

Humidity and the Indoor Environment

[Desirable Humidity Levels](#) | [How to Gauge Indoor Humidity](#) | [Steps to Lower Humidity in your Home](#) | [The Indoor Environment](#) | [Sources of Pollution](#) | [How to Improve the Indoor Environment](#) | [Minnegasco Fact Sheets](#)

Humidity

Humidity is simply vaporized water in the air. Your breath contains hundreds of droplets of invisible water vapor. You can see them when you breathe on a pair of cold glasses.

The term most often used to define the amount of water vapor in the air is "relative humidity." Relative humidity is the percentage of water vapor in the air at a specific temperature, compared to the amount of water vapor the air is capable of holding at that temperature. Warm air holds more water vapor than cold air. When air at a certain temperature contains all the water vapor it can hold at that temperature, its relative humidity is 100 percent. If it contains only half the water vapor it is capable of holding at that temperature, the relative humidity is 50 percent.

If the outside air temperature in winter is 0°F and the relative humidity is 75 percent, that same air inside your 70°F home will have a four percent relative humidity. That's dry! The Sahara Desert has an average relative humidity of 25 percent.

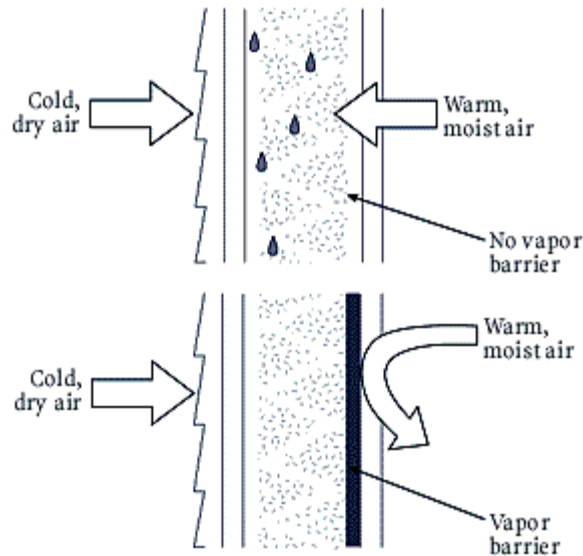
When air is saturated with water vapor, it has reached the dew point; at this point, water vapor condenses and produces visible water or "condensation." In winter it usually occurs first on windows. When warm, moist air comes in contact with a cold window, air temperature drops and it can no longer hold the water vapor; condensation results.

Desirable Humidity Levels

[Return to top](#)

The human body is comfortable when relative humidity ranges between 20 and 60 percent. In your home, an average relative humidity of 35 to 40 percent is appropriate when the outside temperature is 20°F or above. However, during cold weather, higher humidity ranges may cause structural damage because of condensation on windows and on the inside of exterior walls. As outdoor temperatures fall, condensation problems inside may develop.

The construction of a home also influences how much humidity is desirable. Tightly constructed buildings with properly installed vapor barriers and tight fitting doors and windows retain more heat and moisture. This is where mechanical ventilation becomes important. If a home does not have the proper mechanical ventilation, excess water vapor can move through walls and ceilings, causing wet insulation, peeling paint, and mold on walls and woodwork.



A vapor barrier protects walls from condensation.

The following table shows recommended indoor humidity levels in relation to outdoor temperatures.

