

Thermal Remediation

A New Application Of An Old Process

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Most of us are familiar with the term “pasteurization.” Louis Pasteur discovered the process in the 1860s when he determined that bacteria, which caused the wine to spoil, could be killed when heated to a certain threshold temperature over a specific period of time. The bacteria were killed without harming the wine. Later the application for pasteurization included other liquid food products such as milk and fruit juices.

Today, the process is being applied in the building environment for the purpose of killing targeted unwanted pests and contaminating organisms for improving indoor air quality.

“Since the days of Louis Pasteur, it’s been well known that ‘heat kills.’ Millions of lives have been saved through the technique of heating milk and other foods, destroying or otherwise inactivating bacteria,” said Dr. Richard Ashby, a County Medical Director. The application on this principle to our environment is a natural progression of that knowledge.”

Developed as an alternative to chemical fumigants for pest eradication, thermal heat technology patented by ThermaPureHeat, a California environmental and pest control service provider, demonstrated that certain microorganisms were susceptible to heat. Most organisms have a specific thermal death point and many of those

inhabiting our structures fall within the efficacy of thermal remediation.

The application of heat to a structure can have the same impact as the pasteurization of milk – heat kills and reduces the level of harmful



organisms. ThermaPureHeat technology has proven effective with many species of mold, bacteria and viruses. Heat has been successful in reducing odors and VOCs in structures. Additionally, the structural heat process may target insects such as termites, bedbugs, dust mites and cockroaches.

When thermal remediation is used correctly, it can have a significant impact upon the quality of indoor air within the build environment. In the case of mold, thermal remediation used in conjunction with gross removal delivered a more thorough remediation.

The temperatures achieved kill the vegetative form of mold and the spores and have demonstrated in some tests denature the allergen.

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It is a tool for the IH professional to specify when the proper circumstances warrant its use. Some IH professionals are specifying heat as a polisher following gross remediation activities. Heat penetrates effectively into enclosures and building components; as a result, other IH professionals may recommend the heat technology as a “management in place” tool where contaminants are properly contained or as a replacement for post remediation disinfection using

antimicrobial chemicals.

Why the Process is so Effective

Heat is been demonstrated to be an effective component of mold remediation. Heat can treat large areas, small areas or entire structures with a single application, oftentimes in just eight hours or less.

Heat is great for drying out moisture in new construction and new buildings. There are no toxic chemicals – so the building occupant’s health is not at risk. Because it generally takes less than eight hours, there are no multiple day move-outs required.

Offices can be treated overnight, with no staff inconvenience, and there’s no odor. No odor from the treatment itself, and, more importantly, no more odors that may have been present prior to the treatment.

Target Contaminant Mold	Lethal Temp	Time (Min)	Reference
Stachybotrys chartarum	140F	30	Compendium of Soil Fungi, pg. 745
Aspergillus alutaceus	144F	20	Compendium of Soil Fungi, pg. 82
Aspergillus candidus	144F	N/A	Compendium of Soil Fungi, pg. 84
Aspergillus ustus	144F	25	Compendium of Soil Fungi, pg. 119
Aspergillus wenti	145F	25	Compendium of Soil Fungi, pg. 124
Aspergillus niger	145F	25	Compendium of Soil Fungi, pg. 103
Alternaria alternata	145F	25	Compendium of Soil Fungi, pg. 103
Wood Fungi (Staining Fungi)	151F	75	Compendium of Soil Fungi, pg. 106 (Chidester, 1937, 1939)
Basidiomycotina	122F	N/A	Compendium of Soil Fungi, pg. 107 (Hulmes, Franks)
Poria – Wood Eating Fungi (Meruliporia Incrassata)	151F	75	Compendium of Soil Fungi, pg. 106 (Chidester, 1937, 1939)
Fomes (Fomitopsis Rosea)	140F	75	Compendium of Soil Fungi, pg. 106 (Chidester, 1937, 1939)
Escherichia coli	135F	270	Padhye and Doyle, 1992
Escherichia coli	140F	45	Padhye and Doyle, 1992
Escherichia coli	145F	24	Padhye and Doyle, 1992
Escherichia coli	147.7F	9.6	Padhye and Doyle, 1992
Hanta Virus	140F	30	Manual of Hemorrhagic Fever and Hantavirus Pulmonary Syndrome. WHO pg., 196

How it Works

Inside temperatures are carefully monitored by state-of-the-art digital thermometers and lasers to ensure that the temperatures are at levels lethal to the target – mold, bacteria, viruses, dust mites, insects or VOCs.

Special thermal blankets protect large heat-sensitive items like electronics, computers, vinyl, some plastics, etc. Items such as plants, artwork, photography, candles, and software are temporarily removed from the treatment area.

How hot is it? It's about the same temperature as a sauna. Lab tests have demonstrated 147°F temperatures for 30 minutes are lethal to most pesky organisms. Heat trained technicians raise temperatures up to 160 °F – no hotter than a sauna – for a



few hours. Heat then disinfects the area being treated by significantly reducing levels of bacteria, odors, mold and bugs.

Specially designed heaters move heated air through Mylar ducting to the treatment areas causing heat to penetrate into hidden crevices and voids. The process is similar to that in a convective oven, creating a uniform and distributed level of heat. A variety of heating equipment is available depending on the requirements for the structure. Traditional post remediation sampling and analysis is used to verify efficacy of the process.

During summer break, 2005, a significant remodel of 122 individual apartments was scheduled at a major university in southern California. During

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the assessment of the facility to determine the construction requirements, water damage was found in 109 of the apartments. There was also a significant termite infestation within the complex.

These added construction elements created a significant dilemma for the general contractor. Meeting a condensed schedule with a spartan budget was difficult, adding major water damage was a disaster.

Precision Environmental, Inc. (PEI), an environmental contractor, licensed pest control operator, and ThermaPureHeat licensee, was brought in to address the problem. The difficulties of the project were condensed schedule, partial occupancy of the facility throughout the summer, and budget constraints. The environmental consultant, Criterion Environmental, and PEI developed the methodology to accomplish the objectives of the project. Criterion established a protocol that involved traditional remediation, visual inspection, thermal heat application, and post remediation sampling.

The objective of using heat was to minimize the amount of demolition to only those areas where physical damage had occurred. Of the 109 units that required remediation, approximately 10 required removal of cabinetry and only four required the tiled shower stall to be removed. Thermal radiation was able to effectively kill mold in those inaccessible areas, allowing remediation to be reduced and more significantly, restoration time and costs minimized.

A rigorous post-remediation protocol of non-viable surface and air samples was conducted in each of the 109 units that required remediation.

The total project was completed on time and within budget despite the potentially large, unforeseen mold remediation requirements. This could not have been accomplished without the application of ThermaPureHeat to minimize demolition and reconstruction. And all units passed traditional post remediation sampling requirements. The University was able to use the housing throughout the summer for

specialty groups and camps without interruption. As an added time bonus and cost savings, ThermaPureHeat was used simultaneously to eradicate the dry-wood termite infestation. Heat is one of the two methodologies accepted by the California State Pest Control Board for the eradication of dry-wood termites in whole structures. The owner of the complex was pleased with the heat technology and is duplicating the process at another of their properties in Texas. **FSM**

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