Mobile Homes

- **Considering Weight Distribution on Mobile Home Roofs**
  Considering Weight Distribution on Mobile Home Roofs Analyzing Space Limitations for Duct Installation Minimizing Vibrations through Effective Mounting Checking for Clearances near Windows and Doors Verifying Electrical Capacity for New Units Inspecting Crawl Spaces before Major Installations Protecting Exterior Components from Windy Conditions Resolving Access Issues in Narrow Hallways Planning Around Existing Plumbing or Gas Lines Prioritizing Safety in Confined Work Areas Ensuring Adequate Ventilation for Heat Pumps Mitigating Moisture Risks in Humid Climates
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  Comparing Basic and Extended Coverage Options Reviewing Part Replacement Clauses in Detail Understanding Labor Inclusions in Contracts Assessing Multi year Agreements for Homeowners Outlining Limitations of Warranty Claims Inspecting Renewal Terms for Ongoing Coverage Checking Deductible Requirements for Repairs Estimating Future Costs through Contract Analysis Tracking Service Visits Outlined in Agreements Selecting Clauses that Cover Seasonal Tuneups Transferring Warranty Benefits to New Owners Planning Budget Strategies for Contract Renewals
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Mobile homes, often praised for their affordability and flexibility, are a popular housing choice for many people. However, living in a mobile home in humid climates can present unique challenges, particularly when it comes to managing moisture levels. Understanding the impact of humidity on mobile homes is essential for mitigating moisture risks and ensuring that these dwellings remain safe and comfortable over time.

Humidity refers to the amount of water vapor present in the air. In humid climates, this can mean excessive moisture that affects not just comfort but also the structural integrity of buildings. Mobile homes are especially susceptible to these effects due to their construction materials and design. Properly sealed ductwork prevents energy loss in mobile home HVAC systems **best hvac system for mobile home** technician. Unlike traditional houses, mobile homes often have thinner walls and less insulation, which can make them more vulnerable to moisture-related issues like mold growth, wood rot, and metal corrosion.

One of the primary concerns with high humidity levels in mobile homes is mold growth. Mold thrives in moist environments and can quickly become a health hazard if not addressed. It can cause respiratory problems, allergies, and other health issues for inhabitants. Moreover, once mold takes hold within a structure, it can be costly and challenging to remove completely. Therefore, prevention through effective humidity control is critical.

Another issue related to humidity is wood rot. Many components of mobile homes are made from wood or wood-based products that absorb moisture easily. Over time, sustained exposure to high humidity can weaken these materials significantly. This degradation not only affects the aesthetic appearance of the home but also its structural stability. Metal components are not immune either; they can suffer from rust and corrosion due to excess moisture.

To mitigate these risks associated with high humidity levels in mobile homes, several strategies can be employed. First and foremost is proper ventilation. Ensuring good airflow throughout the home helps reduce moisture buildup by allowing damp air to escape while bringing in drier air from outside. Installing exhaust fans in bathrooms and kitchens where steam accumulates most frequently is an effective measure.

Dehumidifiers also play a vital role in controlling indoor humidity levels. These devices extract excess moisture from the air, making it less conducive for mold growth and material degradation. Additionally, using vapor barriers during construction or renovation projects helps prevent ground moisture from seeping into the home.

Regular maintenance checks are equally important when living in a humid climate with a mobile home. Inspecting seals around windows and doors ensures they remain airtight while checking roofing materials helps identify potential leaks early on before they escalate into bigger problems.

In conclusion, understanding how humidity impacts mobile homes allows residents to take proactive steps towards minimizing moisture-related risks effectively-ensuring their investment remains safe while providing healthy living conditions year-round despite climatic challenges posed by high-humidity environments prevalent across regions worldwide today!

Impact of HVAC system installation on roof weight distribution —

In humid climates, mobile homes face unique challenges when it comes to maintaining a comfortable and healthy indoor environment. One of the most pressing issues is moisture management, as excessive humidity can lead to mold growth, structural damage, and poor indoor air quality. An effective HVAC system tailored for mobile homes in such climates not only ensures comfort but also plays a crucial role in mitigating these moisture risks. Understanding the key features of such an HVAC system is essential for homeowners seeking to protect their investment and well-being.

Firstly, an effective mobile home HVAC system in humid climates should have a robust dehumidification capability. Standard air conditioners do offer some dehumidification as they cool the air, but in regions with high humidity levels, this might not be sufficient. A dedicated dehumidifier or an integrated system that enhances moisture removal efficiency ensures that indoor humidity levels remain within a healthy range, typically between 30% and 50%.

Another critical feature is proper ventilation. Mobile homes often have less natural airflow compared to traditional houses due to their compact design and construction materials. An efficient HVAC system should incorporate balanced ventilation solutions that allow for adequate fresh air intake without compromising energy efficiency. Mechanical ventilation systems like Energy Recovery Ventilators (ERVs) or Heat Recovery Ventilators (HRVs) are particularly beneficial as they exchange stale indoor air with fresh outdoor air while minimizing energy loss.

Moreover, precise control mechanisms are vital for an effective HVAC system in managing both temperature and humidity levels accurately. Advanced thermostats equipped with humidity sensors provide homeowners with better control over their indoor environment. These devices can automatically adjust cooling settings based on real-time data about temperature and moisture levels, optimizing comfort while preventing conditions conducive to mold growth.

Insulation also plays a significant role in the efficacy of an HVAC system in humid climates. Properly insulated ducts reduce thermal losses and prevent condensation from forming on duct surfaces-a common issue that can contribute to elevated moisture levels within the home. Additionally, sealing any leaks or gaps around windows, doors, and other openings helps maintain consistent indoor conditions by limiting the infiltration of humid outdoor air.

Lastly, routine maintenance cannot be overlooked when discussing effective mobile home HVAC systems for moisture mitigation. Regular cleaning of filters, inspection of components like coils and condensate drains, and timely servicing by professionals ensure that the system operates at peak performance year-round. This proactive approach not only extends the lifespan of the equipment but also reduces the risk of unexpected failures during peak usage periods.

In conclusion, mitigating moisture risks in humid climates requires more than just basic cooling capabilities from a mobile home's HVAC system. Dehumidification capacity, proper ventilation solutions, advanced control mechanisms, adequate insulation, and regular maintenance are all key features that collectively enhance its effectiveness. By prioritizing these aspects when selecting or upgrading an HVAC system, homeowners can create a safer and more comfortable living environment while safeguarding against potential moisture-related issues.

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Considerations for maintaining structural integrity during HVAC installation

In humid climates, controlling indoor humidity levels is crucial for minimizing moisture-related risks that can affect both the structural integrity of buildings and the health of occupants. Excessive humidity fosters mold growth, encourages dust mites, and can lead to the deterioration of building materials. Therefore, implementing strategies to manage indoor moisture is essential for maintaining a safe and comfortable living environment.

One of the primary strategies for controlling indoor humidity involves the use of dehumidifiers. These devices are designed to extract excess moisture from the air, thereby lowering humidity levels to an acceptable range. Dehumidifiers come in various sizes and capacities, making them suitable for different types of spaces, from small rooms to entire houses. By consistently using a dehumidifier, especially during peak humid seasons, homeowners can significantly reduce the risk of mold growth and other moisture-related issues.

Ventilation also plays a critical role in managing indoor humidity. Proper ventilation ensures that moist air is expelled from enclosed spaces and replaced with drier outdoor air. This process is particularly important in areas like kitchens and bathrooms where water usage is high. Installing exhaust fans or upgrading existing ventilation systems can effectively remove excess moisture generated by cooking or showering activities. Moreover, ensuring that ducts are clean and unobstructed will enhance airflow efficiency throughout the home.

Another effective approach is improving insulation and sealing any leaks within a building's envelope. Gaps around windows, doors, and utility penetrations can allow warm, humid outdoor air to seep into cooler indoor environments, leading to condensation problems. Sealing these leaks with weatherstripping or caulking not only prevents unwanted air exchange but also enhances energy efficiency by reducing heating and cooling demands.

