CEILING SYSTEMS

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The Basics of Formaldehyde Emissions and Interior Spaces

What You Need to Know

Armstrong®

Formaldehyde Emissions & Interior Spaces–What You Need to Know

Increasing attention is being given to green buildings and sustainable design, especially as it pertains to the quality of the indoor environment and the concentration of formaldehyde within it.

What is Formaldehyde?

Formaldehyde is a colorless gas with a pungent odor that occurs naturally in the environment. It is also an important industrial chemical that is widely used in the manufacture of other chemicals, building materials and household products. And, it is a volatile organic compound (VOC), meaning that it vaporizes and becomes a gas at normal room temperatures. As a result, products containing formaldehyde can release it as a gas.

Why Is It a Concern?

Formaldehyde is normally present at low levels in outdoor air. However, interior spaces containing products that release formaldehyde can have levels greater than that of outdoor air. And, as formaldehyde levels increase with the installation of multiple interior finishes, possible illness or discomfort is more likely to occur.

The effect of formaldehyde on people varies widely from person to person. Some people are very sensitive to it, while others have no noticeable reaction to the same level. Depending upon an individual's sensitivity, exposure to low to moderate levels of formaldehyde can cause temporary burning or itching of the eyes or nose, stuffy nose, sore or burning throat, or headaches. Breathing high levels of formaldehyde can cause chest tightness, coughing, wheezing or a worsening of asthma symptoms.

What Affects Formaldehyde Levels?

The formaldehyde level in indoor air depends primarily on four factors:

1) *The source of the formaldehyde* – Building materials containing formaldehyde tend to release more of the gas when the product is new. As the product ages, formaldehyde release usually decreases. As a result, new or renovated spaces tend to have higher formaldehyde levels because they often contain a large amount of recently installed building materials.
2) *Air exchange rate* – Decreasing the flow of outdoor air to the inside of a building increases the formaldehyde level of the indoor air.
3) *Temperature* – As temperature rises, more formaldehyde is emitted.
4) *Humidity* – As humidity rises, more formaldehyde is released.
5) *Loading Factor* – If the quantity of formaldehyde emitting material is reduced, the overall concentration of formaldehyde is reduced. Loading factor is the ratio of building material surface area to the building volume.

What Are Interior Sources of Formaldehyde?

In any given space, a variety of interior products may emit formaldehyde. They include, but are not limited to, such products as:

- Composite or pressed wood products such as doors, casework, finish carpentry, and plywood and fiberboard in all applications
- Paints, coatings and other similar finishes
- Sealants and caulking
- Adhesives
- Concrete sealants
- Acoustical sealants
- Carpet
- Resilient flooring of all types
- Epoxy resin floor coverings
- Wallcoverings
- Acoustical ceiling tiles
- Insulation
- Fireproofing

How Can Formaldehyde Levels Be Reduced?

A number of measures can be taken to help reduce indoor levels of formaldehyde emissions. They include:

Maintain proper levels of temperature and humidity – Since elevated temperatures and high relative humidity increase formaldehyde release, it is vital to continually monitor and control these conditions. In addition, explore air conditioning, dehumidifiers and other moisture control measures.

Provide adequate ventilation – Use American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE) Standard 62, "Ventilation for Acceptable IAQ," and Uniform Building Code (UBC), Chapter 12, Title 24, "Energy Standards," Section 121 as guidelines.

Control emissions at the source – Reduce formaldehyde levels by choosing products with low formaldehyde emission rates. While avoiding indoor conditions of elevated temperature and humidity and providing proper ventilation can help in controlling formaldehyde emissions, **the best strategy is "source reduction."** This means substituting lower-formaldehyde products for those emitting higher levels.

To further help reduce emissions at the source, it is important to "precondition" products that do have significant emissions by allowing them to off-gas without any packaging in a dry, well-ventilated space for 14 days prior to installation.

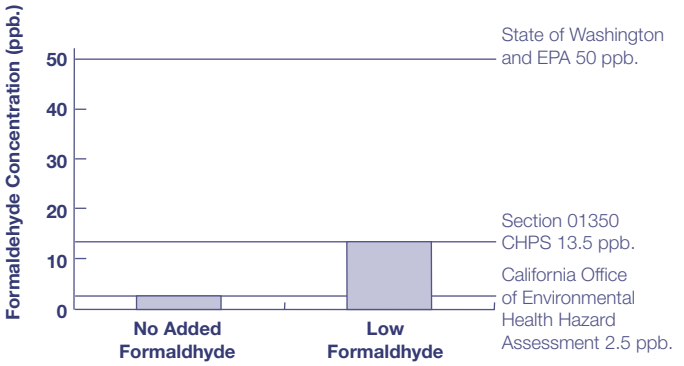
Choosing Acoustical Ceiling Systems

When selecting acoustical ceiling systems for an entire building or a specific space, it's important to know that Armstrong offers the widest selection of acoustical ceilings that satisfy stringent indoor environmental quality requirements for formaldehyde and VOC emissions — without affecting other performance properties such as acoustics, durability, sag resistance, light reflectance, fire and seismic performance, recycleability and recycled content.

For installers, all Armstrong acoustical ceiling systems meet the U.S. Department of Labor Occupational Safety & Health Administration (OSHA) requirements for formaldehyde exposure and content requirements for workers handling these materials.

Guidelines for Formaldehyde Concentrations

The chart below shows the various guidelines for formaldehyde concentrations in indoor air, and how Armstrong products meet these guidelines. These concentrations are measured in ppb. (parts per billion).

