the end of the product's useful life?

No, AirRenew can be recycled where available or may be landfilled. EPA Leachate tests were conducted to determine if groundwater contamination is a concern for AirRenew board disposed of in landfills. The EPA Leachate test met all applicable regulatory guidelines with no contamination or harmful effects to humans or animals. Testing was also conducted to determine the effects of high temperature and gypsum processing conditions on AirRenew board that is recycled back into new gypsum board. This testing demonstrated that the inert compound formed in the gypsum core does not release back the captured formaldehyde and may be re-processed as recycled gypsum.

Are there other similar products currently on the market?

No, AirRenew is the first gypsum board product in North America that has the ability to capture, convert and store VOC's.

What are the key performance attributes of the product?

- AirRenew's primary performance benefit is that it absorbs and "neutralizes" VOC's from a building's interior. No other gypsum board in North America will do that.
- In addition, AirRenew meets the industry's most stringent standards for mold resistance, achieving the best possible scores of 0 for mold resistance per ASTM G 21 and 10 per ASTM D 3273.
- 5/8" AirRenew Type X is comprised of a Type X gypsum core and is UL Classified for fire resistance.
- AirRenew is produced in our Carrollton, KY facility resulting in a high recycled materials content, which contributes toward credit for LEED and other green building rating programs.
- AirRenew is also GREENGUARD Indoor Air Quality and GREENGUARD Children & Schools Certified.

What VOC's are you specifically reducing or eliminating with AirRenew?

Formaldehyde and other aldehydes. Aldehydes are a family of organic compounds and they typically have a pungent odor. Many fragrances are aldehydes. Formaldehyde is the first member of the aldehyde series and gives us the most concern relative to indoor air quality as it is often the highest concentration VOC in the indoor air. Hexaldehyde and acetaldehyde are also common VOC's in indoor air.

What does "inert compounds" mean?

Inert compounds do not readily react with other materials; therefore, they remain safe and inactive within the gypsum board.

Where should AirRenew be used?

AirRenew is ideal for buildings with stringent indoor air quality requirements, such as education, healthcare, office and hospitality buildings where indoor environment and occupant comfort are a top priority.

Why is indoor air quality important?

There is a rapidly growing awareness for indoor air quality and its impact on health and productivity. People spend approximately 90 percent of their time indoors, therefore it is important to manage indoor air quality to improve occupant health and provide peace of mind.

What factors affect indoor air quality?

The indoor environment is affected by many factors, including local climate, HVAC systems, building materials, occupants, and potential contaminant sources such as furnishings, moisture, and outdoor pollutants.

Where do the pollutants come from that jeopardize indoor air quality?

According to the U.S. Environmental Protection Agency, sources of VOC's inside a building can come from pressed wood products, such as sub-flooring, shelving, cabinets and furniture. Other sources include computers, carpeting, treated fabrics, smoke, perfumes, hair sprays and cleaning materials. Also, carbon monoxide, carbon dioxide, particulates, extreme humidity and temperatures as well as inadequate air circulation and ventilation contribute to high levels of pollutants within a building.

Does it absorb 100% of the VOC's or formaldehyde in the room?

AirRenew testing under high concentrations of formaldehyde, much greater than typical indoor exposure levels, resulted in a 70% reduction in formaldehyde. At typical indoor concentration levels it is expected that the vast majority of the indoor formaldehyde would be eliminated by AirRenew. Since formaldehyde emission levels vary depending on air flow (HVAC system), furniture, temperature, humidity and other external factors, it is difficult to state an exact percentage reduction of formaldehyde for every application.

What's a typical formaldehyde concentration level in a classroom, as an example? What would AirRenew's net affect be on this?

Independent studies have measured formaldehyde concentrations from 4 to 18 parts per billion (ppb) in school environments. AirRenew has been shown to be 70% efficient at formaldehyde reduction when exposed to concentrations up to 122 ppb. Based on this work, it is expected that the formaldehyde concentration in a typical classroom with AirRenew installed and finished per our recommendations on all four walls would be essentially zero.

Will additional formaldehyde sorption studies be conducted to determine the effects of multiple coats of paint beyond the reported 7 coats?

Yes, we are designing a test series using many more coats of paint to simulate repainting of AirRenew throughout the 75 year service life.

What about effects of other types of paint and finishes on AirRenew's effectiveness to absorb formaldehyde?

The next test series will include paints such as oil-based paints and sealers, and various types of wallpapers to determine their effects on the performance of AirRenew. Until this testing is completed, we do not recommend that oil-based paints and sealers or non-breathable wallpapers be used to finish AirRenew.

What is the result of reducing the AirRenew wall area in a room on its effectiveness at absorbing formaldehyde?

For a typical room the predicted concentration of formaldehyde is known based on multiple field studies. The 75 year service life for AirRenew is a result of installing the board on all 4 walls within this typical room. By covering fewer walls in a room with AirRenew the service life is reduced in direct proportion since the capacity to absorb formaldehyde is a fixed amount for each AirRenew board. For example, installing AirRenew on one wall would reduce the service life for the board in that room to absorb formaldehyde to approximately 19 years. Installing AirRenew on two walls would reduce the service life for the board in that room to approximately 38 years.

How does AirRenew contribute to green building rating programs?

AirRenew will help meet the VOC concentration limits recognized by the U.S. Green Building Council's LEED green building certification program under the following categories:

- MR Credit 4: Recycled Content

- MR Credit 5: Regional Materials (within 500 miles of Carrollton, KY manufacturing location)

- IEQ Credit 3.2 Construction Indoor Air Quality Management Plan – Before Occupancy

- ID Credit 1: Innovation in Design

Are there special installation requirements?

No, AirRenew is lightweight, easy to cut and install and does not require special tools. It is shipped, handled, installed and finished like standard gypsum board.

Where will the product be sold?

AirRenew will be available for sale across the U.S. and Canada. Building professionals can contact their CertainTeed representative for more information.

How will building professionals and occupants track or measure improvements to indoor air quality?

There are standard IAQ measuring and test methods referenced in the LEED program and other green building rating programs. Baseline and subsequent IAQ testing may be conducted using protocols consistent with the EPA Compendium of Methods for the Determination of Air Pollutants in Indoor Air

Will you be adding AirRenew technology to other products?

CertainTeed Gypsum's vision is to focus on innovative, sustainable products and systems. The expansion of the AirRenew Gypsum Board product line meets this vision with market recognition and specification of AirRenew being a significant factor in future product development.

Marketing Technical Services