Additionally, maintaining an optimal temperature through efficient HVAC systems helps in regulating humidity levels indoors. Air conditioners naturally dehumidify as they cool the air; therefore, ensuring that HVAC systems are well-maintained will improve their ability to control both temperature and humidity effectively. Regular maintenance checks should include cleaning filters and coils as well as inspecting ductwork for any signs of dampness or leakage.

Furthermore, adopting lifestyle changes can contribute to lower humidity levels indoors. Simple practices such as hanging wet clothes outside rather than drying them indoors or covering pots while cooking can significantly reduce additional moisture sources within a home.

Lastly, monitoring indoor humidity with hygrometers provides valuable insights into current conditions allowing homeowners to take timely corrective actions when necessary. Keeping track of fluctuations enables proactive adjustments before excessive moisture becomes problematic.

In summary, controlling indoor humidity levels in humid climates requires a combination of technological solutions like dehumidifiers along with practical measures such as adequate ventilation insulation improvements regular HVAC maintenance conscious lifestyle choices coupled with vigilant monitoring efforts all aimed at creating healthier living environments while safeguarding property investments against potential damage caused by excess moisture buildup ultimately achieving long-term comfort sustainability resilience against adverse climatic influences prevalent across these regions worldwide today!

Strategies for evenly distributing weight across the roof when adding or upgrading HVAC systems

Living in a mobile home can offer a unique blend of flexibility and comfort, but maintaining an optimal indoor climate, especially in humid environments, presents its own set of challenges. One of the key components to ensuring a comfortable living space is the HVAC system, which must work efficiently to regulate temperature and humidity levels. In such climates, moisture control becomes crucial not only for comfort but also for preventing damage and health issues. Here are some maintenance tips that can help mitigate moisture risks in mobile homes located in humid regions.

Firstly, regular inspection and cleaning of the HVAC system are imperative. Check filters monthly and replace them as needed-typically every one to three months-to ensure clean airflow and efficient operation. A clogged filter forces the system to work harder, reducing its lifespan and effectiveness at controlling humidity levels. Additionally, it's important to inspect ducts for any leaks or blockages that might allow moisture infiltration or restrict airflow.

Another vital aspect is the dehumidification capability of your HVAC system. In humid climates, even a small increase in indoor humidity can lead to mold growth and structural damage over time. Therefore, consider installing a dedicated dehumidifier if your current system struggles with high humidity levels consistently. Modern HVAC systems often come with built-in dehumidifiers; however, their effectiveness should be assessed regularly.

Furthermore, ensure that your home's ventilation is adequate. Proper ventilation helps manage excess moisture by allowing it to escape outside rather than condensing on walls or ceilings within your mobile home. Use exhaust fans in kitchens and bathrooms where steam commonly accumulates during cooking or showering. These fans should be vented directly outdoors rather than into attics or crawl spaces where they could contribute to dampness.

Additionally, it's essential to maintain proper drainage around the exterior of your home to prevent water from seeping inside. Ensure gutters are clear of debris so that rainwater flows away from your home's foundation effectively. Inspect seals around windows and doors for any gaps where moisture could enter and caulk these areas as necessary.

On particularly humid days when outdoor conditions exacerbate internal humidity levels, consider using portable fans or air conditioning units strategically placed throughout your mobile home to assist with air circulation and drying out moist areas quickly.

Finally, regular professional maintenance should not be overlooked. Schedule annual tune-ups with an HVAC technician who can conduct thorough inspections beyond basic tasks like filter changes-checking refrigerant levels, inspecting electrical connections, lubricating moving parts-all essential for peak performance under challenging climatic conditions.

In conclusion, maintaining an efficient HVAC system in a mobile home situated within a humid environment requires diligence but pays off by preserving both comfort and property integrity over time through effective moisture management strategies tailored specifically towards mitigating associated risks prevalent under such climatic circumstances.

Potential risks of improper weight distribution on mobile home roofs and HVAC efficiency

In the quest to create comfortable and durable living environments, particularly in humid climates, effective moisture management plays a pivotal role. The challenges posed by excessive moisture can lead to significant structural damage, health issues, and decreased energy efficiency if not properly addressed. Two critical components that work synergistically to mitigate these risks are insulation and ventilation.

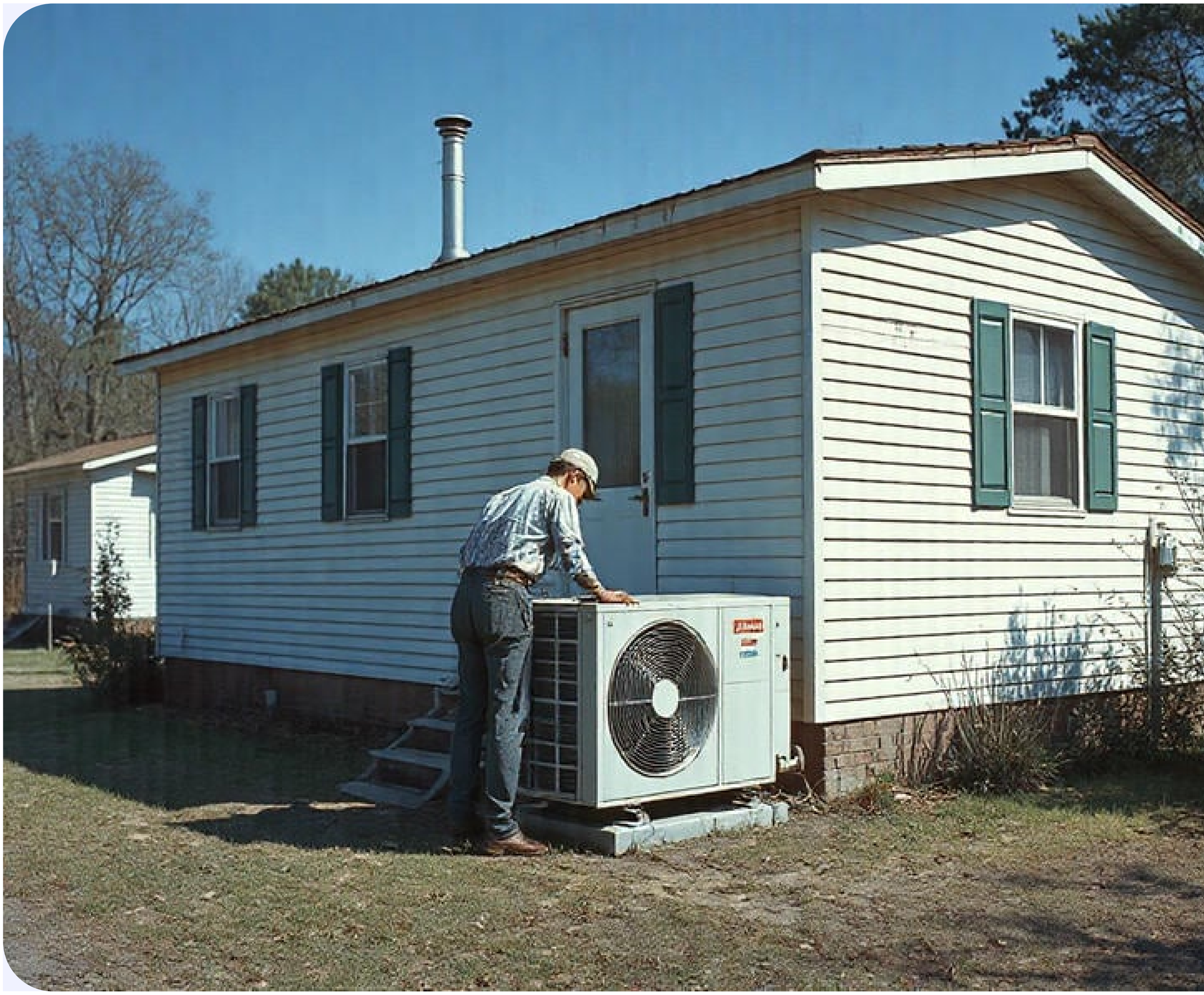
Insulation serves as a barrier that regulates the transfer of heat between the interior and exterior of a building. In humid climates, its role extends beyond temperature control to include moisture management. Properly installed insulation helps maintain indoor temperatures at levels that reduce humidity-related condensation on surfaces such as walls, ceilings, and floors. By keeping indoor environments cooler during hot seasons and warmer during colder periods, insulation minimizes the likelihood of mold growth-a common consequence of persistent dampness.

