

Ever since we were able to make our homes and working environments warmer and air-tight, we have chosen to ignore the potential harm from Mould which has been known for thousands of years.

What is Mould?

Mould is a type of fungi that grows in the natural environment all year round and is the single biggest cause of poor indoor air quality. There are hundreds of thousands of species of mould which grow in a wide variety of colours. Mould is found everywhere both indoors and outdoors.



Outdoors, moulds live in the soil, on trees, plants, and on dead or decaying matter. In nature, mould helps break down organic material which helps recycle nutrients throughout the ecosystem. Mould growing indoors however, presents a major health issue. Some species of mould like *Aspergillus* and *Stachybotrys Chartarum* can not only grow but can also reproduce into colonies indoors. Many times, mould is easily detected by a musty odour in places with high moisture like basements, crawl spaces, attics, and bathrooms. Moulds produce microscopic cells called "spores" that easily spread through the air. These spores act like seeds, forming new mould growth colonies when they land in areas where the conditions are right for mould growth.

What are the primary concerns of mould infestation?

Mould exists in all structures, virtually everywhere, floating in the air and on all surfaces. Many building materials such as wood, plasterboard etc. provide the "food" that can support mould growth. Even dust that has settled on these materials or furniture can be a food source for moulds. Mould needs to eat to survive, and it's perfectly happy eating your home, if you allow it. But health risks arise when the levels are too high, and most people don't even consider the possibility of an infected home or workplace; **Doctors** don't even delve into the chance that their patient's condition is due to indoor air quality issues.

According to the HSE, all indoor mould growth should be removed promptly, no matter what type(s) of mould are present, or whether or not it can produce toxic mould. It's not a myth, prolonged exposure to mould increases health risks. The HHSRS has mould and dampness in the **same** Category as Asbestos but consider it as a **more** prevalent and immediate concern.

How does mould originate, and where does it reside?

Mould only needs a few things to grow and multiply; Nutrients (food), a suitable place to grow, and moisture. Moulds can grow almost anywhere there is enough moisture or high humidity. The Moisture can come from our bodies (sweat, wet hair on pillows, breath), steam, moist air from outdoors, tiny plumbing leak, clothes that aren't fully dried and a host of other reasons. Mould often appears as a staining or fuzzy growth on furniture, walls, ceilings, or anything made of wood or paper. It can smell like an earthy, or musty odour, though oftentimes it's undetectable. Mould colours range from white, grey, brown, black, yellow, or green.

What promotes mould exposure?

Exposure increases when indoor mouldy materials become dried, damaged or disturbed, causing spores and other mould cells to be released into the air and consequently inhaled. Elevated exposure to mould may also occur if a person directly handles mouldy materials or accidentally ingests non-edible moulds.

Do you perform mould tests?

We can take samples to test for mould and send them to our lab for analysis, although not all moulds are detectable. Most of our clients detect mould with their nose or eyes. If you see mould in one area of your dwelling, be assured it is everywhere in that building, and when it's blatantly visible, there usually isn't a need for the added expense of testing. Why test? Just get rid of it unless of course this turns into a legal argument and proof that at least one of the harmful six exist in your property.

Can't I just use bleach to eradicate mould?

Bleach does not kill mould, it only removes the colour. When you treat mould in your bathroom, you effectively eliminate the appearance; but it comes back in the same place, doesn't it? Not only does it not work, but the when the mould comes back, its roots become even more resilient, not to mention that bleach is an incredibly caustic chemical.

Will Paint and / or Primer kill mould?

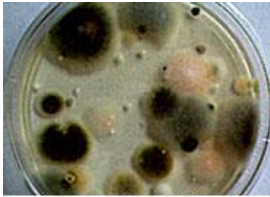
The simple answer is No. It can seal the problem for a short while, but it will return. After our treatment plan is complete, that is a good time to prime, and we recommend the use of an oil-based primer. Water based primers are ok as well, but not as effective.

Newer Homes and Buildings are immune to the mould problem, right?

Unfortunately this is Not true. Building materials, timber and trusses sitting outside in the rain too long, can all become infested, and the mould can show up several months after the structure is complete. Some moulds will lay dormant until moisture re-activates them.

How can mould affect one's health?

