



TECHNICAL NOTE

Facts About Formaldehyde Emissions
from
EWPAA Certified Products



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Introduction

This brief statement is in response to recent concern over formaldehyde emissions from plywood, laminated veneer lumber (LVL) and other veneer based wood products expressed to the Plywood Association of Australasia. The EWPA shares the public's concern that exposure to high formaldehyde concentrations for extended time is harmful. This statement gives a brief summary of formaldehyde, its sources, emissions from EWPA certified product and ways to reduce emissions.

Sources of Formaldehyde

There is a misconception that formaldehyde is an artificial man made compound which is foreign to the environment. This is not true. Formaldehyde is one of the most common naturally occurring molecules. It is a colourless strong smelling naturally occurring gas which is irritant to the eyes and throat and toxic at very high concentration. Formaldehyde is present in the air that we breathe at a typical background concentration of 0.03 ppm (parts per million) but may occur in urban air at up to 0.08 ppm.

Formaldehyde even occurs naturally in the human body at relatively high concentrations. It is present in the blood stream and in every cell of the human body at a concentration of 2-3ppm (parts per million) in healthy individuals. It is estimated that the human body produces approximately 50 grams of formaldehyde per day and as the body metabolises such large amounts of formaldehyde it is unlikely to be toxic to internal organs and tissues at concentrations below these levels.

Formaldehyde also occurs naturally in many foods that we eat as detailed in Table One.

| Food | Formaldehyde Concentration (ppm) |
|-------------|----------------------------------|
| Smoked Fish | 1.0 |
| Shell Fish | 0.1 |
| Pork | 0.02 |
| Tomatoes | 0.006 |
| Beer | 0.0007 |

Table 1 : Formaldehyde Concentration in Some Common Foods

Other natural and man made sources of formaldehyde include decay, combustion, wood smoke, tobacco smoke, car exhausts, panel products, carpets, textiles, clothing and domestic appliances such as wood heaters. Formaldehyde concentration in tobacco smoke can very high and has been measured at up to 40ppm. Measurements of passive smoke in a typical room with two smokers have shown formaldehyde concentrations of up to 0.4ppm.

Formaldehyde Emissions from EWPAA Certified Products

With the recent publicity there has been significant confusion over formaldehyde emissions from plywood, laminated veneer lumber products (LVL) and other veneer based wood products manufactured by EWPAA member mills. These concerns are unfounded in products manufactured in Australia and New Zealand and other countries in which the EWPAA operates where strict workplace restrictions apply to formaldehyde emissions limiting the choice, and type of adhesives which may be used in the manufacture of plywood and LVL to only those with zero or very low formaldehyde emissions. This automatically results in product with low formaldehyde emissions. The same does not hold true for all imported products where workplace restrictions on formaldehyde emissions may not apply.

Plywood and LVL products manufactured by EWPAA certified mills are produced using two different adhesive types, phenolic and low emission amino plastic (Urea formaldehyde and Melamine Urea formaldehyde) adhesives. The phenolic adhesive is very stable form of plastic commonly called “bakelite” and is used in items such as pot handles, light switches and electrical components due its high stability and thermal resistance.

Phenolic adhesives are waterproof and stable under full weather exposure and long term structural load. Phenolic adhesives in their initial liquid state emit low levels of formaldehyde but once cured are inert and do not emit further significant measurable quantities of formaldehyde.

Amino plastic adhesives are used in applications where the black phenolic adhesive would be disfiguring or difficult to glue wood species. Amino plastic adhesives are not as stable as phenolics and do emit very low levels of formaldehyde. The modern low emission amino plastic adhesives now in use in Australia and New Zealand have been specially manufactured to provide the lowest possible formaldehyde emissions and meet the World’s most stringent emission limits. These modern adhesives when measured using state of the art technology are provide formaldehyde emissions practically equivalent to non-emitting phenolic adhesives.