However, insulation alone is not a panacea; without adequate ventilation, it can trap moisture within building envelopes. This is where ventilation becomes indispensable in managing moisture levels effectively. Ventilation systems facilitate the exchange of indoor air with outdoor air, which is crucial for expelling excess humidity generated from everyday activities like cooking, bathing, and even breathing. In homes with high-performance insulation but poor ventilation, trapped moisture can lead to elevated humidity levels indoors, creating an ideal breeding ground for mold and mildew.

There are several strategies to ensure proper ventilation in humid climates. Mechanical ventilation systems such as exhaust fans or whole-house ventilators can be employed to actively remove moist air from interior spaces while introducing drier outside air. Natural ventilation through windows and vents also offers a cost-effective method for enhancing airflow when weather conditions permit.

The integration of both insulation and ventilation must be carefully balanced to optimize their collective effectiveness in controlling moisture levels. High-quality vapor barriers can also complement this duo by further preventing external humidity from penetrating into insulated areas. Moreover, selecting appropriate materials that resist moisture absorption is essential in constructing buildings resilient against humid conditions.

In conclusion, insulation and ventilation are integral components in the strategy for mitigating moisture risks in humid climates. While each has distinct functions-insulation controls temperature gradients while ventilation facilitates air exchange-their combined action forms a comprehensive approach to maintaining healthy indoor environments free from excess humidity-related problems. As climate patterns continue to shift globally towards increased humidity levels in various regions, understanding and implementing these principles will become even more crucial for sustainable building practices that prioritize both human comfort and structural integrity.



Guidelines for professional assessment and installation to ensure balanced weight

distribution

Moisture-related problems are a pervasive challenge in humid climates, where the persistent presence of high humidity levels can cause a host of issues for buildings and their occupants. These challenges range from structural damage to health implications, each necessitating a tailored approach to mitigation.

One of the most common moisture-related problems is mold growth. Mold thrives in damp environments, and its spores can spread rapidly in humid conditions. This not only leads to unsightly stains and unpleasant odors but also poses significant health risks, including respiratory issues and allergic reactions. To combat this, effective ventilation systems are crucial. Ensuring that air circulates properly helps reduce humidity levels indoors, making it less conducive for mold to develop. Additionally, dehumidifiers can be used to maintain optimal humidity levels within enclosed spaces.

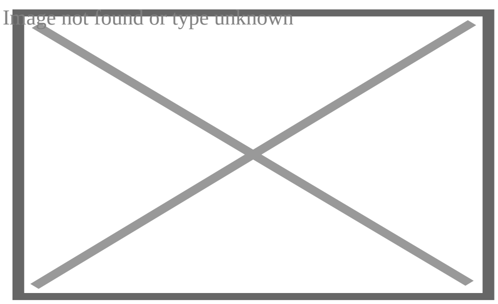
Another issue frequently encountered is wood rot and structural degradation. Prolonged exposure to moisture can compromise the integrity of wooden structures, leading to costly repairs or replacements. Protecting wood from moisture involves using treated lumber that resists water damage or applying sealants and paints designed to repel water. Regular maintenance checks are also vital; early detection of potential problem areas allows for timely intervention before significant damage occurs.

Condensation is yet another concern in humid climates, often manifesting as water droplets on windows and walls. This phenomenon results from the temperature difference between indoor air and cool surfaces, which can lead to further complications like peeling paint or wallpaper damage if not addressed promptly. Insulating windows with double glazing can help prevent condensation by keeping interior surfaces warmer.

For those living in areas prone to flooding or heavy rains, water intrusion becomes a critical issue. Water seepage through foundations or roofs can lead to severe structural damage over time. Proper drainage systems such as gutters and downspouts should be regularly maintained to direct water away from buildings effectively. Waterproofing measures like sealing cracks in foundations or applying waterproof membranes on roofs provide additional layers of protection against intruding water.

In dealing with these moisture-related problems, adopting an integrated approach is essential - one that combines preventive measures with regular maintenance practices tailored specifically for humid environments. By understanding the unique challenges posed by excess moisture and implementing solutions accordingly, we can significantly mitigate its risks while ensuring healthier living conditions and prolonged lifespan for our built environments in humid climates.

About Ventilation (architecture)



An ab anbar (water reservoir) with double domes and windcatchers (openings near the top of the towers) in the central desert city of Naeen, Iran. Windcatchers are a form of natural ventilation.[1]

Ventilation is the intentional introduction of outdoor air into a space. Ventilation is mainly used to control indoor air quality by diluting and displacing indoor pollutants; it can also be used to control indoor temperature, humidity, and air motion to benefit thermal comfort, satisfaction with other aspects of the indoor environment, or other objectives.

The intentional introduction of outdoor air is usually categorized as either mechanical ventilation, natural ventilation, or mixed-mode ventilation.[2]

- Mechanical ventilation is the intentional fan-driven flow of outdoor air into and/or out from a building. Mechanical ventilation systems may include supply fans (which push outdoor air into a building), exhaust[3] fans (which draw air out of a building and thereby cause equal ventilation flow into a building), or a combination of both (called balanced ventilation if it neither pressurizes nor depressurizes the inside air,[3] or only slightly depressurizes it). Mechanical ventilation is often provided by equipment that is also used to heat and cool a space.

- Natural ventilation is the intentional passive flow of outdoor air into a building through planned openings (such as louvers, doors, and windows). Natural ventilation does not require mechanical systems to move outdoor air. Instead, it relies entirely on passive physical phenomena, such as wind pressure, or the stack effect. Natural ventilation openings may be fixed, or adjustable. Adjustable openings may be controlled automatically (automated), owned by occupants (operable), or a combination of both. Cross ventilation is a phenomenon of natural ventilation.
- Mixed-mode ventilation systems use both mechanical and natural processes. The mechanical and natural components may be used at the same time, at different times of day, or in different seasons of the year.[4] Since natural ventilation flow depends on environmental conditions, it may not always provide an appropriate amount of ventilation. In this case, mechanical systems may be used to supplement or regulate the naturally driven flow.

Ventilation is typically described as separate from infiltration.

- Infiltration is the circumstantial flow of air from outdoors to indoors through leaks (unplanned openings) in a building envelope. When a building design relies on infiltration to maintain indoor air quality, this flow has been referred to as adventitious ventilation.[5]

The design of buildings that promote occupant health and well-being requires a clear understanding of the ways that ventilation airflow interacts with, dilutes, displaces, or introduces pollutants within the occupied space. Although ventilation is an integral component of maintaining good indoor air quality, it may not be satisfactory alone.[6] A clear understanding of both indoor and outdoor air quality parameters is needed to improve the performance of ventilation in terms of occupant health and energy.[7] In scenarios where outdoor pollution would deteriorate indoor air quality, other treatment devices such as filtration may also be necessary.[8] In kitchen ventilation systems, or for laboratory fume hoods, the design of effective effluent capture can be more important than the bulk amount of ventilation in a space. More generally, the way that an air distribution system causes ventilation to flow into and out of a space impacts the ability of a particular ventilation rate to remove internally generated pollutants. The ability of a system to reduce pollution in space is described as its "ventilation effectiveness". However, the overall impacts of ventilation on indoor air quality can depend on more complex factors such as the sources of pollution, and the ways that activities and airflow interact to affect occupant exposure.

An array of factors related to the design and operation of ventilation systems are regulated by various codes and standards. Standards dealing with the design and operation of ventilation systems to achieve acceptable indoor air quality include the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) Standards 62.1 and 62.2, the International Residential Code, the International

Mechanical Code, and the United Kingdom Building Regulations Part F. Other standards that focus on energy conservation also impact the design and operation of ventilation systems, including ASHRAE Standard 90.1, and the International Energy Conservation Code.

