

Stevens & Kuss S.C.

Attorneys at Law

CONDENSATION IN THE WALLS

Home inspectors are not mold inspectors, however they do not inspect for defects that can result in mold. Mold grows in wet or damp environments. Defects that result in a wet or damp environment cause mold. Water can enter walls directly through leakage or indirectly through condensation. Leakage occurs from leaky pipes, air conditioners, windows roofs, and furnaces in the attic. Often this type of leakage has other signs because not all the water leaking ends up going inside the walls. Leakage often leaves signs on the interior drywall and ceiling.

What many people today want to know is the likelihood they will have condensation in the walls, and what are the causes of this condensation. They are concerned that this potential for condensation will lead to moisture and mold and they want to know what they can do to prevent this from happening. This is information that home inspectors should be able to provide to customers.

HOW CONDENSATION OCCURS IN THE WALLS

In Wisconsin condensation occurs in walls primarily in December, January, and February, to a lesser degree March, and November. During these months, humid air from inside the house gets inside the walls; it comes in contact with the cold inside surface of the outside walls, condenses and creates moisture. If enough humid air gets inside the wall and condenses, the insulation inside becomes wet and can become a site for mold growth. What homeowners want to know is why this occurs and what can be done to prevent or eliminate the situation. In extreme cases, the insulation inside the walls can be saturated causing potential health hazard and also doing structural damage to the house.

CAUSES OF CONDENSATION

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Humidity inside the house in the wintertime is the initial cause. This comes from people taking showers, people cooking, moisture evaporating from a damp basement and even human breathing. If you reduce the humidity from your house you reduce the potential for condensation in the walls.

One cause of increased humidity in newer houses is that they are sealed up with polyethylene. Polyethylene surrounds the ceilings and walls. Polyethylene keeps the humid air from leaking to the outside. A second cause of humidity is a lack of air exchange with the outside air.

AIR LEAKAGE INTO WALL SPACES

The amount of moisture in the walls is based upon how much humid air inside the house gets into the wall spaces. Humid air gets into the wall through two processes, diffusion and air penetration. Diffusion is a wicking effect where the drywall absorbs the moisture and then that it transferred to the insulation and interior air pressure pushing out. If there is any type of positive air pressure inside the house, small spaces around outlets, walls switches, the top and bottom of drywall etc. will allow air from inside the house to be pushed into the wall cavities. Positive interior air pressure comes from a house taking in more air from a house taking in more air from the outside than is ventilated through sources like bathroom vent fans, fireplaces, or clothes dryers. Air also naturally flows from hot humid areas to cold dry ones.

A third factor causing condensation in the walls relates to how cold the inside surface of the outside wall is. The inside surface of the outside wall, is typically the inside surface of the OSB board. If the board is very cold, the rate of condensation increases. This is why sealing the outside of the building with Tyvek is important because it prevents the inside surface of the outside wall from becoming cold except in extreme circumstances. The colder it gets outside, the colder the inside surface of the outside wall is and the more likely condensation will occur.

HW TO KNOW WHEN CONDENSATION IS OCCURRING

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Home inspectors are not required to look inside walls nor should they. It is hard to tell if there is condensation going on inside a wall. One method of determining whether this is a potential problem is whether there is condensation occurring on the inside surface of the windows during very cold periods. If condensation is occurring on the inside surface of windows, there is often signs of water staining or deterioration on the inside window sills.

Another red flag is lack mold around edges of the windows that may have contact with the air inside the wall surfaces. This is also a sign that there may be water condensation in the walls.

HW TO REMEDY OR AVOID CONDENSATION INSIDE THE WALLS

Reduce the humidity level of the house. This can be done by better and more powerful ventilation of bathroom areas especially during times of use, and a dehumidifier being run in the basement even during the winter. Larger powerful ventilation fans in key areas can greatly reduce humidity.

Prevent air leakage from the inside into the wall cavity. This can be done by sealing outlet boxes, and light switch boxes, with rubberized materials around them to prevent air leakage inside the walls.

Insulate the exterior wall. While this is an expensive process, if the siding is going to be replaced or redone anyway it is important to insulate the outside wall. Insulation prevents the inside surface of the outside wall from becoming so cold that moisture condenses on it, during extremely cold periods. The insulating material should allow moisture to be absorbed and pass through it.

Probably the most effective cure is an air to heat exchanger that exchanges the dry cold outside air with the warm humid interior air. These are most effective when they can draw air from the higher and most humid areas of the house (upstairs areas and bathrooms) to be

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discharged outside and also draw dry outside air into the furnace, or better yet, the bedrooms. This process keeps the humidity level down and reduces the chance of condensation in the walls. It also cleans the air. Someday every new house will have an air to air heat exchanger as standard equipment.

High humidity houses also have an increased likelihood of humid air entering the attic and forming frost in the attic which later warms up creating moisture. The primary remedy for attic problems is sufficient ventilation with larger soffit vents, and larger roof vents. If it is there is insufficient ventilation, the attic will be warm in the winter.

Moisture from some source will eventually get outside the walls. Modern houses in Wisconsin are primarily designed to dry to the outside. Polyethylene is placed underneath the drywall on the inside of the walls preventing evaporation to the inside. Materials like Tyvek are used on the outside of the house so that any moisture inside the walls can eventually be absorbed through the OSB board or plywood, into the Tyvek and eventually to the outside. No houses in Wisconsin should have a polyethylene on both the inside and outside walls as any moisture that gets into the walls becomes trapped, condenses and cannot evaporate.

Condensation inside walls is not usually a problem in Wisconsin during summertime. In the summer the hot humid air is on the outside and the dry cool conditioned air is on the inside. While warm moist air can enter the wall cavity from the outside in summer, the inside surface of the interior wall is usually not cold enough to produce condensation. That's why condensation in the walls is not a concern in the summertime.

In conclusion the key to avoiding condensation inside the walls in the winter is to keep the humidity levels down and by having a system exchanges humid air from the inside with dry air from the outside it is a good practice to seal houses tight is right, but the interior humidity must be controlled.