This answer is not meant to scare you, but it is real. Mould can grow in the lungs and on the spine. It can cause paralysis, eye fungus, and the toxic effects of fungal exposure and deadly mycotoxins can compromise the immune system. Reoccurring bronchitis is commonly caused from tainted indoor environments. Too many times, testing and removal is performed after the damage is done, this is why we promote the eradication of even the possibility of mould, especially in surroundings that you spend most of your time in. In rare cases, mould can even produce arsenic gas and cause permanent brain damage. People that suffer from allergies, breathing impairments, nasal and sinus congestion, nose and throat irritation, and migraine headaches should make a call to us their Top Priority.



culture taken at a home
with no visible mold growth

While occupational exposure to airborne pollutants such as coal dust and asbestos have long been known to cause lung cancer, mesothelioma, and pneumoconiosis (black lung), the effects of being exposed to airborne contaminants, especially bio-aerosols like mould, in homes and non-industrial work sites such as office buildings, are just being realised. In the last 10 years, micro-organisms and mould have been concluded to be the primary source of indoor air contamination in as many as 50% of homes and offices studied since 1994.

Many building materials such as wood and plasterboard provide ample food to support mould growth and reproduction. Even the dust that settles on these materials or furniture can be a food source for moulds. Moulds can grow anywhere there is adequate moisture. Some common causes of mould growing conditions are:

- » Flooding from external sources-(storm water, overflowing rivers, lakes and streams)
- » Flooding from internal sources-(overflow from sinks, bathtubs, showers, air conditioners)
- » Condensations-(from indoor humidity in basements, crawlspaces and attics)
- » Water leaks from the outside-(structural leaks from roof, walls, and floors)
- » Water leaks from the inside-(indoor plumbing leads or a broken pipe)
- » Poor ventilation-(steam from cooking and bathroom moisture from showers)

What is Black Mould?

Toxic black mould or black mould is a name commonly used for *Stachybotrys chartarum*. It is one of the most infamous of the toxic moulds because it can grow readily in domestic properties. In addition it is extremely dangerous to humans. *Stachybotrys* is known as a toxic mould because it produces harmful toxins called mycotoxins.

Stachybotrys is a genus of moulds that reproduce by releasing large numbers of spores. Described as a hydrophilic or "water loving". For this reason it only grows under conditions of high water availability like dwellings affected by damp, flooding and condensation. Although mould growth may be widespread, it can also be limited to scattered patches. This is usually because there is thermal bridging between inner and outer layers of the building envelope at these sites, and as a consequence there are cold spots and an increased incidence of condensation or interstitial condensation.

Stachybotrys is considered to be a strongly cellulolytic "cellulose loving" species. It degrades cellulose into sugar with a range of enzymes and absorbs nutrients necessary for it to grow and reproduce. Another commonly colonised material is gypsum plasterboards. Gypsum plasterboards contain a layer of plaster sandwiched between sheets of paper and/or insulation packing. When thoroughly wetted, gypsum boards are readily colonised by black mould because they contain large amounts of cellulose and minerals necessary for growth. When old and new gypsum board was artificially inoculated with this species, there was evidence of rapid colonisation.

Thus, the animal no-effect dose is comparable "to a continuous 24-hour exposure to 2.1×10^6 spores/m³ for infants, 6.6×10^6 conidia/m³ for school-aged children, and 15.3×10^6 conidia/m³ for an adult." Animals injected with *Stachybotrys* experienced bleeding in the brain, thymus, spleen, intestine, lung, heart, lymph node, liver and kidney and in some cases death (Aerias, 2001b)".

Disturbing the toxic black mould can release considerable amounts of toxic fungal particles. This is why one should never disturb or try to remove contamination found within a property. Removing toxic black mould is much more dangerous than removing ordinary mould and it should only be done by a professional. With enough exposure, mould can be harmful to most people, but there are certain people it can affect much worse than others. Death from mould is something that can be difficult to discern because mould can cause several medical issues which can be linked to or cause death. There are several cases in which moulds have been directly linked to death. Among the people that mould affects the most are children and the elderly. Mould inhalation affects your respiratory system, therefore anyone who has pre-existing respiratory issues is placed more in the danger zone.

In the UK toxic black moulds found in homes are becoming an everyday occurrence, and occupants are being affected unknowingly. The risks of infection are so strong that under the guide lines set by the Governments Health and safety standards for rented homes (HHSRS) state that a category 1 hazard possesses a serious threat to the health and safety of people living in and visiting your home, mould on the walls or ceiling is a category 1 hazard the same as asbestos!