Outside temperature (0°F)	Recommended relative humidity
+20° and above	35% to 40%
+10°	30%
0°	25%
-10°	20%
-20°	15%

How to Gauge Indoor Humidity

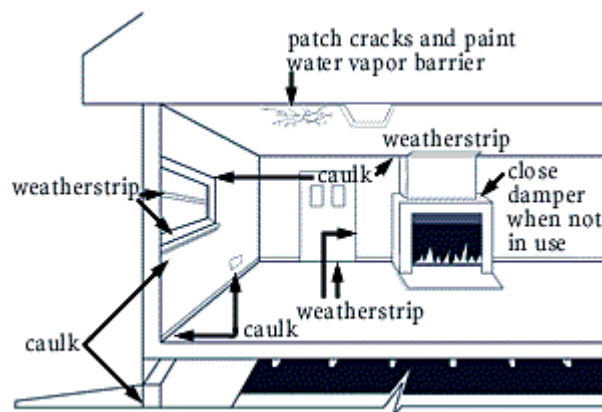
[Return to top](#)

- Drop three ice cubes into a glass, add water and stir. Wait three minutes. If moisture does not form on the outside of the glass, the air is too dry; you may need a humidifier. (Do not perform this test in the kitchen, because cooking vapors may produce inaccurate results.)
- Frequent fogging of windows may indicate too much humidity. The appropriate relative humidity will allow only slight condensation along the lower edges or corners of windows. More condensation could be damaging.
- Moisture buildup or mold on closet walls or room ceilings and walls indicates high humidity.

If humidity is too low

Low humidity causes static electricity, dry skin and hair, and itching and chapping. Mucous membranes in nose and throat dry out, increasing your discomfort and susceptibility to colds and respiratory illness. With low humidity levels, body moisture evaporates so quickly that you feel chilled even at higher thermostat settings. Adding a humidifier to your home will remedy these problems. There are three standard types from which to choose.

- **Evaporating**
Moisture evaporates into the air from a pan or absorbent plates partially immersed in water and attached to the sides of a radiator or to a warm air heating system; limited humidification capacities.
- **Portable or room**
Air circulates through a wet pad or a very fine mist of water is discharged into the room. Water must be manually added regularly; unit may be moved from room to room as desired.
- **Power**
Moisture is introduced directly into the air stream circulating through the furnace; water is fed automatically into the unit by a connection to the house water system. A humidistat (humidity control) should be located near the furnace thermostat or in the return side of the duct system. The unit may be built in or attached to a forced air heating system; greatest humidification capacity.



Seal your home from the inside to keep warm, moist air from escaping.

If humidity is too high

High humidity levels produce constantly fogged windows, musty odor and/or a clammy feel to the air. During cold weather, condensation in the lower corners and edges on prime (inside) windows is common. Excessive condensation on prime windows indicates loose **storm** windows; seal storm windows by caulking and weatherstripping. Condensation on inside surface of storm windows indicates loose **prime** windows; seal prime windows, also by caulking and weatherstripping.

If you maintain high humidity, expect to have more window condensation. Remember that structural damage may result from extended periods of high humidity.

Excessive humidity can be temporary. During summer, outdoor humidity is high; your house and its furnishings naturally absorb some water vapor. In fall, when temperatures drop and the air becomes drier, this water vapor is released into the living space and condensation on windows may occur. The situation normally subsides within a short time.

Often the principal source of higher humidity in a home is your family's living habits.

- One person's breathing produces 1/4 cup of water per hour.
- Cooking for a family of four produces approximately five pints of water in 24 hours.
- Showering puts 1/2 pint of water into the air.

- Bathing puts 1/8 pint of water into the air.

Adding only four to six pints of water to the air raises the relative humidity in a 1,000 square foot home from 15 to 60 percent, assuming the temperature is constant.

Try these steps to lower humidity in your home

[Return to top](#)

- Turn down or stop using humidifier.
- Use range and bathroom exhaust fans while cooking and bathing or open a window for a few minutes to bring in cool, drier air.
- Cook with pans covered.
- Take shorter showers with cooler water.
- Install a fresh air intake duct. Outside air introduced into the home lowers the humidity level.
- Reduce the number of plants in your home or water them less; they release water vapor into the environment.
- Vent clothes dryer to the outside.
- In tightly insulated homes, consider installing an air-to-air heat exchanger.
- In summer, use a dehumidifier.

