THE DRIPPING POINT

HOW ADVANCEMENTS IN BUILDING CONSTRUCTION AND HVAC TECHNOLOGY ARE DRIVING THE NEED FOR MOISTURE CONTROL

SANTA-FE
DEHUMIDIFIERS

CONTENTS

FOREWORD

WHY IT'S IMPORTANT TO CONTROL MOISTURE IN THE HOME

Controlling humidity throughout the entire home, including the crawl space, basement and attic, is essential for comfort, reducing health risks, and protecting the structure of the home and its contents. It keeps you from feeling sticky or clammy and eliminates musty odors. It stops the growth of mold and dust mites that trigger health problems, like asthma and allergies. Excess moisture can cause damage to wood floors, furniture, artwork, electronics, and even the overall structure of the home. It can also provide a breeding ground for cockroaches, termites, and other damaging pests.

In addition, supplemental dehumidification to ensure proper humidity control is becoming more important as building codes drive us to build tighter homes in order to reduce energy consumption.

Without supplemental dehumidification, the expense of moisture repairs and the increase in complaints and legal action related to mold growth in homes have made homeowners, property managers, tenants, and the construction industry much more aware of the need to control moisture in homes.

People often think that high moisture occurs only during the summer months, but in fact, the most critical times of the year to address humidity issues are in the spring and fall when temperatures are moderate and outdoor humidity levels are high. This same scenario can occur year around in some regions of the country during the evening hours when temperatures are lower, and humidity remains high.

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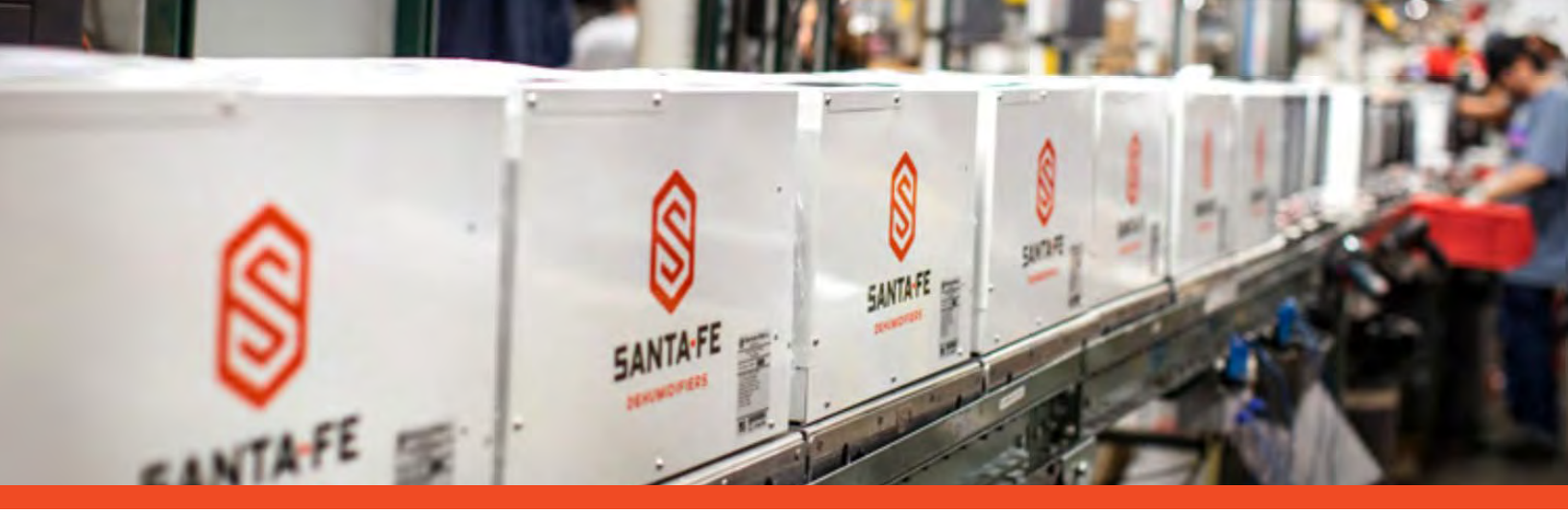


MONITORING

IF YOU ARE NOT MEASURING...YOU'RE GUESSING

Monitoring the relative humidity (RH) in a home is essential for year-round health and comfort, as well as for protection of home and belongings.