Typically, toxic black mould is something to be considered in Housing Disrepair and Cavity Wall Insulation Failure actions where the property has been blighted by dampness. Cases in North America have resulted significant personal injury payments to affected parties.

Health Effects Associated with Moulds

Common moulds like *Aspergillus*, *Penicillium*, *Stachybotrys chartarum*, *Fusarium*, and *Aspergillus versicolor* can produce toxic and harmful substances called mycotoxins, which are lipid-soluble and are absorbed into the body through the airways, skin, and intestinal lining. When small diameter spores are inhaled into the body, they can reach the lung alveoli and induce an inflammatory reaction creating toxic pneumonitis.



Mycotoxins have long presented health risks to human and animal populations, and depending on quantities produced and consumed, mycotoxins can cause immune-logical effects, organ-specific toxicity, cancer, and in some cases death. Other symptoms of mould exposure are respiratory problems such as wheezing, difficulty in breathing, nasal and sinus congestion, burning and watery eyes, hacking cough, chronic fatigue, and skin dermatitis. Moulds also produce many microbial volatile organic compounds (MVOCs). These chemicals are responsible for the musty odours prevalent in areas with mould growth.

In recent studies, moulds that produce potent toxins have been associated with acute pulmonary haemorrhage among infants, and it is documented that mould can cause infections in immuno-compromised individuals.

Some moulds have also been classified by the National Toxicology Program as human carcinogens, and we also know that respiratory illnesses like aspergillosis among workers can be attributed to mould exposure. Based on an American Journal of Medicine report we have learned that outbreaks of Hypersensitivity pneumonitis has been linked to individuals with high exposure to mould-contaminated humidifiers and ventilations systems in office buildings. The Institute of Medicine concluded in its report, "Indoor Allergens", that airborne fungal allergens were most often associated with allergic diseases, such as allergic rhinitis/conjunctivitis, allergic asthma, and hypersensitivity pneumonitis.

Who Does Mould Effect?

There is a wide variability in how individuals are affected by mould exposure, depending on the type of mould, the amount of mould present and the length of exposure to the mould. People who are affected more quickly and severely are:

- » Infants and children
- » Elderly people
- » Pregnant women
- » Individuals with respiratory conditions, asthma, and/or allergies
- » Persons with weakened immune systems
- » All individuals with extended exposure

What Should I do if I See or Smell Mould in My Home?



If you see or smell mould in your home, the first step is to call Insite Specialist Services. You may not need to replace all mouldy materials such as carpeting. If you do not see any visible mould, but notice a musty odour, mould is most likely growing in and behind the walls, wallpaper, carpet or flooring. Attempting to remove mould without taking the proper precautions will make the situation worse because more spores and mycotoxins will be released into the air. If you see visible mould, or smell mould behind walls it needs to be remediated immediately. Insite Specialist Services will be able to provide an encompassing solution to your problem.

Should I have My House tested for Mould?

It depends on what you are trying to figure out. Testing for mould is inexpensive compared to the cost of an illness and can uncover potentially hazardous conditions within your home stemming from mould growth that is hidden behind walls, underneath carpeting and in attics, basements and crawlspaces. When testing is done it is necessary to compare the levels and types of mould spores found inside the structure, with those found outside the structure. It is unacceptable to have a higher count indoors than the count of spores outdoors. If visible mould is present, the first step is to take action to remove it. Then take corrective action on the problem causing the mouldy conditions.

What do I do About Mould in the Workplace?

If you see or smell mould, or if you or anyone else is experiencing any mould related symptoms, report it immediately. Tell your employer, supervisor, building manager, health and safety officer and/or your union representative so it can be investigated. If a particular office, floor, or area is affected, see if others are having any symptoms of the adverse side effects associated with mould exposure. Your employer is most likely responsible for removing unhealthy working conditions and must control indoor accumulation of water and humidity levels to prevent mould proliferation.

What could I do if nothing is done?