A natural gas whole-house dehumidifier, recently introduced to the market, removes about 80 pints of water per day. It operates on its own, or in tandem with your central air conditioner, to reduce mold and mildew, improve indoor air quality, extend the life of your central air conditioner and help control your energy bills.

This new technology uses desiccant material to adsorb moisture from the air. When the desiccant is saturated, warm air from the home's water heater dries or regenerates it.

The drier air provides greater comfort at higher temperatures, so homeowners can raise the setting on their central air conditioners, reducing their energy use.

If these steps do not correct the problem, have appliances checked. A malfunctioning appliance can add water vapor to the atmosphere of your home.

The Indoor Environment

[Return to top](#)

The quality of indoor air is a concern to energy and environmental researchers as well as consumers. Since we spend up to 90 percent of our time indoors in winter, maintaining a clean indoor environment is important. Consumers should become aware of how the products they bring home, such as furniture and carpeting, can affect their indoor environment.

Homeowners want to use energy efficiently and reduce their fuel bills. Many have added insulation, vapor barriers, caulk and weatherstripping to their homes to effectively retain heated or cooled air and reduce air infiltration from outside. Therefore, air remains inside longer and so do pollutants within the air.

Air changes

Air infiltration rates for homes vary with the amount of weatherization, construction materials, workmanship, temperature, wind, and activities of the occupants. Infiltration rates are measured in air changes per hour (ACH), the number of times each hour that indoor air is replaced by outside air. Rates differ from house to house and from day to day. Generally, older homes have an average of

one to two ACH. Tight, new homes or older homes which are sealed may replace air only once every two hours or more (or .5 ACH).

Be aware of these signals which may indicate poor indoor air quality:

- "stuffiness"
- mold or mildew
- heavy condensation or frost on windows
- frequent head or chest colds
- a musty smell or lingering odors

Sources of Pollution and General Control Measures

[Return to top](#)

- **Consumer product**

Cleaning solutions, aerosol sprays, glues, paints and polishes contain a variety of pollutants such as formaldehyde, chlorine, etc. Be sure to follow manufacturer's directions when using these products. If the directions state, "use in a well-ventilated area," try to use it outdoors. Or, open doors and windows during and after use to allow pollutants to escape.

- **Building material**

Glues containing urea-formaldehyde are found in many building materials used in home and furniture construction. These materials slowly release formaldehyde which can cause eye or nose irritation and headaches. In new construction, use low-formaldehyde materials and cover with latex-based paint to prevent formaldehyde release.

Insulation made from urea-formaldehyde releases formaldehyde through leaks and cracks in walls and ceilings. Caulking leaks and cracks on the interior surface will prevent release into the living area.

In the past, asbestos was used as insulation in attics, walls and around furnace pipes. Today asbestos is no longer allowed because of evidence it can cause illness. If your home has asbestos-type insulation, it is best left undisturbed. However, soft, easily-crumbled asbestos-containing materials have a greater potential for asbestos release and should be professionally sealed. Whenever it is necessary to use or work with asbestos-containing materials, consult a professional.

- **Garage**

Exhaust from a gasoline-fueled car contains such pollutants as carbon monoxide, lead and nitrogen dioxide. Never run or warm up a car in an attached or enclosed garage, even if the garage door is open; pollutants can enter the home, causing nausea and even death if allowed to build up.

- **Bathrooms**

Bathrooms are a source of moisture. When moisture is not allowed to escape, water damage, mold and mildew may develop. Install a bathroom exhaust fan for ventilation, or open a nearby window slightly when bathing or showering.

- **Fuel-burning appliances**

When burned, fuels such as wood, coal, fuel oil, charcoal and kerosene produce water vapor, carbon dioxide, heat, smoke and other pollutants. When natural gas is completely burned, it produces water vapor, carbon dioxide and heat (the same products human beings exhale.) For any fuel to burn completely, an adequate supply of combustion air is necessary.