Knowing the RH in living spaces, basements, crawl spaces, and attics – even during the winter months – is helpful in understanding the effects of temperature and moisture in each environment. The American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) recommends that for health purposes, RH remains between 30 – 60 percent, depending on the season. Thirty percent in the winter and no more than 60 percent in the spring, summer and fall.

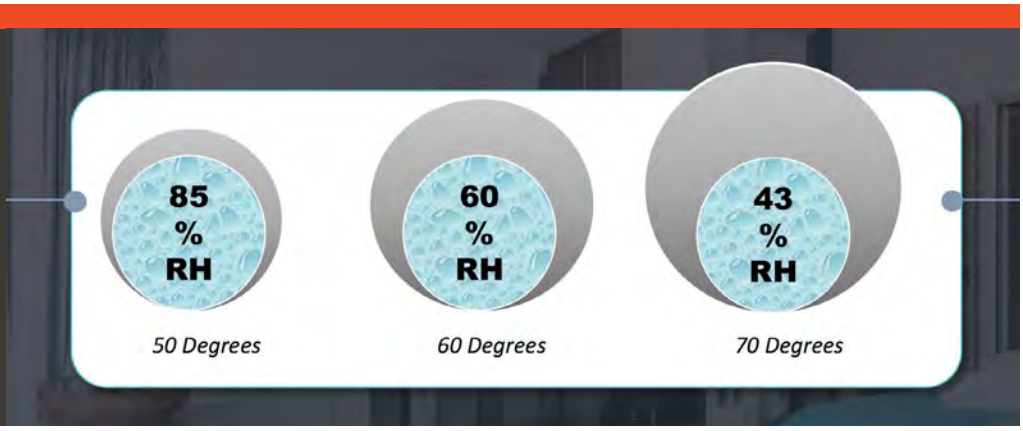
It is important to understand that you can't measure relative humidity without also measuring the temperature of the air; the two go hand-in-hand. RH is just the ratio of actual moisture or water vapor in the air as compared to total saturation. Depending on the temperature, it can vary too; warmer air needs more moisture to reach its saturation point, while colder air has a much lower saturation threshold. That is why it's called "relative" humidity – it's all relative to how much water the air can hold.

Humidity is measured with a device called a hygrometer. There are several different types of hygrometers available, which can vary greatly in price. The better monitors will typically provide additional information, such as temperature and dew point, and deliver warnings when there are conditions that could be problematic. This is especially important in crawl spaces, basements, and attics, where moisture problems can easily go undetected since they aren't frequently visited.

RELATIVE HUMIDITY:

Humidity is relative to the temperature

While the amount of water in the air remains the same, the % of the air that the water occupies changes with the temperature; therefore, the amount of space that the water occupies is relative to the temperature of the air.



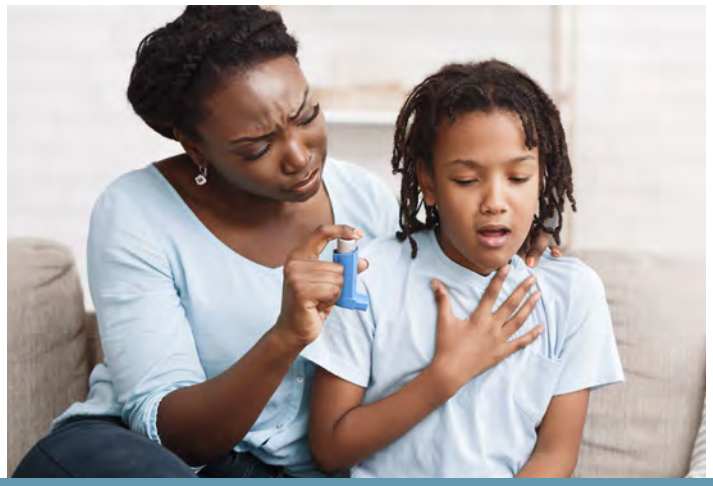
HEALTH IMPACTS ASSOCIATED WITH EXCESS HUMIDITY

