TECHNICAL BULLETIN

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Understanding Condensation

Background:

We insulate and seal our buildings better and tighter in order to control heat loss and air infiltration. By stopping air infiltration, we are also limiting fresh air exchange and thereby restricting the escape of built up humidity from the building. Does this mean a Corbonded house is too tight? No, it means the house has the best possible energy savings and is now in a condition where it is under control from the forces of nature. We can now *manage* heating, cooling, indoor air quality and humidity. Whether in a Corbonded home or any well insulated and sealed building, excessive condensation on windows is an indicator that humidity levels in the house may be too high. Excess humidity can also impact wood floors, furniture and human health.

Problem:

Relative humidity is a function of airborne moisture and air temperature. Warm air holds more moisture, cold air releases moisture. Glass is a poor insulator. The R-value (resistance to heat flow) of a single glazed window is approximately 1; a double glazed window is approximately 2. Since a window is colder than the surrounding air, the moisture in that air condenses when it comes into contact with the cold surface (the interior glass on a window). Some condensation can be expected in cold weather. The colder the outdoor temperature, the more likely you are to have condensation. The best way to control condensation is to keep relative humidity low.

So what is the ideal amount of relative humidity in the air? Based on keeping an indoor temperature of 70° F, it will vary with the outdoor temperature. But as a guide, the following relationship should help.

Outside Air Temp.	Inside Relative Humidity	Dewpoint Temperature
-20° F or Colder	15% Maximum	
-15° F	20% Maximum	
-10° F	25% Maximum	30° F
0° F	30% Maximum	35° F
10° F	35% Maximum	40° F
20° F	40% Maximum	44° F

If your relative humidity is above these levels, you probably will have condensation on any cool surface including windowpanes.

SOURCES of MOISTURE

- Normal breathing and perspiration by a family of four adds a half pint of water to the air each hour.
- Cooking can add up to four or five pints of water per day.
- A shower can add a half pint.
- Dishwashers, washing machines, and dryers can add several pints of water to the air.
- Humidifiers that purposely add water vapor.
- Ventilated crawl spaces or crawl spaces without vapor barriers, which allow moisture to invade the home from outside or from the earth below.
- New homes will often emit considerable humidity from the normal drying out of the building products. This will usually adjust itself within a year or less.

CORBOND®
Performance Insulation System®

Corbond Corporation
32404 E. Frontage Road
Bozeman, MT 59715
Toll Free: (888) 949-9089 Fax: (406) 586-4584
www.corbond.com sales@corbond.com

Solution: Be certain that there is a vapor barrier installed at or below the floor of the crawlspace. If not, install 6-mil, or better yet, 10-mil poly. Reduce moisture from crawl space or basement by grading landscape correctly to provide good water drainage away from the building. Use building overhangs, rain gutters and downspouts, to divert water.

Make sure clothes dryers are properly vented directly to the exterior of the building. Moisture being removed from clothes must not get into the house. Make sure vent ducts for the dryer are sealed and as short and straight as possible. Sealing them assures that excess moisture leaves the house. On new construction, make sure that your window openings are sealed and caulked where the inside frame (jamb) meets the rough opening.

Consider other sources of moisture that make relative humidity high, such as the kitchen and bathroom. You can control moisture by providing adequate ventilation directly to the exterior from these rooms. Use bathroom fans during and after showers and baths. Install a timer that keeps the fan running for at least 15 or 20 minutes after showering or bathing. In extreme cases a humidistat controlled bath fan may be necessary. Use kitchen fans that vent directly outside during and after cooking or baking. They remove moist air and reduce indoor relative humidity. Some kitchen hoods just recirculate air through a smoke filter. These are ineffective for humidity control and should be replaced with an outside venting hood.

If condensation problems persist, consider a whole-house ventilation system. These balanced systems manage humidity and keep indoor air healthier. Balanced means fresh air is brought into the house in the same amount that is being exhausted. Some systems, called Heat Recovery Ventilators (HRV), recover the heat from the outgoing air in the winter to save energy.

Comment: In a Corbonded house, there is little chance for humidity to migrate into the wall cavity to a dew point, so there is no chance for condensation to occur, or resulting mold to develop, hidden behind the drywall. Corbonded walls also have very little water or moisture storage capacity. A Corbonded house puts the building under control, where indoor air and resulting humidity can be managed. A building envelope under control stops pollutants from the exterior, or from an air and glass fiber filled building wall cavity, from infiltrating into the living space on air leakage. Overall, this results in vastly improved indoor air quality.

It is also true that many houses are "too dry" in winter. This can be climatic and/or the result of a building with severe air leakage. Humidity may be added as a personal preference, a health consideration or to preserve interior finishes. Corbond insulated buildings are well suited to handle modest humidification because of the characteristic of having no dew point in walls.