Your home normally exhausts air through flues, fans, cracks, etc. When air leaves the home, it must be replaced by outside air. Generally, outside air is provided through cracks

and leaks. But, when insufficient outside air is supplied to the house, replacement air may be pulled down chimneys, preventing proper venting of furnace flue products (water vapor and carbon dioxide). The flue products will then mix with indoor air and reduce the amount of available oxygen. This causes the fuel to burn incompletely and may produce carbon monoxide.

It is important that enough fresh air be available for complete combustion. This becomes especially critical when indoor air changes are reduced due to weatherization. An outdoor air intake can be installed in the heating system for efficient and proper operation. See Minnegasco's Combustion Air fact sheet for more information.

All furnaces, wood-burning stoves, space heaters, water heaters and gas logs must be vented to the outside. Follow manufacturer's directions and check local codes before installing. Inspect vent/chimney periodically to make sure it is tight, clean and in good repair.

A range hood can be installed to exhaust steam and cooking vapors.

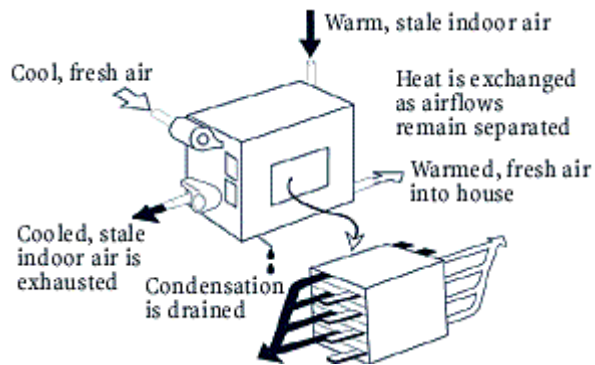
- **Smoking**
Tobacco smoke contains many pollutants. If there is a smoker in your home, adequate ventilation becomes an even greater health issue.

How to Improve the Indoor Environment

[Return to top](#)

There are many ways to add ventilation or filter the air to improve the indoor environment.

- **Windows**
When heating and cooling requirements are low, open windows to provide ventilation and reduce moisture and odors caused by cooking and bathing.
- **Spot ventilation**
Local or spot ventilation helps reduce the amount of pollutants emitted and prevents their movement to the rest of your house. For example, a range hood directs steam and cooking vapors to the outside.
- **Air-to-air heat exchanger**
An air-to-air heat exchanger mechanically ventilates and dehumidifies homes in colder climates. During the winter it transfers heat from the air being exhausted, to the fresh, outside air entering the home. Fifty to eighty percent of the heat normally lost in exhausted air is returned to the house. Air-to-air heat exchangers can be installed as part of a central heating and cooling system or in walls or windows. Wall and window-mounted units resemble air conditioners and will ventilate one room or area. They are easy to install.



- Conventional or mechanical furnace filters**
 Filters are coated with a viscous substance to collect dust, lint and fibers. These range from low to high efficiency in ability and capacity for filtering pollutants from the air. Clean or replace as needed.
- Electronic furnace filters (air cleaners)**
 Air is cleaned as it moves through a series of mechanical filters and electronically charged plates, chambers or filters which hold dust like a magnet. These are more efficient in removing pollutants from the air than conventional filters. Follow manufacturer's directions for cleaning.

Minnegasco Fact Sheets with Related Information:

[Return to top](#)

[Combustion Air](#)

[Using Natural Gas Safely](#)

Call your local natural gas utility company or the Minnesota Blue Flame Gas Association at (763) 424-1841.

Reprinted with permission of Minnegasco.

[Residential](#) | [Industrial & Commercial](#) | [Head of the Lakes](#)
[Natural Gas Industry Information](#) | [Contact Us](#) | [Search](#) | [Home](#)

Copyright 2004, Minnesota Blue Flame Gas Association
 Send Comments/Suggestions to the [Webmaster](#)

These pages are maintained by Members of Blue Flame