When indoor and outdoor conditions are favorable, increasing ventilation beyond the minimum required for indoor air quality can significantly improve both indoor air quality and thermal comfort through ventilative cooling, which also helps reduce the energy demand of buildings.[9][10] During these times, higher ventilation rates, achieved through passive or mechanical means (air-side economizer, ventilative pre-cooling), can be particularly beneficial for enhancing people's physical health.[11] Conversely, when conditions are less favorable, maintaining or improving indoor air quality through ventilation may require increased use of mechanical heating or cooling, leading to higher energy consumption.

Ventilation should be considered for its relationship to "venting" for appliances and combustion equipment such as water heaters, furnaces, boilers, and wood stoves. Most importantly, building ventilation design must be careful to avoid the backdraft of combustion products from "naturally vented" appliances into the occupied space. This issue is of greater importance for buildings with more air-tight envelopes. To avoid the hazard, many modern combustion appliances utilize "direct venting" which draws combustion air directly from outdoors, instead of from the indoor environment.

Design of air flow in rooms

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The air in a room can be supplied and removed in several ways, for example via ceiling ventilation, cross ventilation, floor ventilation or displacement ventilation.[*citation needed*]

Ceiling ventilation

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  Ceiling ventilation

Cross ventilation

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  Cross ventilation
  Floor ventilation

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  Floor ventilation
  Displacement ventilation

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  Displacement
  ventilation

Furthermore, the air can be circulated in the room using vortexes which can be initiated in various ways:

Tangential flow vortices, initiated horizontally

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  Tangential flow
  vortices, initiated
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Tangential flow vortices, initiated vertically

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Tangential flow
vortices, initiated
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Diffused flow vortices from air nozzles

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Diffused flow vortices due to roof vortices

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Diffused flow
vortices due to roof
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Ventilation rates for indoor air quality

[edit]

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The examples and perspective in this article **deal primarily with the United States and do not represent a worldwide view of the subject**. You may improve this article, discuss the issue on the talk page, or create a new article, as appropriate. *(April 2024) (Learn how and when to remove this message)*

The ventilation rate, for commercial, industrial, and institutional (CII) buildings, is normally expressed by the volumetric flow rate of outdoor air, introduced to the building. The typical units used are cubic feet per minute (CFM) in the imperial system, or liters per second (L/s) in the metric system (even though cubic meter per second is the preferred unit for volumetric flow rate in the SI system of units). The ventilation rate can also be expressed on a per person or per unit floor area basis, such as CFM/p or CFM/ft^2, or as air changes per hour (ACH).

Standards for residential buildings

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For residential buildings, which mostly rely on infiltration for meeting their ventilation needs, a common ventilation rate measure is the air change rate (or air changes per hour): the hourly ventilation rate divided by the volume of the space (*I* or *ACH*; units of 1/h). During the winter, ACH may range from 0.50 to 0.41 in a tightly air-sealed house to 1.11 to 1.47 in a loosely air-sealed house.[12]

ASHRAE now recommends ventilation rates dependent upon floor area, as a revision to the 62-2001 standard, in which the minimum ACH was 0.35, but no less than 15 CFM/person (7.1 L/s/person). As of 2003, the standard has been changed to 3 CFM/100 sq. ft. (15 L/s/100 sq. m.) plus 7.5 CFM/person (3.5 L/s/person).[13]

Standards for commercial buildings

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Ventilation rate procedure

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Ventilation Rate Procedure is rate based on standard and prescribes the rate at which ventilation air must be delivered to space and various means to the condition that air.[14] Air quality is assessed (through CO_2 measurement) and ventilation rates are mathematically derived using constants. Indoor Air Quality Procedure uses one or more guidelines for the specification of acceptable concentrations of certain contaminants in indoor air but does not prescribe ventilation rates or air treatment methods.[14] This addresses both quantitative and subjective evaluations and is based on the Ventilation Rate Procedure. It also accounts for potential contaminants that may have no measured limits, or for which no limits are not set (such as formaldehyde off-gassing from carpet and furniture).

Natural ventilation

[edit]
Main article: Natural ventilation

Natural ventilation harnesses naturally available forces to supply and remove air in an enclosed space. Poor ventilation in rooms is identified to significantly increase the localized moldy smell in specific places of the room including room corners.[11] There are three types of natural ventilation occurring in buildings: wind-driven ventilation, pressure-driven flows, and stack ventilation.[15] The pressures generated by 'the stack effect' rely upon the buoyancy of heated or rising air. Wind-driven ventilation relies upon the force of the prevailing wind to pull and push air through the enclosed space as well as through breaches in the building's envelope.

Almost all historic buildings were ventilated naturally.[16] The technique was generally abandoned in larger US buildings during the late 20th century as the use of air conditioning became more widespread. However, with the advent of advanced Building Performance Simulation (BPS) software, improved Building Automation Systems (BAS), Leadership in Energy and Environmental Design (LEED) design requirements, and improved window manufacturing techniques; natural ventilation has made a resurgence in commercial buildings both globally and throughout the US.[17]

The benefits of natural ventilation include:

- Improved indoor air quality (IAQ)
- Energy savings
- Reduction of greenhouse gas emissions
- Occupant control
- Reduction in occupant illness associated with sick building syndrome
- Increased worker productivity

Techniques and architectural features used to ventilate buildings and structures naturally include, but are not limited to:

- Operable windows
- Clerestory windows and vented skylights
- Lev/convection doors
- Night purge ventilation
- Building orientation
- Wind capture façades

Airborne diseases

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Natural ventilation is a key factor in reducing the spread of airborne illnesses such as tuberculosis, the common cold, influenza, meningitis or COVID-19.[18] Opening doors and windows are good ways to maximize natural ventilation, which would make the risk of airborne contagion much lower than with costly and maintenance-requiring mechanical systems. Old-fashioned clinical areas with high ceilings and large windows provide the greatest protection. Natural ventilation costs little and is maintenance-free, and is particularly suited to limited-resource settings and tropical climates, where the burden of TB and institutional TB transmission is highest. In settings where respiratory isolation is difficult and climate permits, windows and doors should be opened to reduce the risk of airborne contagion. Natural ventilation requires little maintenance and is inexpensive.[19]

Natural ventilation is not practical in much of the infrastructure because of climate. This means that the facilities need to have effective mechanical ventilation systems and or use Ceiling Level UV or FAR UV ventilation systems.

Ventilation is measured in terms of air changes per hour (ACH). As of 2023, the CDC recommends that all spaces have a minimum of 5 ACH.[20] For hospital rooms with airborne contagions the CDC recommends a minimum of 12 ACH.[21] Challenges in facility ventilation are public unawareness,[22][23] ineffective government oversight, poor building codes that are based on comfort levels, poor system operations, poor maintenance, and lack of transparency.[24]

Pressure, both political and economic, to improve energy conservation has led to decreased ventilation rates. Heating, ventilation, and air conditioning rates have dropped since the energy crisis in the 1970s and the banning of cigarette smoke in the 1980s and 1990s.[25][26][*better source needed*]

Mechanical ventilation

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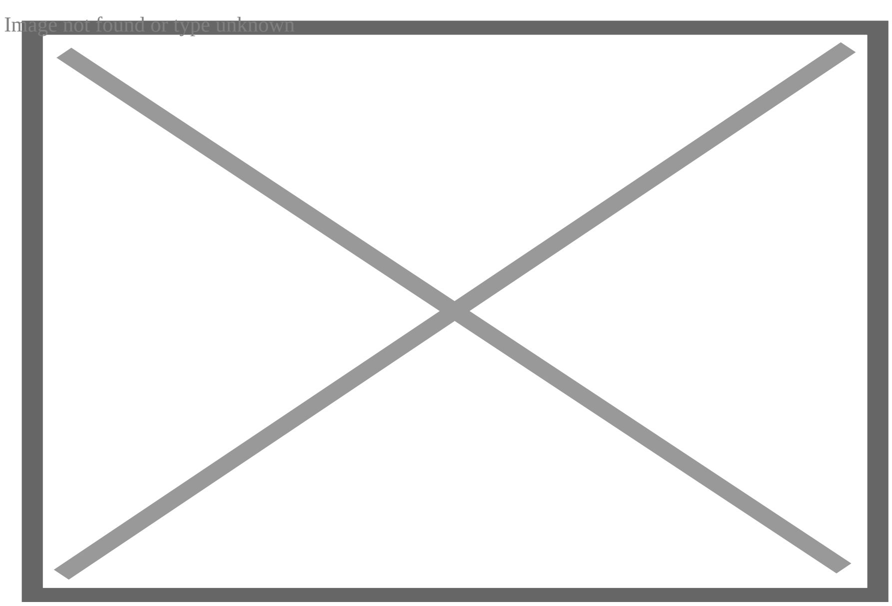
Main article: HVAC



An axial belt-drive exhaust fan serving an underground car park. This exhaust fan's operation is interlocked with the concentration of contaminants emitted by internal combustion engines.

