

Mold: wedi is Your Solution for a Growing Problem



Mold is a growing problem, no pun intended. Molds are part of our natural environment, growing outdoors and indoors, basically anywhere there is a moisture source. However, not all molds are the same- some are harmless, and even are instrumental in

making food like cheese, while other types of mold have devastating effects – especially when growing indoors – in our homes. Molds can damage your home, literally consuming certain building materials and pose health risks – sometimes serious.

What is mold?

Molds are part of the fungi kingdom – neither plant nor animal. Mold is an eukaryotic multicellular micro-organism that is a decomposer of dead organic material. The mold spores and hair- like bodies of individual mold colonies are invisible to the naked eye – and a microscope is needed to see them. By time you actually see mold – there is already a lot of it growing on the surface. The color of the mold is determined by the type, and is also influenced by the nutrient source, substrate and age of the colony.

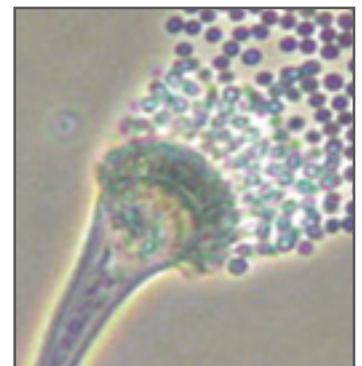
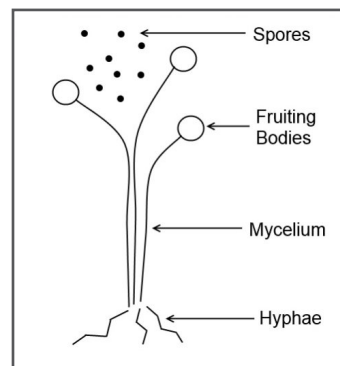
Mold requires the following conditions to grow in homes:

- Mold spores
- A food source (e.g. wood, drywall – organic material)
- Darkness (mold can't grow under ultraviolet light)
- Warmth (mold can't grow in freezing temperatures)
- Oxygen
- Moisture (e.g. water, humidity)
- Enough time (most molds can begin to grow in 24-48 hours if the conditions are right)

Moisture is really the key cause of mold growth since the other conditions on the list are always going to be present in homes. So essentially, the difference between whether mold grows in your home or not comes down to whether or not you have a continuous localized moisture problem in areas, provided the other necessary conditions to grow.

The most common types of mold that are found indoors include Cladosporium, Penicillium, Alternaria, and Aspergillus. *Stachybotrys chartarum* (also known as *Stachybotrys atra* and sometimes referred to as “black mold”) is a greenish-black mold that can also be found indoors. *Stachybotrys* grows on household surfaces that have high cellulose content, such as wood, fiberboard, gypsum board, paper, dust, and lint.

Molds reproduce by forming tiny spores that not visible to the naked eye. Mold spores are very hardy and can survive under conditions in which mold cannot grow, such as in dry and harsh environments. These spores travel through outdoor and indoor air. When mold spores land on a surface where moisture is present, mold can start to grow. Present on some types of mold spores are mycotoxins. Mycotoxins are toxic chemicals that are present on spores and small fragments of mold and fungus that are released into the air.



How can mold affect your health?

Exposure to mold can cause a variety of health effects from as insignificant as a runny nose to as severe as asthma, or neurological effects. Many individuals may have a minor sensitivity to mold; molds can cause nasal stuffiness, throat irritation, coughing or wheezing, eye irritation, or, in some

cases, skin irritation. However more severe effects can occur in the 25% of the American population who are genetically predisposed to mold susceptibility - Those who carry a specific gene called the HLA-DR gene, can have difficulty recovering from mold and other toxin exposures. Many of these individuals have severe mold allergies, develop asthma, joint and muscle pain, brain fog, and even neurological symptoms that mimic classic neurologic disorders including pain syndromes, movement disorders, delirium, dementia, and disorders of balance and coordination.

Additionally, there are some types of mold that also produce mycotoxins which are considered toxic to all individuals. Prolonged exposure to these toxic molds come with serious adverse health effects including cancer, pulmonary bleeding, immune and blood disorders, liver and kidney conditions/damage, neurotoxicity (nervous system issues), digestive issues, and heart conditions.

