



White Paper: **Identifying Chinese Drywall**

Prepared by:

Bracken Engineering, Inc.
2701 W. Busch Blvd, Ste 200
Tampa, Florida 33618

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INTRODUCTION

Much is being reported about problems caused by drywall manufactured in China and installed in tens of thousands of homes here in the US. Drywall, also known as sheet rock, plaster board and Gypsum (gyp) board, is commonly used to complete the interior wall and ceiling envelope of homes and businesses. The problems being reported in newspapers and on T.V. relate to a number of issues, and of course the news media often plays up fears of potentially chronic health effects. It is not totally clear exactly what compounds in the drywall are causing the problems and any of the suspected toxic compounds (if present) are present at an extremely low concentration. So testing is not always the best place to start in identifying if you have a problem.

CHINESE DRYWALL

The things to remember in this assessment are: not all Chinese drywall is tainted, and there are some reports of similar problems being caused by drywall containing other identification. Once the simple questions above are answered it should be clear whether additional examination is warranted.

Chinese drywall is made from fly ash, a residue of coal combustion. From this drywall vaporous gases tend to be released into the air. Chemicals and gasses that can be released can include:

1. Iron Disulfide (FeS_2 Pyrite)
2. Hydrogen Sulfide (H_2S)
3. Carbonyl Sulfide
4. Sulfur Dioxide (SO_2)
5. Carbon Disulfide (CS_2)
6. Strontium Sulfide (causes the smell)

The issue and problems begin when these gasses mix with water to form corrosive agents. This mixture occurs as a result of free moisture such as water intrusion to the building envelope or condensation to HVAC lines. This mixture can also occur as a result of ambient moisture such as elevated humidity. Once mixed, the corrosive agents then attack the softer metals with greater electric potential.

IDENTIFYING CHINESE DRYWALL

The first place to start is for the home or building owner to ask themselves a few simple questions: Have I noticed an odor of ammonia or Sulfur (rotten eggs) in my home? Have I noticed black sooty deposits on my gold jewelry or other malleable metals in my home? Have I had unexpected problems with appliances in my home, especially the air conditioner or electronic devices? A “yes” answer to any of these should cause you to ask yourself one additional question; has any drywall been installed since 2002?

In the event additional examination is warranted or sought, this would be the point at which to get a professional. In addition to determination of the questions listed above, the professional investigation may include any of the following tests:

I. Identifying Chinese Drywall in a structure (non-destructive)

If there is the presence of a sulfur-like smell similar to rotten eggs and the drywall was installed after 2002, then:

- a. Verify the smell through the use of an air sampling device to test the air present in the structure.
 - i. ITX Multi-Gas Monitor: Measures six gases simultaneously (LEL, O₂, CO, H₂S, and SO₂)
 - ii. RKI GX-2001 Multi-Gas Monitor: Measures four gases simultaneously (LEL, O₂, CO, H₂S)
 - iii. MSA Altair Multi-Gas Monitor: Measures four gases (LEL, O₂, H₂S, SO₂)
 - iv. Gas Badge Pro Single Gas Monitor: Measures SO₂
- b. Check the drywall label by going into the attic of the structure and look for the label on the back of the drywall
 - i. It is Chinese drywall If it possibly says: “Made in China” or “Knauf Plasterboard Tianjin (KPT)”
 - ii. It is usually American made if it has nothing or the name of an American drywall manufacturer such as: U.S. Gypsum Company, Gridmarx, etc.
- c. Check the copper piping leading back to the air conditioning unit for corrosion. This piping is usually exposed. Corrosion is indicated by a black, sooty coating generally caused by
- d. Check the wiring behind wall outlets to determine if corrosion has taken place. This corrosion is indicated by a black, sooty coating
- e. Check metals throughout structure to identify any corroding. This corrosion is indicated by a black, sooty coating. Examples include: metal frame of mirrors, light fixtures, window frames, appliances, etc.

II. How to test for Chinese Drywall (destructive)

- a. Simple method for testing Chinese Drywall
 - i. Obtain a small sample of the Chinese drywall and a small sample of American made drywall
 - ii. Remove the manila paper on both sides of the samples
 - iii. Using a blade of some sort, scrape the hardened drywall of each sample into a cup causing both samples to have a physical property of powder.
 - iv. Dissolve each sample into a high purity dispersion/suspension solvent
 - v. From this solvent, the tainted drywall reacts differently than the domestic drywall
 1. Tainted drywall in solution is gray in color and separated impurities are early seen
 2. Domestic drywall in solution is a creamy beige color
- b. More sophisticated form of testing Chinese Drywall
 - i. One sample of domestic drywall, multiple samples of the affected drywall, and a sample of the affected copper piping should be taken to a lab for testing.
 1. Testing the gypsum crystal structure
 - a. Scrape portion of gypsum drywall from each sample
 - b. Ground each sample to a slurry in a mortar with alcohol
 - c. Dry resulting slurry on a glass slide
 - d. Obtain X-ray diffraction patterns and compare between affected drywall and domestic drywall
 2. Testing the physical structure of the gypsum
 - a. Scrape each sample into a powder as before
 - b. Press onto carbon tape
 - c. Use Edax Phoenix System (EDS) to analyze the gypsum component and compare
 3. Testing the volatile content of the gypsum
 - a. One sample (3/4"x2-3/4") of affected drywall and one sample (3/4"x2-3/4") of domestic drywall is used
 - b. Remove the manila paper from both sides of each of the samples
 - c. The paper from each sample becomes two separate samples resulting in a total of four samples. (2-paper and 2-gypsum)
 - d. Weigh all samples then expose samples to 95% humidity in a sealed chamber.
 - e. After 24 hours samples, reweigh samples and seal them under nitrogen in septum vials.

- f. Use an Algient Gas Chromatograph with an Atomic Emission Detector (GC-AED) to identify the volatiles accumulated in the head space as per ASTM D6228.
4. Testing the black deposits on the copper piping
 - a. Use a tungsten needle to remove black deposits under microscopic observation
 - b. Mount black material on a beryllium plate and analyze to determine elemental content
 - c. Analyze using a scanning electron microscopy with energy dispersive spectrometry detection (SEM/EDS).

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