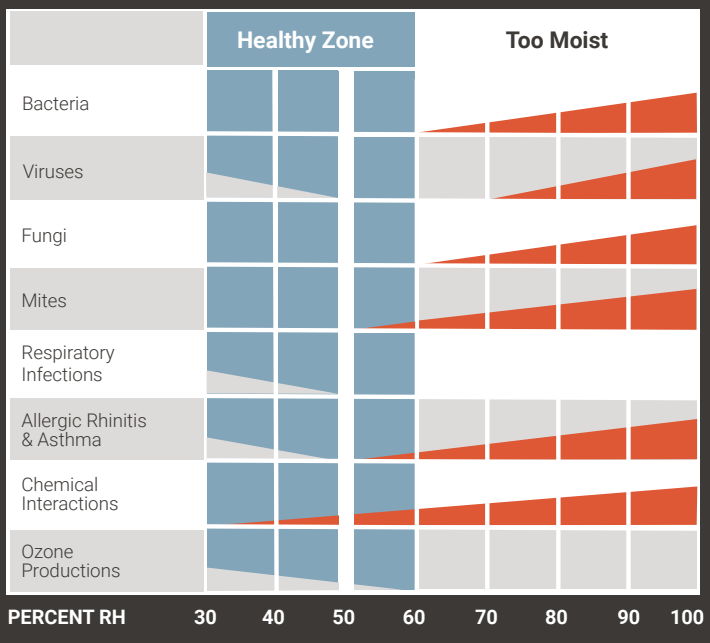
Indoor air quality (IAQ) refers to the quality of air within your home, especially as it relates to the health and comfort of you and your family. Since we spend around 90 percent indoors, IAQ has a significant impact on our health.

The health and well-being of your family is paramount and the role that moisture plays in IAQ can have a major impact. According to the *Environmental Protection Agency,* health problems associated with poor indoor air quality include eye irritation, allergies, headaches, and respiratory ailments, such as asthma.

These problems can be directly related to the presence of mold, high volatile organic compound (VOC) levels, and dust mite infestations in the home. All which thrive on elevated humidity levels.

The most recognized and effective solutions to address these health issues include moisture control and ventilation. Whole house ventilating dehumidifiers greatly reduce the risks of these serious health issues through superior filtration, fresh air ventilation, and dedicated dehumidification of the entire home.





FACTS:

According to the Allergy and Asthma Foundation of America

- Asthma is a disease of the lungs in which the airways become blocked or narrowed causing breathing difficulty.
- Allergic asthma is triggered by inhaled allergens such as dust mite allergen, pet dander, pollen, mold, etc. resulting in asthma symptoms.
- Allergic asthma is the most common form of asthma, affecting over 50 percent of the 20 million asthma sufferers. Over 2.5 million children under age 18 suffer from allergic asthma.

HOW ADVANCEMENTS IN CONSTRUCTION PRACTICES, BUILDING CODES AND HVAC EQUIPMENT AFFECT MOISTURE LEVELS

New construction practices and the drive for energy upgrades in existing homes have resulted in tighter homes that often have comfort issues and poor IAQ. Airtight and well-insulated building construction restricts air infiltration from the outside, which allows pollutants and moisture levels to accumulate inside. If effective mechanical ventilation and moisture control methods are not implemented the result could lead to uncomfortable living conditions, homeowner health issues and in extreme cases - significant structural damage.

HIGH-PERFORMANCE HOMES

The goal of designing and constructing a high-performance home is to make it as energy efficient as possible with advanced insulation and air sealing measures in order to minimize the run time of the heating and cooling equipment. But such energy saving strategies can result in unintended consequences. A by-product of running the air conditioner to cool the home is moisture removal. Traditional practice left it up to the air conditioning (A/C) system to remove this moisture in an attempt to keep it at an acceptable level. However, tightening houses limits the air conditioner running time and as a result, less humidity removal.

ENERGY EFFICIENT AIR CONDITIONING EQUIPMENT

Energy efficient, higher Seasonal Energy Efficiency Ratio (SEER) A/C units do not remove as much moisture as older, lower SEER systems. Plus – an A/C system is only removing moisture when it is running. In tighter high-performance homes, we are seeing more and more partial to no-loads on the A/C systems, even in hot and humid climates. As a result, we are gaining more efficient sensible cooling at the expense of latent removal capacity, resulting in (inefficient) overcooling to remove moisture.

