



## When to Ventilate the Basement to Reduce Moisture Problems

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Ventilating a damp basement can help to solve moisture problems, but only if the ventilation air has a relatively low moisture content itself. If there is too much moisture in outdoor air, or if basement surfaces are too cool, condensation will occur as outside air meets the cool surfaces of the wall and floor, making the problem worse.

The moisture content of air is commonly described as the “relative humidity” (RH). This is expressed as a percentage, and compares the moisture content of air to the maximum moisture capacity of air at a specified temperature. The air temperature is important since air’s capacity to hold moisture is lower at reduced temperatures. When warm outdoor air contacts cold basement surfaces, its temperature falls, causing the RH to increase. If RH reaches 100 percent, condensation occurs.

When is outdoor air suitable for ventilating a basement? For any given basement temperature, there exists a series of temperature-humidity conditions of outdoor air which, if exceeded, will cause condensation problems in the basement. These are indicated in the diagram on the back of this sheet. If these conditions are exceeded, condensation will occur and ventilation will not be an effective strategy. Mechanical dehumidification may be necessary instead.

### How to Use the Diagram

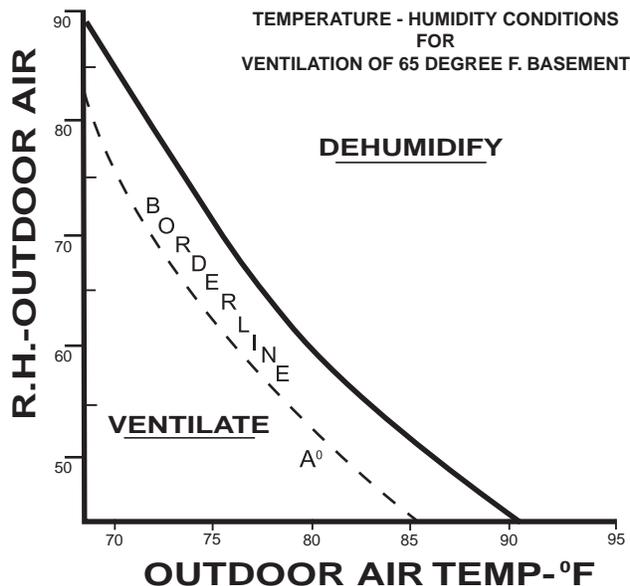
The diagram (over) illustrates condensation conditions in a basement at 65° F. for various combinations of outdoor temperature and humidity.

This diagram can be used to indicate when ventilation with outdoor air will be effective in drying a damp basement, and when outdoor conditions can contribute to, or worsen, basement moisture problems. To use this chart, you need to know: (1) basement temperature; (2) outdoor temperature; (3) relative humidity of outdoor air (obtained from a local weather report or measured with a hygrometer or psychrometer).

When you have this information, find the outdoor temperature on the horizontal axis, and construct a vertical line from this point. Locate the relative humidity on the vertical axis, and draw a horizontal line from this point. If these two lines intersect to the **right** of the heavy line, ventilation will not be effective and a dehumidifier will probably be necessary. If temperature-humidity conditions are well to the **left** of the heavy line, ventilation will be effective. See the **example** that accompanies the diagram. Ventilation will probably not be worthwhile for conditions in the “borderline” region. **NOTE:** This graph is for a 65°F. Basement; the heavy line shifts to the right if the basement is warmer, but to the left for cooler basements.



**VENTILATION CONSIDERATIONS:** To be effective, a basement ventilation fan should have a fairly high capacity; fans with a 12- to 24-inch blade diameter are much more likely to be effective than smaller fans, even when the latter run continuously. In one home, where it was possible to exhaust hot attic air into the basement through a stairwell, effective drying was accomplished using a large whole-house fan operating only 3 to 4 hours per day.



Example:  
 Outdoor temperature: 80 degrees F.  
 RH: 50 %  
 These conditions intersect at Point A; ventilation would be effective for a 65 degree F. basement, but probably not for a basement at 55 degrees F.

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**PRECAUTIONS:** It is possible that a large exhaust fan, operating without adequate air inlet openings ( a partially opened window, for example) to the basement, could depressurize this area. This effect might not be readily observed, but it could have some important consequences. For example, backdrafting could occur in fuel burning equipment in the depressurized space, drawing exhaust products from the furnace, hot water heater, or clothes dryer back into the building. If the building has the potential for radon problems (common in central and northern New Jersey) depressurization is almost certain to make matters worse. A vent fan blowing air into the basement is probably less likely to cause problems; nevertheless, conditions and equipment in the basement should be carefully monitored for potential problems.

**Other Publications in this Series:**

Prepared by:

**Basement Flooding - Some Simple Remedies - FS257**

**When to Humidify the Basement to Reduce Moisture Problems - FS259**

**Basement Perimeter Drain Systems - FS260.**

**Reference:**

ASHRAE 1997 Handbook: Fundamentals. 1997. American Society of Heating, Refrigeration and Air Conditioning Engineers, Atlanta, GA

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