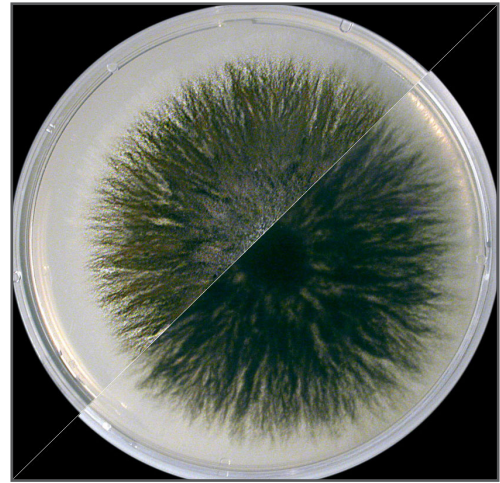
Some of these toxic molds you can find in your home are:

Acremonium – Acremonium mold is a toxigenic mold type that evolves in its appearance over time. It first starts out as a small moist mold that turns into a fine powdery substance. Acremonium mold is often pink, grey, orange or white in color. Acremonium typically grows in household systems and areas such as drain pans and around moisture seals. Acremonium is sometimes known to grow with other types of mold including strachybotrys. Acremonium can significantly impact the immune system, impair brain function and also is a carcinogen.



Alternaria is the most common form of allergenic mold in the world. It's a velvet-textured mold with dark green or brown hairs. It typically grows wherever dampness occurs and spreads quickly. In homes, this is commonly in showers,

bathrooms, and below leaking sinks. Alternaria is also a common mold species that appears as a result of water damage to a home.. Alternaria causes asthma-like symptoms including in the upper respiratory tract, nose and mouth.



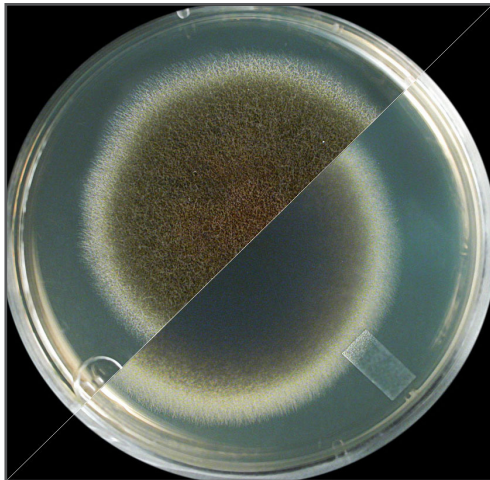
Aspergillus is a common mold found in American households. It has long flask-shaped spores that can form thick layers or walls of mold. This creates long chains of mold growth on surfaces. Because there are many species of aspergillus mold, it can appear in many different colors. Typically aspergillus cause allergic reactions – leading to asthma like symptoms, however it can become more toxic depending on the species and the extent/environment. Certain aspergillus mold species are capable of producing aflatoxins, a known and deadly carcinogen.



Chaetomium is a mold commonly found in water-damaged areas of the home. Chaetomium has a cotton-like texture and usually changes colors from white to grey to brown and eventually to black over time. Chaetomium mold is usually found in a damp or leaking areas, basement or sink and may be recognizable by its musty odor. Chaetomium mold can grow in places such as your bathroom around leaking pipes. Chaetomium is especially dangerous to individuals with compromised immune systems.



Ulocladium is a type of mold that thrives in wetness and water. It is usually black in color. Ulocladium is typically found in areas of homes that have been affected by water damage. It can be found in kitchens, bathrooms and basements. Ulocladium may grow in conjunction with stachybotrys, fusarium and chaetomium molds and is a good indicator of water damage. General asthma-like symptoms, allergies and difficulty breathing are the most common effects of ulocladium exposure.



Stachybotrys is also known as the infamous “black mold.” It is a toxic type of mold that can also cause allergic reactions. Stachybotrys mold is dark greenish or black in color and has a slimy texture. Stachybotrys thrives in damp, wet areas with high humidity levels that maintain these environmental conditions for weeks. It is known for growing on cellulose material such as woods. Stachybotrys is sometimes called “toxic mold” because it produces mycotoxins that cause severe health problems to those who have been exposed to it. Stachybotrys exposure symptoms include difficulty breathing, sinusitis, fatigue and even depression. This “black mold” can cause burning sensations in your airways, severe breathing problems, fever and severe headaches.

Stachybotrys is also linked to neurological problems especially in children or those that are genetically predisposed to mold susceptibility.



Mold can cause structural damage to your home.