Also, shoulder seasons tend to be when the dew points are highest and temperatures are mild, so most people are not running their air conditioner during these times. As a consequence of solely relying on the AC to control humidity, homes experience high interior humidity levels with little to no moisture removal during these times.

CAUTION: EFFECTS OF OVERCOOLING

Overcooling to control relative humidity isn't an effective or economical and can lead to comfort and health issues. It can also result in creating very cold areas that result in condensation on ductwork, registers, and even in the walls.

MECHANICAL VENTILATION

Bringing in filtered outdoor air to an energy-efficient built home to dilute indoor air contaminants is absolutely necessary to ensure a healthy indoor environment and mandatory according to the 2015 International Mechanical Code. Depending on what region of the country the home is built in, you may also need to think about how to remove the humidity that you are bringing into the home from the outside. This ventilation humidity combined with the moisture the occupants generate inside the home could lead to significant IAQ issues if not properly controlled. Dedicated dehumidification will almost certainly be necessary to maintain an RH below 50 percent in a house that meets these new building codes in green grass climates (areas where dew points reach above 60 degrees F). Outdoor air supply ventilation systems, such as a whole house ventilating dehumidifier, allow improved control and treatment of the air that enters the house. By slightly pressurizing the house, these systems dilute indoor air pollutants in the living space and filter outdoor air before introducing it into the home, and if there is a call for dehumidification, this air is also dehumidified.

CRAWL SPACES

Excess moisture, introduced by way of unsealed, vented crawl spaces, contributes to wood rot, mold growth, poor air quality and increased pest activity, including infestation and colonization. Moisture in crawl spaces often migrates to the upper levels of the home through a "stack effect." As warm air rises and escapes through the upper levels of the home, new air finds its way into the home to replace what's been lost. Intake air comes in at the lower levels—through unsealed crawl spaces. In essence, whatever air is below the house is also inside the house. This includes high relative humidity, mold, chemicals used for pest treatments, and the off gassing of building materials that are often chemically treated for use below the home.

Building experts agree that in humid climates homeowners and builders should invest the additional effort to incorporate encapsulated space systems in both new and existing homes. The moisture control provided by a properly encapsulated space with a dehumidifier specifically designed for this application can dramatically reduce the risk associated liability of mold and moisture damage.

CRAWL SPACE FACTS:

- According to a study by Advanced Energy, homeowners can expect to reduce their energy bills by as much as 15–18 percent by sealing off their crawl space. Advanced Energy also determined that homes with vented crawl spaces were 19 times more likely to experience relative humidity levels in excess of 70 percent than homes with encapsulated crawl spaces.
- As much as 50 percent of the air in a home's living space originates from the crawl space.
- Most pests are attracted to moist environments. As a result, moisture control is an important part of any fully integrated pest management system.