In what has been deemed the largest personal injury verdict in a toxic mould-related lawsuit in the U.S., a Sacramento, California jury awarded Darren and Marcie Mazza and their eight-year-old son, Bryce, \$2.7M on Nov 8th 2001 (plus costs & fee's – Estimated at \$1.1M)

The case, which lasted approximately two and a half weeks, stemmed from a lawsuit the Mazzas filed against the owners and managers of the Partridge Point Apartments: The plaintiffs maintained that “the premises contained toxic mould and toxic mould spores” and began to suffer from a number of health problems about six months after moving into the apartment. The unit in which his clients resided had levels of *Stachybotrys*, *aspergillus* and *penicillium* on surfaces, in air and in a carpet test sample.


Water and Flood Damage Restoration

 **PAS 64 & BS12999** The verified drying and decontamination of water damaged buildings.

 **IICRC S520 International Standard for Professional Mold Remediation**

 The British Standards Institute (BSI) have published two separate guidance and standards documents on the restoration and verification of water damaged and or flooded buildings. The PAS 64, published in 2013 and the BS12999 published in 2015.

Both PAS 64 and BS12999 were written by leading stakeholders in the fire and flood restoration industry in the UK. Technical authors and various insurers, loss adjusting companies, the Association of British Insurers (ABI) and the documents were ratified by the industry. With the industry and insurers adopting the standards they must be seen as best practice when properly complied with. Therefore these guidance documents must be seen as the minimum level of compliance. With a requirement to verify the results of drying, cleaning and sanitation it must be clear that verification will revolve around measurement and sometimes third party (independent) assessments.

 The IICRC S520 is a collaborative effort involving trade associations, educational institutes, training schools and many other technical authors from across the USA and Internationally.

Insite Specialist Services take full and respective cognisance of all 3 standards or guidance notes and extends them with some innovative products to complete the works correctly.

However, for the purposes of this explanation document we will concentrate on PAS 64 and BS12999. Where we extend upon these guidelines and practice the International standard IICRC S520 is when we consider the use of negative air barriers.

Why the standards were written Prior to the standards introduction, contractors were not required to provide any verifiable evidence that their works had been completed properly. This meant many properties were not dried or decontaminated properly and this led to both increased health hazards from biological residue for occupants and reduction of property value at point of sale of a property.

The importance of following British Standards PAS 64 & BS12999 Restoration or repair of a water damaged buildings requires different skill sets beyond just water removal. Water can penetrate materials and cause hidden damage, loss of insulation in properties, release of chemical toxins from building materials and even furniture. Water in its many natural states can act as a gas and penetrate concrete and move 3 dimensionally even ending up in the loft from a basement leak. As water moves through or over materials it can condense or simply activate the omnipresent bacteria and mould spores. The warm moist environment results in bio amplification and this is now recognised as a health hazard.

The emphasis on this industry recognised code of best practice is documentation providing verifiable evidence of completion replacing historic use of caveats in meaningless completion certificates, so often issued by the restoration industry and builders.

Reaction times to water types;

1. Clean (tap water)
2. Grey water (washing machine leak)
3. Black water. Water entering the property from outside source and known to be a health hazard.
4. Toxic.

Water	Category	Day 1	Day 2	Day 3	Day 4	Day 5
Clean	1					
Brown / Grey	2					
Black & Sewage	3					
Toxic	4					

 Safe  Serious
 Urgent  Dangerous

Note all categories escalate over a few days to black water due to uncontrolled bio amplification.

Explanation of table components for PAS 64

- The category is initial flood contamination level based on likely contamination such as known or assumed Toxic or chemical components of flood water,
- Room and components refers to extent of possible damage and severity,
- Days from event is important because it provides a guide to possible bio amplification,
- The ages of occupants is a significant issue due to likely immune defence issues.

Health issues can multiply hazards and risks and drug takers for example can be classified as prescription and illegal drugs use.

- a) Identify the Category of water and record
- b) Identify the areas of damage (always use highest score) and record
- c) Identify how many days from the event? and record the score
- d) Establish the ages of the occupants (always use the highest score) and record
- e) Establish the occupants state of health prior to the incident and record
- f) Add the score for additional issues which focus attention on severity and record

SCORE	5	10	15	20	25
Category	1	2	3	4	
Rooms & components	1 to 3	All ground floor	Plasterboard walls	Insulated floors	Timber frame
Days from event	1 to 3	4 to 7	8 to 14	15 to 25	Over 25
Occupant age			6 to 60	61 to 79	0 to 5 and over 80
Occupant Health	Good	Poor	Drug user prescription / illegal	Asthma or Alcohol abuse	Chemo Radio therapy
Addition		Condensation visible	Odour	Visible mould coughing	Humidity ratio

Note. This table was developed by the authors of PAS 64 and is for initial guidance only. Acceptable risk ranges from 35 to 50.