Mechanical ventilation of buildings and structures can be achieved by the use of the following techniques:

- Whole-house ventilation
- Mixing ventilation
- Displacement ventilation
- Dedicated subaerial air supply

Demand-controlled ventilation (DCV)

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Demand-controlled ventilation (**DCV**, also known as Demand Control Ventilation) makes it possible to maintain air quality while conserving energy.[27][28] ASHRAE has determined that "It is consistent with the ventilation rate procedure that demand control be permitted for use to reduce the total outdoor air supply during periods of less occupancy."[29] In a DCV system, CO_2 sensors control the amount of ventilation.[30][31] During peak occupancy, CO_2 levels rise, and the system adjusts to deliver the same amount of outdoor air as would be used by the ventilation-rate procedure.[32] However, when spaces are less occupied, CO_2 levels reduce, and the system reduces ventilation to conserves energy. DCV is a well-established practice,[33] and is required in high occupancy spaces by building energy standards such as ASHRAE 90.1.[34]

Personalized ventilation

[edit]

This section needs to be **updated**. Please help update this article to reflect recent events or newly available information. *(September 2024)*

Personalized ventilation is an air distribution strategy that allows individuals to control the amount of ventilation received. The approach delivers fresh air more directly to the breathing zone and aims to improve the air quality of inhaled air. Personalized ventilation provides much higher ventilation effectiveness than conventional mixing ventilation systems by displacing pollution from the breathing zone with far less air volume. Beyond improved air quality benefits, the strategy can also improve occupants' thermal comfort, perceived air quality, and overall satisfaction with the indoor environment. Individuals' preferences for temperature and air movement are not equal, and so traditional approaches to homogeneous environmental control have failed to achieve high occupant satisfaction. Techniques such as personalized ventilation facilitate control of a more diverse thermal environment that can improve thermal satisfaction for most occupants.

Local exhaust ventilation

[edit]
See also: Power tool

Local exhaust ventilation addresses the issue of avoiding the contamination of indoor air by specific high-emission sources by capturing airborne contaminants before they are spread into the environment. This can include water vapor control, lavatory effluent control, solvent vapors from industrial processes, and dust from wood- and metal-working machinery. Air can be exhausted through pressurized hoods or the use of fans and pressurizing a specific area.[35]
A local exhaust system is composed of five basic parts:

1. A hood that captures the contaminant at its source
2. Ducts for transporting the air
3. An air-cleaning device that removes/minimizes the contaminant
4. A fan that moves the air through the system
5. An exhaust stack through which the contaminated air is discharged[35]

In the UK, the use of LEV systems has regulations set out by the Health and Safety Executive (HSE) which are referred to as the Control of Substances Hazardous to Health (CoSHH). Under CoSHH, legislation is set to protect users of LEV systems by ensuring that all equipment is tested at least every fourteen months to ensure the LEV systems are performing adequately. All parts of the system must be visually inspected and thoroughly tested and where any parts are found to be defective, the inspector must issue a red label to identify the defective part and the issue.

The owner of the LEV system must then have the defective parts repaired or replaced before the system can be used.

Smart ventilation

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Smart ventilation is a process of continually adjusting the ventilation system in time, and optionally by location, to provide the desired IAQ benefits while minimizing energy consumption, utility bills, and other non-IAQ costs (such as thermal discomfort or noise). A smart ventilation system adjusts ventilation rates in time or by location in a building to be responsive to one or more of the following: occupancy, outdoor thermal and air quality conditions, electricity grid needs, direct sensing of contaminants, operation of other air moving and air cleaning systems. In addition, smart ventilation systems can provide information to building owners, occupants, and managers on operational energy consumption and indoor air quality as well as a signal when systems need maintenance or repair. Being responsive to occupancy means that a smart ventilation system can adjust ventilation depending on demand such as reducing ventilation if the building is unoccupied. Smart ventilation can time-shift ventilation to periods when a) indoor-outdoor temperature differences are smaller (and away from peak outdoor temperatures and humidity), b) when indoor-outdoor temperatures are appropriate for ventilative cooling, or c) when outdoor air quality is acceptable. Being responsive to electricity grid needs means providing flexibility to electricity demand (including direct signals from utilities) and integration with electric grid control strategies. Smart ventilation systems can have sensors to detect airflow, systems pressures, or fan energy use in such a way that systems failures can be detected and repaired, as well as when system components need maintenance, such as filter replacement.[36]

Ventilation and combustion

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Combustion (in a fireplace, gas heater, candle, oil lamp, etc.) consumes oxygen while producing carbon dioxide and other unhealthy gases and smoke, requiring ventilation air. An open chimney promotes infiltration (i.e. natural ventilation) because of the negative pressure change induced by the buoyant, warmer air leaving through the chimney. The warm air is typically replaced by heavier, cold air.

Ventilation in a structure is also needed for removing water vapor produced by respiration, burning, and cooking, and for removing odors. If water vapor is permitted to accumulate, it may damage the structure, insulation, or finishes. [*citation needed*] When operating, an air conditioner usually removes excess moisture from the air. A dehumidifier may also be appropriate for removing airborne moisture.

Calculation for acceptable ventilation rate

[edit]

Ventilation guidelines are based on the minimum ventilation rate required to maintain acceptable levels of effluents. Carbon dioxide is used as a reference point, as it is the gas of highest emission at a relatively constant value of 0.005 L/s. The mass balance equation is:

$Q = G/(C_i ? C_a)$

- Q = ventilation rate (L/s)
- G = CO_2 generation rate

- C_i = acceptable indoor CO_2 concentration
- C_a = ambient CO_2 concentration[37]

Smoking and ventilation

[edit]

ASHRAE standard 62 states that air removed from an area with environmental tobacco smoke shall not be recirculated into ETS-free air. A space with ETS requires more ventilation to achieve similar perceived air quality to that of a non-smoking environment.

The amount of ventilation in an ETS area is equal to the amount of an ETS-free area plus the amount V, where:

$V = DSD \times VA \times A/60E$

- V = recommended extra flow rate in CFM (L/s)
- DSD = design smoking density (estimated number of cigarettes smoked per hour per unit area)
- VA = volume of ventilation air per cigarette for the room being designed (ft^3/cig)
- E = contaminant removal effectiveness[38]

History

[edit]