Besides affecting your health, chronic mold growth can destroy your home. Mold growth can expand far beyond just being an unsightly cosmetic problem. It literally consumes/ feeds on organic materials, causing them to decay or rot, breaking down and finally falling apart. Mold can eat away at materials like wallpaper, drywall, carpet, wooden studs in walls, ceiling tiles, floorboards, and other structures inside the home. If left unaddressed or undiscovered, mold can eventually cause damage great enough to lead to the collapse of ceilings, caving in of floorboards, and falling down of walls over time. Mold can also originate in a wet area like a bathroom, but due to the small spores, can even spread through a home ventilation system, expanding the extent of the issue. Since mold can grow quickly, many building materials can also quickly become damaged beyond repair, and if left unchecked in time a home can be completely destroyed by mold growth. Mold remediation can be very costly and sometimes the extent of the mold growth does not allow for complete removal, with residual affected areas remaining after clean up.



Waterproofing design options – how to navigate common pitfalls:

As you can see, mold may become a serious issue if invited. The best offense in this case is actually defense: stopping it before it can start to grow. Tiled showers, including steam showers, are constructed from many different materials and layers of structures: including framing and subfloor, underlayment product and tile backer product, adhesives, membranes, fastening hardware, sealants and caulks, and finish materials. The more products and layers, the more attention must be paid to choose product not affected by any of the factors inviting mold growth, or providing breeding ground for mold by offering food, shelter, shade, wet and warm environment. The more product is used, the higher the risk they don't work as a wholesome design to defend against mold or the migration of vital mold promoters like water or organic material incl. skin particles, dirt, shampoo residues and more. The more manual work is needed to build such multi product, multi-layer structures – the more potential for mistakes being made, which may provide openings for mold promoters.



It is apparent; a system is needed to provide a tight and pinhole free defense.

The essential line of defense is formed to protect framing and subfloor by installing safe and non-absorbing tile backer walls safely tying safe and non-absorbing shower floors. Attention must be paid not only to choosing the right backer board or shower base, but that its assembly performs as well, means it is providing a non-absorbing design as a whole. For this to happen, such assemblies' seams, fastener points, areas of protrusions (like shower fixtures) must not be weak links in the chain of defense. Rather, they allow wall backers and shower floor to become one non-absorbing unit.

This is why the International Code Council banned Drywall (paper faced gypsum core board) but also "Greenboard" (the same but with a "water repellent facer" which would not stand the test of time) in 2006. This is why cement boards and fiber cement boards, both absorbing product, are recommended by the tile Council of North- America, to receive waterproofing membranes when used in wet areas.

This is also why, increasingly, sloped cement mortar based shower floors are covered with topically applied waterproofing membranes also. In an attempt to manage water and keep it close to the surface, which is the tile layer finish.

Historically, both, cement based wall backers and shower floors were allowed to absorb water. With water, however, may penetrate food sources for mold. The more layers are allowed to absorb, the longer the construction remains wet. Only behind such cement based structures would waterproofing and management be attempted. This was, and is done using plastic sheet membranes attached behind the cement wall backers. These sheets would tie into vinyl liners, which would cover a subfloor, which is pre-sloped in latter days. The floor liner ultimately connects to a secondary drainage in the shower drain. The hope is that water would travel behind and below and through the cement structures and find the secondary drainage. This, however, was and is far from certain. The reality with such "water in – water out" concepts: they hold water and potential food source for a very long time. Cement is porous and its structures provide crevices for mold to hide out, never to be reached and removed. In addition, the approach invites leaks due to the highly complex design of seamed together layers, susceptible to gaps left and mistakes made. Moreover, the waterproofing sheet on walls is penetrated by staples and seams are just overhanging, while the waterproofing on the floor is positioned in a highly alkaline environment that will take its tolls over time.

With the emergence of topically applied membranes, including sheet applied and liquid applied membranes, the design claim was to create a "water out" system that would stop water right below the tile level on floor and wall. These systems have their own challenges, which must be overcome for them to work. If breached, the structure would be open for water and food source intrusion.

While many liquid applied membranes can be applied seamless, they are also very thin and vulnerable to slightest movement of substructures or accidents. Something as minor as a rock caught in the tread of an installer's boots

can penetrate a thin membrane, leading to a major issue. When applied over very porous surfaces, pinholes through air entrapment or loss into substrates can easily form and may not be visible.