We would suggest that through this process you have actually found it to difficult to have 'managed the job' to get it below 50 and as each day passes, the scores rise and the occupants can potentially begin to show symptoms of exposure, further impacting on your score and starting to create further and further issues.

Sanitation Water damage enables bacteria and mould to flourish and black water can contain virus and chemical waste. It is therefore imperative that properties are properly decontaminated. The evaporation or drying process will leave surface dust and biological contamination which could become aerosolised and according the WHO is the greatest health hazard. There are many fallacies surrounding sanitation and contractors are required in PAS 64 to prove the process they use, actually works by verification. Spraying biocide or fungicide can leave residues which cause chemical sensitivity, asthma and other acute and chronic illness. Killing bacteria and mould results in tiny allergenic and sometimes toxic fragments which can be inhaled for months and years after the water damage event. PAS 64 requires contractors to prove they have sanitised both surfaces and the air.

What's the health risk? The health risks of water damage and biological growth (mould) are recognised by World Health Organisation Sec 2.41 and mould is now legally recognised as a health hazard with the same (category 1) risk as asbestos. Ref Housing Health and Safety Rating System 2006

It is therefore imperative that health hazards and risks are not only removed from damp or wet buildings be proven to.

Using different contractors and using different products to kill fungus, moulds, bacteria, viruses, etc involves delays and the mixing of a 'soup' that no one can measure, control or recognise the potential harm that can result e.g. mixing bleach with many products will release deadly chlorine gas.

The following PAS 64 excerpts show critical issues which should be addressed by flood and water damage contractors:

- Recognition of potential health risks to building occupants escalating within 24 hours Sec 3.2
- Recognise that dead mould and bacteria may be as toxic and allergenic as live growth and simply applying biocides may increase inhalation risk for years after application (ref WHO Sec 2.41 and BS ISO - 16000-19 ref G.2.4)
- Assess Indoor Air Quality and monitor occupant health risk Sec 3.4.2
- Assess Likely presence of hidden mould and microbial growth Sec 3.7

However, Insite Specialist Services now provides a solution beyond previous products where we can kill all bacteria, moulds, fungus, parasites, yeasts and SPORES by oxidising them and the only bi-products are harmless Hydrogen and Oxygen. Small amounts of silver are left behind and acts as an antimicrobial barrier for a short period of time.

Cleaning of the air often involves HEPA vacuuming and is not usually a worthwhile additional action in the affected area. In the case where we use negative air barrier system, normally in a heavily infested property which is isolated to a single room and the disturbance of the spores is expected to escape to other areas of the building, this is used. It should be noted that the spores within the affected area are oxidised and pose no further threat.

The existing high level of spores throughout the remaining building due to the affected area can be vacuumed easily with a HEPA filtered, domestic type vacuum.

Certification When contractors have finished their work it is important they provide the client with verified evidence that they have completed the works properly and can prove it has been dried effectively, sanitised and the Indoor Air Quality is at least equal to outside conditions. This verification should form part of a completion certificate. This completion certificate is important because future purchasers or tenants may require evidence that the property was restored properly by professionals who followed the Industry Best Code of Practice.

Failure to provide this evidence may result in a property devaluation and or blight until such time as evidence is forthcoming.

PAS 64 provides a start to finish route of competent documented restoration, drying, sanitation and reduction and control of health hazards.

The emphasis on this industry recognised code of best practice is documentation and verifiable evidence of completion replacing historic use of caveats in meaningless completion certificates, so often issues by incompetent contractors.

The World Health Organisation and international opinion state that water damage buildings can lead to an increased health risk to occupants.

When selling a property, vendors must disclose historic (flood) events which may affect the property value. Failure to provide prospective purchasers with certified evidence of competent restoration sanitation and decontamination could result a property value being reduced.

There is a high risk of acute and chronic health effects even years after the event from a poorly decontaminated property. Of particular importance is the recognised hazard and risk of airborne and surface contamination which is invariably invisible and beyond the competence of anyone unless they are a competent and trained hygiene professional.