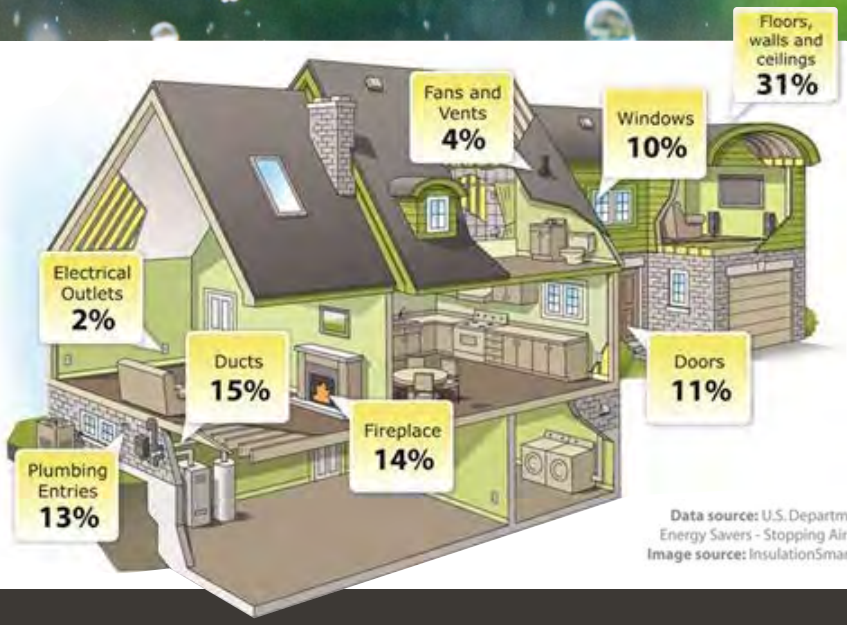
ATTICS

The same thing that happens in vented crawl spaces below the home can happen in vented attics above it. This is called "reverse stack effect." This is due to the Second Law of Thermodynamics that states hot goes to cold, wet goes to dry and high goes to low. During the warmer times of the year where hot wet air is trying to make its way into the cooler dryer air in the home. Moisture also makes its way into the attic from activities in the home like cooking, bathing, and breathing. It could even be from a very humid crawl space or basement making its way up through the home.

HOW MOISTURE CAN ENTER THE HOME

MOISTURE SOURCE #1: AIR LEAKS

Air. It can leak into a home through walls, roofs and floors. This kind of uncontrolled airflow leads to moisture that can cause mold and rot, as well as indoor air quality issues and increased home energy costs.



MOISTURE SOURCE #2: DIFFUSION THROUGH MATERIALS

Essentially, this is when moisture in the form of water vapor spreads through permeable materials. For example, because the soil around and under the home is typically saturated with water, that moisture then permeates adjacent crawl space and basement walls. Once inside the walls, the moisture will soon enter the space itself.

It is extremely important in green grass climates to control this moisture in crawl spaces and basements with an energy efficient, commercial-grade dehumidifier designed to effectively operate in the cooler temperatures. Santa Fe freestanding dehumidifiers help maintain the structural integrity of your home, inhibit mold growth, and improve the indoor air quality of your home by removing odor-causing moisture.

MOISTURE SOURCE #3:
INTERNAL MOISTURE

Moisture in the home comes from many sources: people, pets, plants, cooking, washing, ground water, and outdoor air infiltration. On average, a family of four produces 2 pints of water an hour, or up to 48 pints of water a day.

MOISTURE SOURCE #4:
MECHANICAL VENTILATION

Bringing in filtered outdoor air to an energy-efficient built home to dilute indoor air contaminants is absolutely necessary to ensure a healthy indoor environment and mandatory according to building code. Depending on what region of the country the home is built in, you may also need to think about how to remove the humidity that you are bringing into the home from the outside during the humid times of the year. Dedicated dehumidification will almost certainly be necessary to maintain an RH below 50 percent in a house that meets these new building codes in green grass climates (areas where dew points reach above 60 degrees F).

Outdoor air supply ventilation systems, such as a whole house ventilating dehumidifier, allow improved control and treatment of the air that enters the house. By slightly pressurizing the house, these systems dilute indoor air pollutants in the living space and filter outdoor air before introducing it into the home, and if there is a call for dehumidification, this air is also dehumidified.

STRATEGIES FOR CONTROLLING MOISTURE

BASEMENT AND CRAWLSPACES

THE IMPORTANCE OF AIR MOVEMENT

A key factor to consider when choosing a dehumidifier is the amount of air movement needed to distribute dry air throughout the crawl space and basement.

Most free-standing dehumidifiers tend to recirculate the air immediately surrounding them, creating a zone of warm, lower-relative-humidity. This often leads to a dehumidifier prematurely shutting down its cooling cycle and then starting up again a short time later — not only is this inefficient, but it delivers poor moisture removal.

All Santa Fe dehumidifiers feature patented dual exhaust (except the smallest Compact70) specifically designed to provide the optimal amount of airflow in crawl spaces and basements. The powerful dual exhaust improves air circulation throughout the entire space, allowing the maximum amount of air to be treated in the shortest time. Dual exhaust dehumidifiers will offer a lot of versatility for any application.

