



# **Humidification Facts For Total Indoor Air Comfort**

# Introduction

HUMIDIFICATION – the process of adding moisture to the air is one of the most important aspects of total indoor comfort, yet it is one of the least understood.

One reason is that humidity is an intangible. It can't be seen, touched, or smelled. It has no color or sound. But its presence, when properly controlled, offers many proven benefits.

Humidification during the heating season not only adds to human comfort, but it helps to protect your home and its furnishings from the harmful effects of air that is too dry. In addition, it reduces undesirable wintertime static electricity.

The popularity of home humidification has grown rapidly in recent years. Many builders now install a humidifier as standard equipment in all new homes. This recognizes the fact that more and more buyers are becoming aware of the "Total Indoor Air Comfort" concept. That includes several factors: room-to-room temperature control for both heating and air conditioning, ventilation, air cleaning, and humidification.

Take a few minutes to read this booklet and you'll have the facts you need when you decide to select a humidifier.

## **Humidity**

Humidity is the amount of water vapor in the air. Through a never-ending natural cycle moisture is evaporated from the earth, then returned as precipitation.

## **Relative Humidity**

Relative Humidity is the percentage of water vapor the air is holding, in relation to the amount it is capable of holding at a given temperature.

The relative humidity (RH) figure you hear on radio and TV is the outdoor RH. During the heating season the indoor RH is very low in comparison to the outdoor percentage.

## **Humidity, Temperature and Comfort**

Hot summer air usually has high humidity, and a person's ability to throw off heat by evaporation decreases or stops altogether. Cooling is needed then to provide comfort by extracting excessive moisture from the air.

During the winter, the condition is reversed. Cold outside air, heated to room temperature, has great ability to hold extra moisture. For example, air at 70°F can hold about 20 times as much as air at 0°F. Heated wintertime air takes moisture from whatever sources are available, including the human body.

If the air in your home does not contain enough moisture, you may feel cold and uncomfortable – even at 75°F.

If you know the outdoor temperature and relative humidity (RH), you can use the following chart to determine your indoor RH. The outdoor readings are typically reported on local TV and radio stations.

Locate outdoor RH at the left of the chart and the outdoor temperature at the bottom. Your indoor RH is where the vertical and horizontal columns meet. This chart assumes that outdoor air is brought into the home and heated to 70°F.

## Outdoor-Indoor Relative Humidity Conversion Chart

(Figures in chart are percentages.)

100%	2	4	5	6	7	9	12	17	19	23	29	36	43	52
95%	2	3	4	6	7	9	12	16	17	22	28	34	41	50
90%	2	3	4	5	6	8	11	15	16	21	26	31	39	48
85%	2	3	4	5	6	8	11	14	15	20	24	29	37	45
80%	2	3	4	5	6	7	10	13	15	19	23	27	35	42
75%	2	3	4	4	5	7	10	12	14	18	22	26	33	39
70%	1	2	3	4	5	6	9	11	13	17	20	24	31	36
65%	1	2	3	4	4	5	8	10	12	15	19	23	29	34
60%	1	2	3	3	4	5	7	9	11	14	17	21	26	31
55%	1	1	3	3	4	4	7	8	10	13	16	19	24	29
50%	1	1	2	3	3	4	6	8	9	12	14	18	22	26
45%	1	1	2	3	3	4	6	7	8	11	13	16	20	24
40%	1	1	2	2	3	4	5	7	7	10	12	14	18	21
35%	1	1	2	2	2	4	5	6	6	9	10	12	15	18
30%	0	1	2	2	2	3	4	5	6	7	9	11	13	15
25%	0	1	1	1	2	3	3	4	5	5	7	9	11	13
20%	0	1	1	1	2	2	3	3	4	5	5	7	9	10
15%	0	0	1	1	1	1	2	3	3	4	4	5	6	8
10%	0	0	0	1	1	1	2	2	2	3	3	3	4	6
5%	0	0	0	0	0	0	1	1	1	2	2	2	3	3
0%	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	-20°	-10°	-5°	0°	+5°	+10°	+15°	+20°	+25°	+30°	+35°	+40°	+45°	+50°