Sheet membranes attach in thinset tile adhesives and provide at first glance stronger material protection. However they are not applied seamless and do not easily conform to a slope on shower floors. If seams are merely overlapped with some thinset adhesive gluing the overlaps together, chances are that water will migrate right through the cement based thinset mortar. There is no valid formula that may be used to determine how wide an overlapping seam has to be, so the thinset mortar will not allow water migration to the point where it would find the seam. Every shower is different and, given enough water output and a seam in close proximity of the high water exposure, water may easily penetrate all the way through. The cement in such taped seam may be permanently wet, as may the framing stud behind the seam and tile backer board. So attention must be paid to sealing off the open edges of sheet membrane seams and overlaps. So the thinset will not touch the water it will otherwise draw. The same process should apply to such tile backer boards that may come equipped with a sheet membrane finish, and are taped and fastened. Here, attention must also be paid to safely tape over fasteners. Particularly important, where such wall boards include layers below the waterproofing sheet that contain material negatively affected by water (e.g. paper or cellulose based materials). Such layers may not only get wet and deteriorate the tile backer itself, but they might also feed mold directly.

As you can see, the devil is often in the details and the assembly as a whole is important. It is important to ensure the products are tested and certified by independent parties such as the International Code Council, for watertight and mold proof performance. Not only as a single product, but as the system they are installed within. Think system – which is also relative to whether tested and certified performance

also applies over the various substrates you may find in your project, along with the many surface finish and setting material options you may want to consider.

If a first line of impenetrable waterproofing is successfully established to protect wall framing and subfloor, as well as tile backer board, shower floor (and curb), much has been achieved.

At this point, water will only penetrate into tile, grout and tile adhesives. There is little that can be done against these layers absorbing water. And we still have some areas here, which may form a habitat for mold growth; a food source, water, warmth, shade will be there. The risk for mold growth in and below the tile layer can be further minimized by choice of materials and installation technique. On a range where most safe is on one end, and least safe on the other, here are materials that would be on the end for “most safe”: dense porcelain tile offering little absorption, a smooth and easy to clean surface, no crevices for food and mold to hide; tile adhesives and grouts made of solid epoxies, and installation technique providing 95% or more compressed thinset coverage under each tile, leaving little room for anything to accumulate that should not be there or dry out quicker. On the end for “least safe” materials and techniques would be very porous natural stones, setting materials like organic mastics, or setting techniques allowing for less than sufficient compressed coverage or entrapment of water, such as when thinset is not troweled on in straight lines allowing a collapse and compression leaving no air pockets entrapped, that could later fill with water.

There are other spots on the surface of a shower that need continuous attention to defend against mold. Drain grates, outlets, hidden areas under seats – all these must be cleaned often and thorough. Sealant or caulks in expansion joints or used at glass doors or fixture escutcheons must be made of mold proof material.

How wedi can help:

The wedi Shower System was created to form a modular and wholesome installation concept to provide waterproofing and tile substrate in one product. Its waterproofing capability is as based on its internally waterproof core made of a proprietary and specific closed cell, extruded polystyrene (XPS) foam. The specific design of wedi’s XPS foam, and by far, not all XPS are created equal, is the particular consistency and density of its cells forming a core which will not absorb water. It offers no capillary absorption potential which cement based products certainly offer, but same is possible with many other types of foam, too.



Its material nature is, throughout, inorganic and it cannot feed mold. As a waterproofing layer, it is much thicker and more robust than any liquid or sheet applied membrane can be. Simply due to its form as a solid backer board, pre-sloped shower floor, curb or seat. There are many options for installation designs (including curbless recessed showers or linear drain designs) and accessories wedi offers to build entire showers from bottom to top just using one modular, yet easily customizable system.

wedi discloses its products, as well as the assembly (incl. all components and installation methodology) are tested and certified for waterproof and mold proof performance. It is also backed by a 10, 15 or 20 year warranty which will all cover you against consequential damage caused by product defects, including mold. It should be worth it anytime, taking a good look at competitive warranties and their extent of coverage.

When it comes to waterproofing, mold and fungus resistance, wedi passed or exceeded requirements when tested based on individual components (wedi Building Panel) and as a full system (Fundo Shower Systems Primo, Ligno, Riolito) per the following standards/ test methods:

IAPMO PS106 : “Field Fabricated Tiling Kits” , includes testing to:

PASSED ASTM D4068 - Waterproof :Standard Specification for Chlorinated Polyethylene (CPE) Sheeting for Concealed Water-Containment Membrane

PASSED ASTM E331 – Waterproof (complete wedi System): Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference

PASSED ASTM G21 – Fungus/Bacteria Resistance: Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi

Tested and proven, the wedi Shower System is your solution for water management and a great defense in stopping mold growth in its tracks.

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