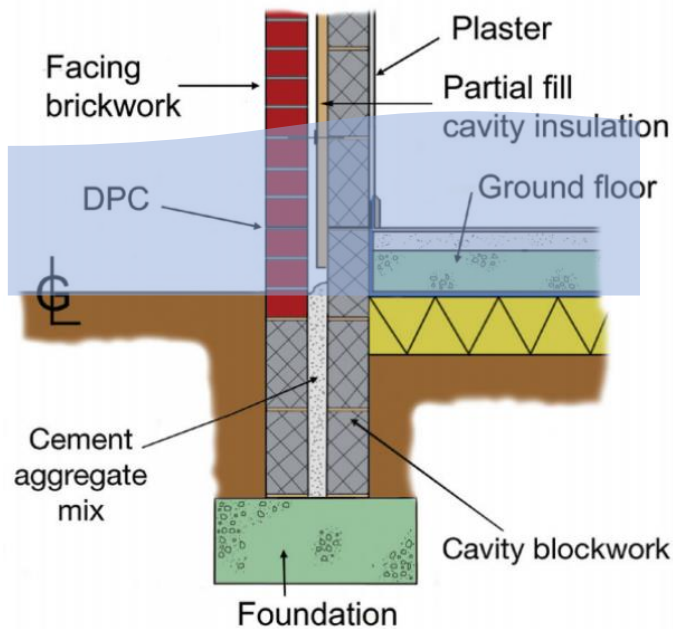
The PAS 64 provides the contractor and more importantly the property owner with a guide to industry best practice in the professional drying and decontamination of a property prior to its restoration and reinstatement.

Insite Specialist Services can provide a 'cradle to grave' service and an Insurance backed Guarantee that the work has been completed the highest standard. However, like most of these types of Guarantees in the market these have several caveats that normally exonerate the Contractor due to lack of maintenance of the building. This is very apt in the case of mould as no one can prevent the re infestation of the moulds or fungus if the original conditions are allowed to return and therefore this is an **unnecessary cost**.

However, Insite Specialist services do have a product that can prevent bacterial, viral and fungal growth on hard or soft surfaces as long as condensation is not the cause of the outbreak.

Verification? We can verify our works using ATP testing equipment which is a new, more scientific way of measuring contaminants on a supposedly clean surface. ATP Hygiene Monitoring is becoming more and more popular, particularly for use in public buildings such as schools and hospitals. A sample is taken with a special swab, inserted into the ATP meter, and a numerical value is returned. Pre-defined ranges of values determine if the surface is clean or dirty. This provides a quick, easy, and scientific method to determine if a surface is clean and free of mould, bacteria and viruses.

Here is a typical image of a mould damaged wall with concentrated levels towards the bottom however as you rise up the wall there are other species which can propagate and grow in the ideal conditions but not necessarily show to the naked eye, only the strongest survive lower down in the more saturated areas but are not limited to here. The whole area must be considered due to the elevated humidity levels.



Cavity wall construction has almost entirely replaced solid wall construction in the United Kingdom. It evolved in the latter years of the nineteenth century and became common in dwellings in northern and western Britain in the early 1900s. Its widespread adoption as virtually standard in the construction industry happened throughout the building booms of the 1920s, '30s and '40s.

How have we treated or even considered these areas following the submersion from flood waters or ingress from 'escapes of water' ?

Furthermore, Timber Kit houses use 'OSB' to line the kit on the cavity side and could become an ideal surface to harbour health affecting moulds, fungus, viruses and yeasts.

By forming some access hatches or holes in the construction we are now able to treat these areas and

provide a solution to a very rarely considered issue.

Apart from the British Standard PAS 64 there is also BS ISO 16000:19 which is possibly one of the biggest improvements in identifying mould health issues. This standard provides the basis of how to measure mould contamination in the air and reduce occupant's health risk.

The standard emphasises the need to measure **dead or non-viable spores** which replaces the historic use of swabs and culture plates which only identifies some viable spores.

The World Health Organisation made the statement that culture plates and swab type sampling is seriously flawed and this has been internationally accepted. The main issues here is that dead spores released during cleaning, or drying out, application of bleach or fungicide, cause the main spore to fragment into sub-micron particles which are allergenic and can be toxic and these are inhaled more easily to sometimes produce serious health effects. These can also leave behind a dangerous bio-film which can off gas mycotoxins.