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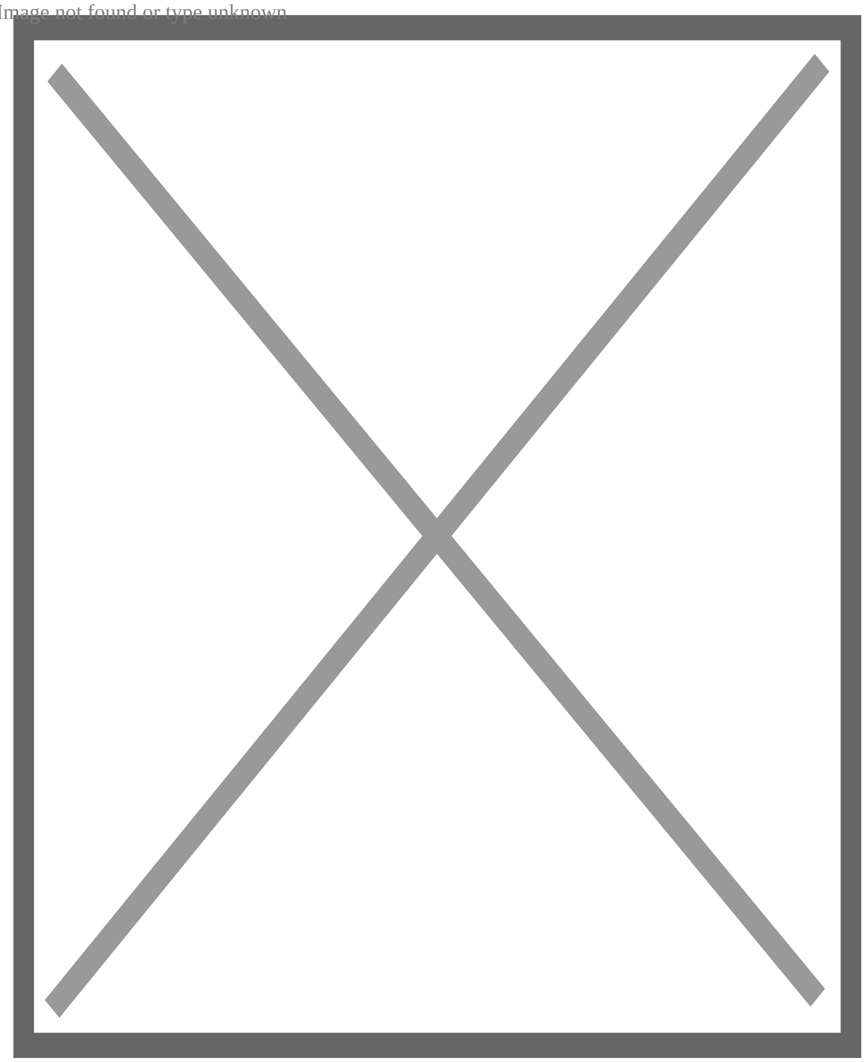

This ancient Roman house uses a variety of passive cooling and passive ventilation techniques. Heavy masonry walls, small exterior windows, and a narrow walled garden oriented N-S shade the house, preventing heat gain. The house opens onto a central atrium with an impluvium (open to the sky); the evaporative cooling of the water causes a cross-draft from atrium to garden.

Primitive ventilation systems were found at the PloÃƒÆ’Ã†â€™ÃƒÂ¢Ã¢â€šÂ¬Ã…Â¾ÃƒÆ’Ã¢â‚¬Å¡Ãƒâ€šÃ‚Â•nik archeological site (belonging to the VinÃƒÆ’Ã†â€™ÃƒÂ¢Ã¢â€šÂ¬Ã…Â¾ÃƒÆ’Ã¢â‚¬Å¡Ãƒâ€šÃ‚Â•a culture) in Serbia and were built into early copper smelting furnaces. The furnace, built on the outside of the workshop, featured earthen pipe-like air vents with hundreds of tiny holes in them and a prototype chimney to ensure air goes into the furnace to feed the fire and smoke comes out safely.[39]

Passive ventilation and passive cooling systems were widely written about around the Mediterranean by Classical times. Both sources of heat and sources of cooling (such as fountains and subterranean heat reservoirs) were used to drive air circulation, and buildings were designed to encourage or exclude drafts, according to climate and function. Public bathhouses were often particularly sophisticated in their heating and cooling. Icehouses are some millennia old, and were part of a well-developed ice industry by classical times.

The development of forced ventilation was spurred by the common belief in the late 18th and early 19th century in the miasma theory of disease, where stagnant 'airs' were thought to spread illness. An early method of ventilation was the use of a ventilating fire near an air vent which would forcibly cause the air in the building to circulate. English engineer John Theophilus Desaguliers provided an early example of this when he installed ventilating fires in the air tubes on the roof of the House of Commons. Starting with the Covent Garden Theatre, gas burning chandeliers on the ceiling were often specially designed to perform a ventilating role.

Mechanical systems

[edit]
Further information: Heating, ventilation, and air conditioning § Mechanical or forced ventilation

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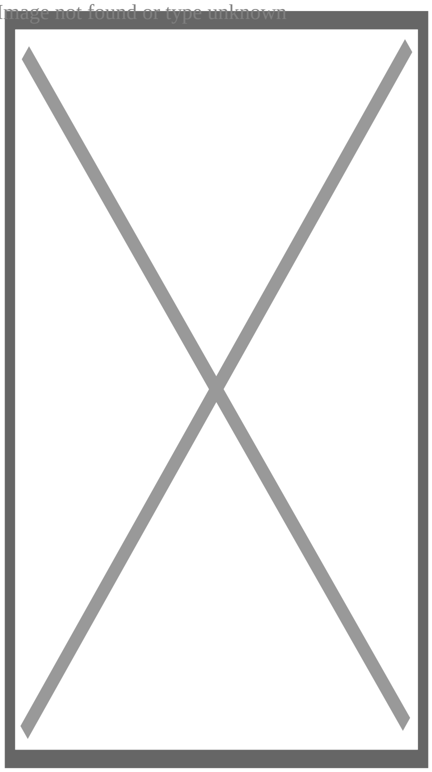

The Central Tower of the Palace of Westminster. This octagonal spire was for ventilation purposes, in the more complex system imposed by Reid on Barry, in which it was to draw air out of the Palace. The design was for the aesthetic disguise of its function.[40][41]

A more sophisticated system involving the use of mechanical equipment to circulate the air was developed in the mid-19th century. A basic system of bellows was put in place to ventilate Newgate Prison and outlying buildings, by the engineer Stephen Hales in the mid-1700s. The problem with these early devices was that they required constant human labor to operate. David Boswell Reid was called to testify before a Parliamentary committee on proposed architectural designs for the new House of Commons, after the old one burned down in a fire in 1834.[40] In January 1840 Reid was appointed by the committee for the House of Lords dealing with the construction of the replacement for the Houses of Parliament. The post was in the capacity of ventilation engineer, in effect; and with its creation there began a long series of quarrels between Reid and Charles Barry, the architect.[42]

Reid advocated the installation of a very advanced ventilation system in the new House. His design had air being drawn into an underground chamber, where it would undergo either heating or cooling. It would then ascend into the chamber through thousands of small holes drilled into the floor, and would be extracted through the ceiling by a special ventilation fire within a great stack.[43]

Reid's reputation was made by his work in Westminster. He was commissioned for an air quality survey in 1837 by the Leeds and Selby Railway in their tunnel.[44] The steam vessels built for the Niger expedition of 1841 were fitted with ventilation systems based on Reid's Westminster model.[45] Air was dried, filtered and passed over charcoal.[46][47] Reid's ventilation method was also applied more fully to St. George's Hall, Liverpool, where the architect, Harvey Lonsdale Elmes, requested that Reid should be involved in ventilation design.[48] Reid considered this the only building in which his system was completely carried out.[49]

Fans

[edit]

With the advent of practical steam power, ceiling fans could finally be used for ventilation. Reid installed four steam-powered fans in the ceiling of St George's Hospital in Liverpool, so that the pressure produced by the fans would force the incoming air upward and through vents in the ceiling. Reid's pioneering work provides the basis for ventilation systems to this day.[43] He was remembered as "Dr. Reid the ventilator" in the twenty-first century in discussions of energy efficiency, by Lord Wade of Chorlton.[50]

History and development of ventilation rate standards

[edit]

Ventilating a space with fresh air aims to avoid "bad air". The study of what constitutes bad air dates back to the 1600s when the scientist Mayow studied asphyxia of animals in confined bottles.[51] The poisonous component of air was later identified as carbon dioxide (CO_2), by Lavoisier in the very late 1700s, starting a debate as to the nature of "bad air" which humans perceive to be stuffy or unpleasant. Early hypotheses included excess concentrations of CO_2 and oxygen depletion. However, by the late 1800s, scientists thought biological contamination, not oxygen or CO_2, was the primary component of unacceptable indoor air. However, it was noted as early as 1872 that CO_2 concentration closely correlates to perceived air quality.