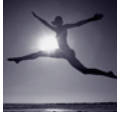


No-Added Formaldehyde Ceilings

Many Armstrong acoustical mineral fiber ceilings are formulated with no formaldehyde and they outperform CHPS Section 01350 requirements on emissions. Several products in this category meet the most stringent requirements set by CA Office of Environmental Health Hazard Assessment (OEHHA), contributing less than 2.5 ppb of formaldehyde when used under typical conditions required by ASHRAE Standard 62.1- 2004, "Ventilation for Acceptable Indoor Air Quality," California Code of Regulations, Title 24, and other building types outlined in CHPS Section 01350. Third party certified test reports from independent laboratories are available. Contact TechLine at 877-ARMSTRONG (278-7876).

Low Formaldehyde Ceilings

Armstrong acoustical mineral fiber and fiberglass ceilings are classified as low formaldehyde, contributing less than 13.5 ppb when used under typical conditions required by ASHRAE Standard 62.1- 2004, "Ventilation for Acceptable Indoor Air Quality," California Code of Regulations, Title 24, and other building types outlined in CHPS Section 01350. For project-specific calculation and test report, contact TechLine 1 877 ARMSTRONG (1 877-276 7876).



Choosing Acoustical Ceiling Systems

Many of our acoustical ceilings have no-added formaldehyde. All other Armstrong mineral fiber and fiberglass acoustical ceilings are classified as low formaldehyde.

Armstrong No Added Formaldehyde Ceilings

Item #	Product Name	Size	Edge Detail	Suspension System	Recycled Content
607	Ceramaguard® Fine Fissured™	2 x 2	Square Lay in	15/16″	38%
608	Ceramaguard Fine Fissured	2 x 4	Square Lay in	15/16″	38%
605	Ceramaguard Unperforated	2 x 4	Square Lay in	15/16″	38%
574	Cirrus®	2 x 2	Square Lay in	15/16″	70%-75%
533	Cirrus	2 x 4	Square Lay in	15/16″	70%-75%
589	Cirrus	2 x 2	Beveled Tegular	9/16″	70%-75%
577	Cirrus	2 x 2	Beveled Tegular	9/16″	70%-75%
584	Cirrus	2 x 2	Angled Tegular	15/16″	70%-75%
578	Cirrus	2 x 2	Angled Tegular	15/16″	40
769NF	Cortega®	2 x 4	Square Lay in	15/16″	35%
704NF	Cortega	2 x 2	Angled Tegular	15/16″	25%
1772NF	Dune™	2 x 2	Square Lay in	15/16″	35%
1775NF	Dune	2 x 2	Beveled Tegular	9/16″	35%
1774NF	Dune	2 x 2	Angled Tegular	15/16″	35%
1728NF	Fine Fissured	2 x 2	Square Lay in	15/16″	35%
1713	Fine Fissured	2 x 2	Square Lay in	15/16″	38%
1810	Fine Fissured	2 x 2	Square Lay in	15/16″	52%
1714	Fine Fissured	2 x 4	Square Lay in	15/16″	38%
1811	Fine Fissured	2 x 4	Square Lay in	15/16″	52%
1821	Fine Fissured	2 x 2	Beveled Tegular	9/16″	52%
1820	Fine Fissured	2 x 2	Angled Tegular	15/16″	52%
1824	Fine Fissured	2 x 4	Angled Tegular	15/16″	52%
755NF	Fissured™	2 x 4	Square Lay in	15/16″	35%
2767NF	Cortega Second Look®	2 x 4	Angled Tegular	15/16″	35%
1860	Fine Fissured Second Look	2 x 4	Angled Tegular	15/16″	52%
1861	Fine Fissured Second Look	2 x 4	Angled Tegular	15/16″	52%
1862	Fine Fissured Second Look	2 x 4	Angled Tegular	15/16″	52%
1863	Fine Fissured Second Look	2 x 4	Angled Tegular	15/16″	52%
1910	Ultima®	2 x 2	Square Lay in	15/16″	61%
1913	Ultima	2 x 4	Square Lay in	15/16″	61%
1916	Ultima	1 x 2	Beveled Tegular	9/16″	61%
1912	Ultima	2 x 2	Beveled Tegular	9/16″	61%
1915	Ultima	2 x 4	Beveled Tegular	9/16″	61%
1917	Ultima	1 x 2	Beveled Tegular	15/16″	61%
1911	Ultima	2 x2	Beveled Tegular	15/16″	61%
1914	Ultima	2 x 4	Beveled Tegular	15/16″	61%
1942	Ultima Open Plan	2 x 2	Beveled Tegular	9/16″	70%
1945	Ultima Open Plan	2 x 4	Beveled Tegular	9/16″	70%
1941	Ultima Open Plan	2 x 2	Beveled Tegular	15/16″	70%
1944	Ultima Open Plan	2 x 4	Beveled Tegular	15/16″	70%

For technical assistance on Armstrong no-added/low-formaldehyde call TechLine at 1 877 ARMSTRONG (1 877 276 7876).

Product information as well as guide specifications for Armstrong low-formaldehyde ceilings can be viewed and downloaded at armstrong.com/ceilings.

All products listed in chart have been tested by an approved, third party laboratory per section 01350. Test reports are available through TechLine.

For technical assistance on Armstrong low-formaldehyde and high recycled content ceilings, call TechLine℠ at 1 877 ARMSTRONG (1 877 276 7876).

Product information as well as guide specifications for Armstrong low-formaldehyde ceilings can be viewed and downloaded at armstrong.com/ceilings.

TechLine℠ / 1 877 ARMSTRONG
1 877 276 7876

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