The EWPAA routinely tests formaldehyde emissions from its members’ products. This testing has shown that formaldehyde emissions from phenolic bonded EWPAA certified products to be consistently very low and in fact many times lower than the typical indoor background formaldehyde level of 0.03ppm and hundreds of times lower than the Worksafe Australia 8 hr time weighted average occupational exposure limit of 1.0ppm and the 15 minute short term exposure limit of 2.0ppm.



At this very low level the significant majority formaldehyde measured has been emitted naturally from the timber itself through a natural ageing process which occurs when timber is exposed to oxygen. Testing of modern low emission amino plastic adhesives also show similar low emissions.

The EWPAAs Emission Labeling Program

To ensure the users of EWPAAs certified products have confidence that they are using plywood and LVL with the lowest possible formaldehyde emissions the EWPAAs has introduced an industry wide formaldehyde testing and labelling program. All EWPAAs certified mills are required to forward formaldehyde test samples to the EWPAAs National Laboratory on a regular basis for formaldehyde emission testing. On the basis of these laboratory tests certified mills are permitted to brand a formaldehyde emission class on its products as detailed in Table Two. These emission classes are also incorporated into National Plywood and LVL Product Standards.

| Emission Class | Emission Limit (mg/l) | Emission Limit (ppm)* |
|-----------------------|------------------------------|------------------------------|
| Super E ₀ | Less than or equal to 0.3 | Less than or equal to 0.024 |
| E ₀ | Less than or equal to 0.5 | Less than or equal to 0.04 |
| E ₁ | Less than or equal to 1.0 | Less than or equal to 0.08 |
| E ₂ | Less than or equal to 2.0 | Less than or equal to 0.16 |
| E ₃ | Greater than 2.0 | Greater than 0.16 |

* Based on a test chamber volume of 10litre, zero airflow during the 24hr test cycle, molecular weight of formaldehyde 30.03 and the number of microlitres of formaldehyde gas in 1 micromole at 101KPa and 298K.

Table 2 : Formaldehyde Emission Classes

What do I do to minimise formaldehyde emissions?

There are many things that a user of plywood, LVL or other veneer based wood products can do to reduce formaldehyde emissions. These relate to how the product is used, how it is finished and choice of the product used. As a simple guide follow this advice :

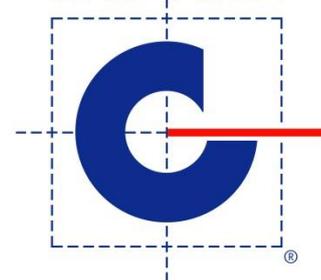
1. Choose a product with a type A bond phenolic glue line. These products can be identified by the EWPAAs Product Certified Structural Plywood, Laminated Veneer Lumber, Marine Plywood or Exterior (Type A) certification marks (see below).
2. Look for the formaldehyde emission label e.g. E₀, E₁, E₂ and E₃ and choose products with the lowest emission class suitable to the application.
3. Paint or varnish the plywood or LVL product. Painting products with an acrylic or polyurethane finish reduce emissions by over 90%.
4. Allow products to air for a few days before installation. Formaldehyde emissions are at the highest immediately after manufacture due to residual formaldehyde from the manufacturing process. These reduce rapidly over a short period. By allowing product to air prior to installation formaldehyde emissions are greatly reduced. Additionally, there is the added benefit of allowing product moisture content to equalise with the surrounding environment providing a flatter and more stable product.
5. Beware of formaldehyde emission claims of some non-certified products. By choosing a EWPAAs certified product you are assured that the product is subject to rigorous independent third party laboratory testing on a regular and on-going basis.

Simon Dorries
General Manager

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Revision History

| Revision | Changes | Date | Who |
|----------|--|----------|-----|
| 4 | <ul style="list-style-type: none">Added Super E0 to the Table of Formaldehyde Emission Classes | 18-02-15 | AM |
| 3 | <ul style="list-style-type: none">Changed to standard Technical Note format.Updated logos and member list. | 07-02-12 | MB |
| 2 | <ul style="list-style-type: none">General formatting tidy, and minor grammar corrections.Changed references from PAA to EWPA.Removed references to amino plastics in last section. | 02-2008 | SD |
| 1 | Initial Release | | SD |

EWPAA Members

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