**Example:** (See highlighted figures.) Outdoor RH, 70%; outdoor temperature +10°F. Indoor RH is 6%.



## The Effects Of Too-Dry Air

The evidence of air that is too-dry is easy to identify. In addition to making one feel uncomfortable, the dry air “steals” moisture from plaster, wood, glue and fabrics. Over a period of time this can result in cracks in ceilings and walls, loose furniture joints and flooring, shrinking mouldings, and loosened wallpaper. Leather dries out, oil paintings crack, house plants tend to wilt, and the piano goes out of tune. Excessive static electricity is still another problem.

The type of heating in the home doesn't make any difference. The same types of damaging effects are present whenever outdoor air is brought inside and heated. It's quite a common belief that humidification isn't needed in a home heated by hot water or steam. Hot water or steam heat can't add moisture to the air. Neither can any other kind. It is the fact that air is **heated** that is important, not **how** it's heated. If your home is heated, your home needs humidification to maintain proper humidity levels.



# The Benefits Of Proper Indoor Humidity

## For Comfort and Well-Being

Properly humidified air can help repel problems aggravated by too-dry air. In cases where excessive dryness has been diagnosed as the cause of these aggravations, doctors have prescribed humidification. Ask your doctor for recommendations.

Dry, thirsty air evaporates moisture from your skin, a cooling process that makes you feel chilly. But, with the humidity raised to recommended levels, you can dial your thermostat down to 68°F and still feel comfortable.



Heated air dries out wood framing around doors and windows, too. Shrinkage of the wood occurs, leaving spaces that permit cold, outside air to infiltrate the home, lowering the inside temperature and requiring more heating. Proper humidity reduces annoying wintertime static electricity shocks, too.

## For Preservation Of Furnishings

The damaging effects that heated, parched air can cause include separation of wood in floors, trim and furniture... excessive wear of fabrics and carpets... loss of piano tone quality... cracks in walls or ceilings. It can cause plants to dry out so they droop and turn brown. Proper humidification provides the protection that's needed.

# The Proper Indoor Humidity

During the heating season the average American home (unhumidified) may have a relative humidity (RH) as low as 13%. Amazingly, this is about one-half of the average RH in the Sahara Desert! What should the indoor RH be, then? That depends on outside temperatures, as indicated here:

When The Outdoor Temperature Is	This Relative Humidity Should Be Maintained
+40°F	45%
+30°	40%
+20°	35%
+10°	30%
0°	25%
-10°	20%
-20°	15%

A humidifier needs a humidistat (counterpart of the thermostat) which can be adjusted as often as necessary to provide the desired level of humidity. The most recent advancement in humidification is a humidifier that automatically delivers the optimum RH without periodic homeowner adjustment.

The amount of humidity required in a home is dependent to a certain extent on the way it is constructed. A well insulated house with vapor barriers in walls, ceilings and slabs and properly fitting storm doors and windows may need only three gallons of additional moisture per day to maintain the proper relative humidity. A house of similar size but loosely constructed might require five times as much moisture in the same period.

# How To Choose A Humidifier

When you consider buying a humidifier, be sure to check on these key points:

**CAPACITY** – The unit should be capable of maintaining the correct level of relative humidity, considering the size, construction and other characteristics of your home.

**CONTROL** – The newest type of humidifier is computer-equipped and completely automatic, eliminating the need for frequent humidistat adjustments. It generates up to 50% more moisture than other humidifiers. Otherwise, an accurate humidistat is essential to use in conjunction with a humidifier of the proper capacity.

**STURDY CONSTRUCTION** – A properly constructed humidifier uses materials that are rust proof where necessary; corrosion proof where required.

