

Restoration Issues: Chinese Drywall

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Much is being reported about problems caused by drywall manufactured in China and installed in tens of thousands of homes 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 television can potentially relate to a number of issues, but the news media often sensationalizes fears of the potential for chronic health effects. It is not totally clear exactly what compounds in the drywall are causing the problems, and the suspected toxic compounds (if present) are present at an extremely low concentration. Therefore, testing is not always the best place to start in determining if you have a problem.



The first place to start for the home or building owner is 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 one additional question: Has any drywall been installed since 2002?

Chinese drywall is made from fly ash, a residue of coal combustion. From this drywall gas vapors tend to be released into the air. Chemicals and gasses that can be released include: Iron Disulfide (FeS_2 Pyrite), Hydrogen Sulfide (H_2S), Carbonyl Sulfide, Sulfur Dioxide (SO_2), Carbon Disulfide (CS_2), or 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 on HVAC lines. This mixture can also occur as a result of ambient moisture from elevated humidity. Once mixed, the corrosive agents then attach to the softer metals with greater electric potential.

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 with other identification. Once the simple questions above are answered it should be clear whether additional examination is warranted.

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

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

If the drywall was installed after 2002, check the drywall label. First, go into the attic of the structure and look for the label on the back of the drywall. It is Chinese drywall if it says "Made in China" or "Knauf Plasterboard Tianjin" (KPT). It is usually American made if it has nothing or if it contains the name of an American drywall manufacturer such as: U.S. Gypsum Company, Gridmarx, etc. Next, 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 Chinese Drywall. Next, check the wiring behind wall outlets to determine if corrosion has taken place. This corrosion is indicated by a black, sooty coating. Finally, try using an air sampling device to test the air present in the structure. Devices capable of detecting such compounds include: the ITX Multi-Gas Monitor or the MSA Altair Multi-Gas Monitor.

II. How to test for Chinese Drywall (destructive)

Simple method of testing Chinese Drywall:

Obtain a small sample of the Chinese drywall and a small sample of American made drywall. Remove the manila paper on both sides of the samples. 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. Dissolve each sample into a high purity dispersion/suspension solvent. From this solvent, the tainted drywall reacts differently than the domestic drywall

More sophisticated of testing Chinese Drywall:

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. The subsequent testing should: Test the gypsum crystal structure, Test the physical structure of the gypsum, Test the volatile content of the gypsum, and/or Test the black deposits on the copper piping.

For a list of references or to obtain more information on what is involved in identifying and testing Chinese Drywall, please contact Gary Pailthorp, PE, CBO, CFM at gpailthorp@brackenengineering.com or William Bracken, PE, SECB, CFM at wbracken@brackenengineering.com.

Restoration Issues: FEMA's 50% Rule

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Within the US there exists a "50% rule" that governs the restoration of existing structures. FEMA's 50% rule as it is referred to is formally known as the "**Substantial Damage / Substantial Improvement**" rule. This rule is found within the guidelines of the National Flood Insurance Program (NFIP) located within 44 CFR 59.24 & 44 CFR 206.226. It is important to note that this rule is a Federal regulation and as such is not found within the Building Code. The actual language that enacts the provisions and regulations of the NIFP is found within each local municipality's ordinances.

It is very important to note that this rule is completely separate and apart from the Building Code. That is to say it is not triggered by the Building Code and the Building Code is not triggered by it. The two sets of requirements are very different and are to be treated separately.

FEMA's 50% rule may not even apply if the local community is not a current participant in the NFIP or has not legally adopted the NFIP guidelines. Another instance where the rule may not apply is if the structure is not within a Special Flood Hazard Area or is within one but is currently compliant. In any case, when FEMA's 50% rule does apply it states:

"If a community determines that the cost of improvements to a home or business equals or exceeds 50% of the market value of the building, the building is considered a '**substantial improvement**.' If a community determines that the cost of restoring a home or business equals or exceeds 50 of the market value of the building before the damage from any origin occurred, the building is considered '**substantially damaged**.' A substantially improved building or substantially damaged building must meet the minimum requirements of the NFIP."

The NFIP defines "**Substantial Improvement**" or "**Substantial Damage**" as:

"**Substantial improvement**" means any rehabilitation, addition, or other improvement of a building when the cost of the improvement equals or exceeds 50 percent of the market value of the building before start of construction of the improvement. The term includes buildings that have incurred "substantial damage." "**Substantial damage**" means damage of any origin sustained by a building when the cost of restoring the building to its pre-damaged condition would equal or exceed 50 percent of the market value of the building before the damage occurred. Substantial damage is determined regardless of the actual repair work performed.

The NFIP defines "**Market Value**" as:

"**Market Value**" means reasonable sale price or appraised value.

NOTE: Market Value does not mean the tax assessed value or the cost to replace. The tax assessed value or the cost to replace can actually be lower than the Market Value.

In summary, **IF** the community has enacted the NFIP guidelines **AND** the structure is located within a special flood hazard area **AND** the structure is not currently compliant with the NFIP guidelines **AND** the cost of repairs exceeds 50% of its market value, then the structure will need to be upgraded to meet current NIFP requirements. **IF** NFIP upgrades are triggered there is no such corresponding "**Total Compliance**" trigger within the Building Code.