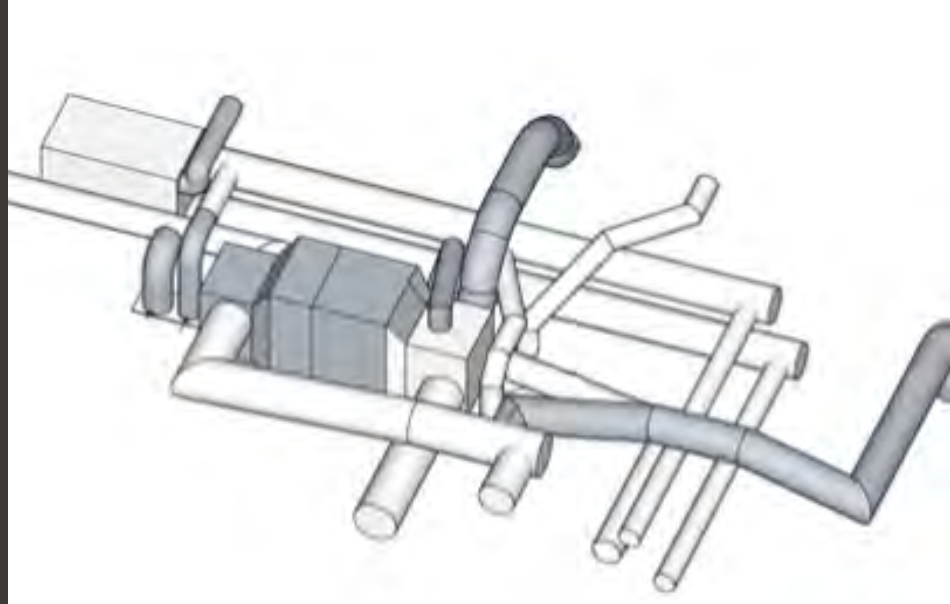
- Ensure your dehumidifier is able to extract moisture in the air from all spaces of your crawl space or basement, whether this is ducting the unit or placing it in a central location.
- Determine the size, placement and ducting options of your dehumidifier, based on the size of your crawl space or basement as well as the number of pillars or sections within them.

BIG BOX PORTABLES AREN'T THE ANSWER

AIR FLOW	RATINGS	INEFFICIENT	AND
They don't have the capacity or air flow, to condition an entire basement or crawl space. **Create a warm spot.**	Portables are rated at 80 degrees and 60% RH (**think about the real temperature of a basement or crawl**)	Portables often run constantly, or their **"tiny little coil freezes up."**	The bucket doesn't empty itself!

WHOLE HOME

A whole house ventilating dehumidifier is a dehumidifier designed to work with the home's HVAC system to bring in outdoor air, which improves air quality by diluting indoor contaminates, all while dehumidifying the entire home to maintain a set relative humidity (RH) level. Santa Fe Ultra Series is the only manufacturer to offer a complete line of whole house ventilating dehumidifiers that are energy efficient and offer superior MERV-13 filtration. By working side-by-side with your current HVAC system, a whole home dehumidification system will improve the moisture levels throughout your entire home.



Santa Fe Ultra Series also offers the flexibility to be installed independently of the HVAC system. This allows for proper dehumidification throughout the home when ductless mini-split A/C systems are used.

Engineered and manufactured in Madison, Wisconsin, we take pride in our products and service. Our products are commercial grade, built to last and readily available.

UNMATCHED 6-YEAR WARRANTY

PROTECTING YOU IS OUR COMMITMENT

When it comes to protecting your family and property from the harmful effects of excessive moisture, you should never settle for anything but a Santa Fe. That's because we take great pride in engineering products that set the standard in dehumidification for the entire home. It's not only our mission, it's our passion.

THE SANTA FE DIFFERENCE

Multiple Dehumidifier Sizing Options	Dehumidifiers for most residential and light commercial applications including two exclusive units
Warranty/Quality/Low Maintenance	Industry-Leading 6 Year Warranty
Ventilation (Ultra Series)	Most units have dedicated ventilation ducts with the ability to meet ASHRAE 62.2
Air Filtration	Industry-Leading MERV13 Filters
Energy Savings and Efficiency	The most energy efficient dehumidifiers in the world
Sales Support	Dedicated support for all dehumidifier applications nationwide
Durability and Handling	Designed and Manufactured in the US to the highest standards of toughness

SANTA-FE DEHUMIDIFIERS