**MAINTENANCE** – An installed, central humidifier requires no manual filling. Many units are equipped with drains to flush out minerals. They normally require attention only once or twice a year, depending on degree of water hardness.

**SAFETY** – Be sure to select a humidifier with a wetted pad design that introduces humidity as a vapor. These units do not emit any bacteria or white dust into the air stream.\*

\*Independent tests conducted by Penn State University.



# Questions To Ask Your Heating Contractor

## **What types of humidifiers are available?**

There are both portable and installed units. If you are a renter, you may want a portable. Most homeowners, however, wisely give preference to an installed unit because of its greater capacity and its relatively maintenance-free operation.

## **Do you have a humidifier for my type of heating system?**

Power humidifiers are now available in various models for use with any heating system.

## **What size humidifier do I need to provide the capacity required by my home?**

A 13,000 cu. ft. home (1625 sq. ft.) requires approximately one-half gallon of moisture per hour. A qualified installer can tell you exactly how much humidification you need, and specify a humidifier to deliver it.

## **On what plenum or water temperature is the capacity rating of the humidifier based?**

The average furnace temperature is 120°F and the average hot water temperature is 140°F. Any capacity based on a temperature above this can be unrealistically high and misleading.

## **Does the humidifier have a control?**

Recent advances in technology include a computer-equipped, completely automatic humidifier with an automatic control. This means optimum levels of humidity will be maintained without the need for frequent manual adjustments. Other humidifiers should at least include an accurate humidistat, conveniently located for frequent resetting, based on outdoor temperature changes.

## **Does the unit's method of humidification require much maintenance?**

Water residue is the cause of most humidifier troubles; rust is the second biggest problem. A good quality humidifier is designed to resist attacks from both.

## **A Word About Maintenance**

Like all other mechanical equipment a humidifier does require some maintenance. In Aprilaire® humidifiers, maintenance is greatly simplified. Rust is one enemy of humidifiers, so Aprilaire engineers have given special attention to the use of rustproof materials, so rust is no problem.

A second factor affecting humidifier maintenance is water hardness. In Aprilaire humidifiers its effects are minimized through the use of the exclusive Aprilaire Water Panel® Evaporator and the use of a drain to control the residue of water hardness.

Further simplifying maintenance is the ease with which the humidifier can be serviced and cleaned. Normal care will assure a long service life for your Aprilaire humidifier.

## Humidification With Heat Pumps



**Model 768**

The emphasis on energy conservation has made the heat pump an increasingly popular heating system. Because heat pumps operate at lower plenum temperatures than conventional heating systems, the evaporative capacity of some humidifiers is significantly reduced.

However, the high capacities which are characteristic of the Aprilaire humidifiers are maintained in a heat pump installation by simply connecting the unit to 140°F service hot water. This provides the heat necessary for evaporation, permits the lower thermostat settings possible when proper indoor relative humidity levels are maintained.

# Aprilaire®

## AUTOMATIC HUMIDIFIER

The Best Cure For Dryness®



**Power Humidifier**



**Bypass Humidifier**

A complete line of Aprilaire® residential humidifiers are manufactured for all types of heating systems. Models are available for forced warm air, steam, hot water, electric, as well as heat pump systems. Introduced in 1954, Aprilaire was the first power humidifier, and has since become the leading brand to which all other brands are compared.

All Aprilaire humidifiers feature the safe, proven flow-through design principle. Constant testing, research, and engineering refinements are your assurance of the highest quality available on the market today.

### Other Products In The Aprilaire® Total Indoor Air Comfort System:

#### **High Efficiency Air Cleaner**

Nobody Makes Clean Air Easier®

#### **Zone Control System**

Custom Comfort  
Throughout Your Home®

#### **Energy Recovery Ventilator**

Only The Freshest Homes  
Have April Air™

#### **Electronic Thermostat**

Energy Efficiency Never  
Looked So Good™

**Aprilaire.com = Indoor Air Comfort**



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