The first estimate of minimum ventilation rates was developed by Tredgold in 1836.[52] This was followed by subsequent studies on the topic by Billings [53] in 1886 and Flugge in 1905. The recommendations of Billings and Flugge were incorporated into numerous building codes from 1900–the 1920s and published as an industry standard by ASHVE (the predecessor to ASHRAE) in 1914.[51]

The study continued into the varied effects of thermal comfort, oxygen, carbon dioxide, and biological contaminants. The research was conducted with human subjects in controlled test chambers. Two studies, published between 1909 and 1911, showed that carbon dioxide was not the offending component. Subjects remained satisfied in chambers with high levels of CO_2, so long as the chamber remained cool.[51] (Subsequently, it has been determined that CO_2 is, in fact, harmful at concentrations over 50,000ppm[54])

ASHVE began a robust research effort in 1919. By 1935, ASHVE-funded research conducted by Lemberg, Brandt, and Morse – again using human subjects in test chambers – suggested the primary component of "bad air" was an odor, perceived by the human olfactory nerves.[55] Human response to odor was found to be logarithmic to contaminant concentrations, and related to temperature. At lower, more comfortable temperatures, lower ventilation rates were satisfactory. A 1936 human test chamber study by Yaglou, Riley, and Coggins culminated much of this effort, considering odor, room volume, occupant age, cooling equipment effects, and recirculated air implications, which guided ventilation rates.[56] The Yaglou research has been validated, and adopted into industry standards, beginning with the ASA code in 1946. From this research base, ASHRAE (having replaced ASHVE) developed space-by-space recommendations, and published them as ASHRAE Standard 62-1975: Ventilation for acceptable indoor air quality.

As more architecture incorporated mechanical ventilation, the cost of outdoor air ventilation came under some scrutiny. In 1973, in response to the 1973 oil crisis and conservation concerns, ASHRAE Standards 62-73 and 62–81) reduced required ventilation from 10 CFM (4.76 L/s) per person to 5 CFM (2.37 L/s) per person. In cold, warm, humid, or dusty climates, it is preferable to minimize ventilation with outdoor air to conserve energy, cost, or filtration. This critique (e.g. Tiller[57]) led ASHRAE to reduce outdoor ventilation rates in 1981, particularly in non-smoking areas. However subsequent research by Fanger,[58] W. Cain, and Janssen validated the Yaglou model. The reduced ventilation rates were found to be a contributing factor to sick building syndrome.[59]

The 1989 ASHRAE standard (Standard 62–89) states that appropriate ventilation guidelines are 20 CFM (9.2 L/s) per person in an office building, and 15 CFM (7.1 L/s) per person for schools, while 2004 Standard 62.1-2004 has lower recommendations again (see tables below). ANSI/ASHRAE (Standard 62–89) speculated that "comfort (odor) criteria are likely to be satisfied if the ventilation rate is set so that 1,000 ppm CO_2 is not exceeded"[60] while OSHA has set a limit of 5000 ppm over 8 hours.[61]

Historical ventilation rates

Author or source	Year	Ventilation rate (IP)	Ventilation rate (SI)	Basis or rationale
Tredgold	1836	4 CFM per person	2 L/s per person	Basic metabolic needs, breathing rate, and candle burning
Billings	1895	30 CFM per person	15 L/s per person	Indoor air hygiene, preventing spread of disease
Flugge	1905	30 CFM per person	15 L/s per person	Excessive temperature or unpleasant odor
ASHVE	1914	30 CFM per person	15 L/s per person	Based on Billings, Flugge and contemporaries
Early US Codes	1925	30 CFM per person	15 L/s per person	Same as above
Yaglou	1936	15 CFM per person	7.5 L/s per person	Odor control, outdoor air as a fraction of total air
ASA	1946	15 CFM per person	7.5 L/s per person	Based on Yahlou and contemporaries
ASHRAE	1975	15 CFM per person	7.5 L/s per person	Same as above
ASHRAE	1981	10 CFM per person	5 L/s per person	For non-smoking areas, reduced.
ASHRAE	1989	15 CFM per person	7.5 L/s per person	Based on Fanger, W. Cain, and Janssen

ASHRAE continues to publish space-by-space ventilation rate recommendations, which are decided by a consensus committee of industry experts. The modern descendants of ASHRAE standard 62-1975 are ASHRAE Standard 62.1, for non-residential spaces, and ASHRAE 62.2 for residences.

In 2004, the calculation method was revised to include both an occupant-based contamination component and an area–based contamination component.[62] These two components are additive, to arrive at an overall ventilation rate. The change was made to recognize that densely populated areas were sometimes overventilated (leading to higher energy and cost) using a per-person methodology.

Occupant Based Ventilation Rates,[62] ANSI/ASHRAE Standard 62.1-2004

IP Units	SI Units	Category	Examples
0 cfm/person	0 L/s/person	Spaces where ventilation requirements are primarily associated with building elements, not occupants.	Storage Rooms, Warehouses
5 cfm/person	2.5 L/s/person	Spaces occupied by adults, engaged in low levels of activity	Office space
7.5 cfm/person	3.5 L/s/person	Spaces where occupants are engaged in higher levels of activity, but not strenuous, or activities generating more contaminants	Retail spaces, lobbies
10 cfm/person	5 L/s/person	Spaces where occupants are engaged in more strenuous activity, but not exercise, or activities generating more contaminants	Classrooms, school settings
20 cfm/person	10 L/s/person	Spaces where occupants are engaged in exercise, or activities generating many contaminants	dance floors, exercise rooms

Area-based ventilation rates,[62] ANSI/ASHRAE Standard 62.1-2004

IP Units	SI Units	Category	Examples
0.06 cfm/ft^2	0.30 L/s/m^2	Spaces where space contamination is normal, or similar to an office environment	Conference rooms, lobbies
0.12 cfm/ft^2	0.60 L/s/m^2	Spaces where space contamination is significantly higher than an office environment	Classrooms, museums
0.18 cfm/ft^2	0.90 L/s/m^2	Spaces where space contamination is even higher than the previous category	Laboratories, art classrooms
0.30 cfm/ft^2	1.5 L/s/m^2	Specific spaces in sports or entertainment where contaminants are released	Sports, entertainment
0.48 cfm/ft^2	2.4 L/s/m^2	Reserved for indoor swimming areas, where chemical concentrations are high	Indoor swimming areas

The addition of occupant- and area-based ventilation rates found in the tables above often results in significantly reduced rates compared to the former standard. This is compensated in other sections of the standard which require that this minimum amount

of air is delivered to the breathing zone of the individual occupant at all times. The total outdoor air intake of the ventilation system (in multiple-zone variable air volume (VAV) systems) might therefore be similar to the airflow required by the 1989 standard.
From 1999 to 2010, there was considerable development of the application protocol for ventilation rates. These advancements address occupant- and process-based ventilation rates, room ventilation effectiveness, and system ventilation effectiveness[63]

Problems

[edit]

- In hot, humid climates, unconditioned ventilation air can daily deliver approximately 260 milliliters of water for each cubic meters per hour (m^3/h) of outdoor air (or one pound of water each day for each cubic feet per minute of outdoor air per day), annual average.[*citation needed*] This is a great deal of moisture and can create serious indoor moisture and mold problems. For example, given a 150 m^2 building with an airflow of 180 m^3/h this could result in about 47 liters of water accumulated per day.
- Ventilation efficiency is determined by design and layout, and is dependent upon the placement and proximity of diffusers and return air outlets. If they are located closely together, supply air may mix with stale air, decreasing the efficiency of the HVAC system, and creating air quality problems.
- System imbalances occur when components of the HVAC system are improperly adjusted or installed and can create pressure differences (too much-circulating air creating a draft or too little circulating air creating stagnancy).
- Cross-contamination occurs when pressure differences arise, forcing potentially contaminated air from one zone to an uncontaminated zone. This often involves undesired odors or VOCs.
- Re-entry of exhaust air occurs when exhaust outlets and fresh air intakes are either too close, prevailing winds change exhaust patterns or infiltration between intake and exhaust air flows.
- Entrainment of contaminated outdoor air through intake flows will result in indoor air contamination. There are a variety of contaminated air sources, ranging from industrial effluent to VOCs put off by nearby construction work.[64] A recent study revealed that in urban European buildings equipped with ventilation systems lacking outdoor air filtration, the exposure to outdoor-originating pollutants indoors resulted in more Disability-Adjusted Life Years (DALYs) than exposure to indoor-emitted pollutants.[65]

