



Facts on Structural Wood Panel Formaldehyde Emissions

Recent news reports have highlighted concerns over the health effects of formaldehyde concentrations in travel trailers and mobile homes that were provided as temporary housing to Gulf Coast hurricane victims by the Federal Emergency Management Agency (FEMA).

Formaldehyde is a naturally occurring substance present in the ambient environment. It is also a by-product of natural organic processes and from combustion associated with the burning of wood, kerosene and natural gas; automobiles; cigarettes; etc.. And it is an important industrial chemical used in the manufacture of numerous consumer products.

Some news accounts have cited “composite wood” and/or “plywood” as a potential source of formaldehyde emissions in the FEMA temporary housing units. It is important to understand that “composite wood” and “plywood” are terms that can encompass products having widely varying formaldehyde emission properties because of the different types of adhesives used in their manufacture.

Formaldehyde-related concerns have most generally been associated with urea formaldehyde adhesives, but *not* with phenol formaldehyde adhesives. Urea formaldehyde adhesives are commonly found in products normally used indoors where high moisture resistance is not required.

Phenolic adhesives, on the other hand, are highly durable, water resistant and more stable. They are commonly used in the manufacture of structural plywood and oriented strand board (OSB), which are products designed for construction applications governed by building codes, such as subfloors, wall sheathing and roof sheathing, as well as numerous industrial applications.

Standards governing the manufacture and/or performance of structural plywood include *Voluntary Product Standard PS 1-07 for Structural Plywood* and *Voluntary Product Standard PS 2, Performance Standard for Wood-Based Structural-Use Panels*. Structural plywood trademarked by APA under these standards is manufactured only to Exterior or Exposure 1 bond classifications and is therefore produced with exclusively phenolic adhesives.

Standards governing the manufacture and/or performance of OSB include *Voluntary Product Standard PS 2, Performance Standard for Wood-Based Structural-Use Panels*. This standard requires OSB to meet the Exposure 1 bond classification and therefore only permits moisture resistant adhesives such as phenolic or MDI adhesives.

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Because formaldehyde levels associated with *PS 1* and *PS 2* structural wood panels are so low, these products easily meet or have been exempted from the world's leading formaldehyde emissions standards and regulations, as follows:

1. **U.S. HUD Manufactured Housing Standard.** This standard specifies a 0.20 ppm emission limit for (non-structural) plywood using the ASTM E1333 method. Because of its extremely low formaldehyde emission levels, phenolic-bonded structural plywood is exempt from the testing and certification requirements of the standard. While there is no specific limit stated for OSB, it has been well accepted that the stated exemption for panels that use phenolic adhesives is applicable to OSB products meeting *Voluntary Product Standard PS 2*.
2. **California Air Resources Board (CARB) Air Toxic Control Measure for Composite Wood Products.** This regulation, developed by a division of the California EPA and scheduled to take effect January 1, 2009, is considered the most stringent formaldehyde emissions regulation in the United States. In recognition of the different formaldehyde emission levels of different types of wood products, definition #8 of the regulation explicitly exempts "structural plywood," "structural panels," "structural composite lumber," "oriented strand board," "glued laminated timber," and "prefabricated wood I-joists."
3. Under the **Japanese Agricultural Standards (JAS)**, panels meeting the most stringent formaldehyde requirements (F****) are required, using test method JIS A 1460, to have average emission levels below 0.30 mg/l. *PS 1* and *PS 2* panels easily meet F**** requirements. This formaldehyde regulation for wood panels is widely considered the most stringent in the world.
4. OSB panels sold into European markets must meet the **EN 300 standard** and be rated for formaldehyde emissions based on the EN-717-1 test method using a formaldehyde test chamber. Structural plywood sold into Europe must meet EN 636 and be evaluated for formaldehyde based on EN 717-1. Structural plywood and OSB manufactured in accordance with *PS 1* and *PS 2* panels easily meet the E-1 formaldehyde emission limit of 0.124 mg/m³ in these standards.

In summary, structural plywood and oriented strand board panels manufactured in accordance with *Voluntary Product Standards PS 1* and *PS 2* easily meet or are exempt from the world's most stringent formaldehyde emissions standards.

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