See also

[edit]

- Architectural engineering
- Biological safety
- Cleanroom

- Environmental tobacco smoke
- Fume hood
- Head-end power
- Heating, ventilation, and air conditioning
- Heat recovery ventilation
- Mechanical engineering
- Room air distribution
- Sick building syndrome
- Siheyuan
- Solar chimney
- Tulou
- Windcatcher

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Air Infiltration & Ventilation Centre (AIVC)

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International Energy Agency (IEA) Energy in Buildings and Communities Programme (EBC)

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- Publications from the International Energy Agency (IEA) Energy in Buildings and Communities Programme (EBC) ventilation-related research projects-annexes:
  - EBC Annex 9 Minimum Ventilation Rates
  - EBC Annex 18 Demand Controlled Ventilation Systems
  - EBC Annex 26 Energy Efficient Ventilation of Large Enclosures
  - EBC Annex 27 Evaluation and Demonstration of Domestic Ventilation Systems
  - EBC Annex 35 Control Strategies for Hybrid Ventilation in New and Retrofitted Office Buildings (HYBVENT)
  - EBC Annex 62 Ventilative Cooling

International Society of Indoor Air Quality and Climate

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- Indoor Air Journal
- Indoor Air Conference Proceedings

American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE)

[edit]

- ASHRAE Standard 62.1 – Ventilation for Acceptable Indoor Air Quality
- ASHRAE Standard 62.2 – Ventilation for Acceptable Indoor Air Quality in Residential Buildings

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Heating, ventilation, and air conditioning

Fundamental concepts

- Air changes per hour
- Bake-out
- Building envelope
- Convection
- Dilution
- Domestic energy consumption
- Enthalpy
- Fluid dynamics
- Gas compressor
- Heat pump and refrigeration cycle
- Heat transfer
- Humidity
- Infiltration
- Latent heat
- Noise control
- Outgassing
- Particulates
- Psychrometrics
- Sensible heat
- Stack effect
- Thermal comfort
- Thermal destratification
- Thermal mass
- Thermodynamics
- Vapour pressure of water

Technology

- Absorption-compression heat pump
- Absorption refrigerator
- Air barrier
- Air conditioning
- Antifreeze
- Automobile air conditioning
- Autonomous building
- Building insulation materials
- Central heating
- Central solar heating
- Chilled beam
- Chilled water
- Constant air volume (CAV)
- Coolant
- Cross ventilation
- Dedicated outdoor air system (DOAS)
- Deep water source cooling
- Demand controlled ventilation (DCV)
- Displacement ventilation
- District cooling
- District heating
- Electric heating
- Energy recovery ventilation (ERV)
- Firestop
- Forced-air
- Forced-air gas
- Free cooling
- Heat recovery ventilation (HRV)
- Hybrid heat
- Hydronics
- Ice storage air conditioning
- Kitchen ventilation
- Mixed-mode ventilation
- Microgeneration
- Passive cooling
- Passive daytime radiative cooling
- Passive house
- Passive ventilation
- Radiant heating and cooling
- Radiant cooling
- Radiant heating
- Radon mitigation
- Refrigeration
- Renewable heat
- Room air distribution
- Solar air heat
- Solar combisystem
- Solar cooling
- Solar heating

- Air conditioner inverter
- Air door
- Air filter
- Air handler
- Air ionizer
- Air-mixing plenum
- Air purifier
- Air source heat pump
- Attic fan
- Automatic balancing valve
- Back boiler
- Barrier pipe
- Blast damper
- Boiler
- Centrifugal fan
- Ceramic heater
- Chiller
- Condensate pump
- Condenser
- Condensing boiler
- Convection heater
- Compressor
- Cooling tower
- Damper
- Dehumidifier
- Duct
- Economizer
- Electrostatic precipitator
- Evaporative cooler
- Evaporator
- Exhaust hood
- Expansion tank
- Fan
- Fan coil unit
- Fan filter unit
- Fan heater
- Fire damper
- Fireplace
- Fireplace insert
- Freeze stat
- Flue
- Freon
- Fume hood
- Furnace
- Gas compressor
- Gas heater
- Gasoline heater
- Grease duct

Components

- Grille

Measurement and control	○ Air flow meter ○ Aquastat ○ BACnet ○ Blower door ○ Building automation ○ Carbon dioxide sensor ○ Clean air delivery rate (CADR) ○ Control valve ○ Gas detector ○ Home energy monitor ○ Humidistat ○ HVAC control system ○ Infrared thermometer ○ Intelligent buildings ○ LonWorks ○ Minimum efficiency reporting value (MERV) ○ Normal temperature and pressure (NTP) ○ OpenTherm ○ Programmable communicating thermostat ○ Programmable thermostat ○ Psychrometrics ○ Room temperature ○ Smart thermostat ○ Standard temperature and pressure (STP) ○ Thermographic camera ○ Thermostat ○ Thermostatic radiator valve
Professions, trades, and services	○ Architectural acoustics ○ Architectural engineering ○ Architectural technologist ○ Building services engineering ○ Building information modeling (BIM) ○ Deep energy retrofit ○ Duct cleaning ○ Duct leakage testing ○ Environmental engineering ○ Hydronic balancing ○ Kitchen exhaust cleaning ○ Mechanical engineering ○ Mechanical, electrical, and plumbing ○ Mold growth, assessment, and remediation ○ Refrigerant reclamation ○ Testing, adjusting, balancing

Industry organizations

- AHRI
- AMCA
- ASHRAE
- ASTM International
- BRE
- BSRIA
- CIBSE
- Institute of Refrigeration
- IIR
- LEED
- SMACNA
- UMC

Health and safety

- Indoor air quality (IAQ)
- Passive smoking
- Sick building syndrome (SBS)
- Volatile organic compound (VOC)

See also

- ASHRAE Handbook
- Building science
- Fireproofing
- Glossary of HVAC terms
- Warm Spaces
- World Refrigeration Day
- Template:Home automation
- Template:Solar energy

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Denver Zoo

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Plains Conservation Center (Visitor Center)

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Aurora History Museum

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Colorado Freedom Memorial

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Cherry Creek State Park

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Denver Museum of Nature & Science

4.7 (16001)

Driving Directions in Arapahoe County

Driving Directions From Walmart Supercenter to Royal Supply South

Driving Directions From Costco Wholesale to Royal Supply South

Driving Directions From Littleton to Royal Supply South

Driving Directions From The Home Depot to Royal Supply South

Driving Directions From Denver to Royal Supply South

Driving Directions From Tandy Leather South Denver - 151 to Royal Supply South

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Driving Directions From Cherry Creek State Park to Royal Supply South

Driving Directions From Denver Zoo to Royal Supply South

Driving Directions From Denver Museum of Nature & Science to Royal Supply South

Driving Directions From Meow Wolf Denver | Convergence Station to Royal Supply South

Driving Directions From Cherry Creek State Park to Royal Supply South

Driving Directions From Plains Conservation Center (Visitor Center) to Royal Supply South

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Reviews for Royal Supply South

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Frequently Asked Questions

How can I ensure my mobile homes HVAC system effectively manages humidity levels?

To manage humidity, use a properly sized dehumidifier or invest in an HVAC system with built-in humidity control. Regular maintenance, such as cleaning filters and ensuring proper ventilation, also helps maintain optimal moisture levels.

What signs indicate that my mobile home might be experiencing excess moisture due to the HVAC system?

Common signs of excess moisture include condensation on windows, musty odors, visible mold growth, and damp spots on walls or ceilings. If you notice any of these issues, it may be necessary to adjust your HVAC settings or seek professional assistance.

Are there specific features I should look for when selecting an HVAC system for a humid climate?

When choosing an HVAC system for a humid climate, consider models with variable speed air handlers, enhanced dehumidification controls, and programmable thermostats. These features help maintain consistent indoor humidity levels by adjusting airflow and temperature more precisely.

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