HVAC cost

- **Estimating Labor Expenses for Repair Services**
  Estimating Labor Expenses for Repair Services Comparing Replacement Part Prices for Various Systems Reviewing Maintenance Plan Rates in Detail Exploring Payment Arrangements for Major Overhauls Analyzing Long Term Savings with Efficient Upgrades Investigating Seasonal Discounts from Service Providers Understanding Monthly Budgeting for HVAC Projects Balancing Initial Spending with Potential Savings Evaluating Total Costs for System Retrofits Preparing for Unexpected Repair Fees Weighing Return on Investment for Modern Equipment Identifying Hidden Expenses in Older Units
- **Understanding Local Building Code Requirements**
  Understanding Local Building Code Requirements Reviewing State Regulations for HVAC Installation Exploring County Permit Applications for Mobile Homes Navigating EPA 608 Certification Steps Recognizing UL Rated Components for Safety Determining Required Inspections for New Units Preparing Official Documents for System Upgrades Knowing When to Seek Professional Licensing Support Identifying Legal Mandates for Refrigerant Disposal Sorting Out Utility Guidelines for Meter Upgrades Meeting Deadlines for Permit Renewals Locating Reliable Compliance Resources for Homeowners
- **About Us**

Navigating the world of mobile home HVAC systems can seem daunting, especially when considering the intricacies involved in obtaining an EPA 608 certification. Understanding the key components and common challenges associated with these systems is crucial for anyone aiming to master this field.

Emergency repairs are often required during extreme weather conditions **mobile home hvac replacement cost** water purification.

Mobile home HVAC systems are designed uniquely to cater to the specific needs of mobile homes, which often have different thermal dynamics compared to traditional houses. The key components of these systems typically include the furnace or heat pump, air conditioning unit, ductwork, and ventilation system. Each component plays a vital role in maintaining a comfortable indoor environment. The furnace or heat pump provides heating during cold months, while the air conditioning unit ensures cooling in warmer seasons. Ductwork is essential for distributing conditioned air throughout the home efficiently.

One of the primary challenges faced by technicians working on mobile home HVAC systems is space constraints. Mobile homes generally have limited space for ductwork and equipment installation, which requires creative solutions and precise work to ensure optimal performance without compromising on energy efficiency or safety standards. Additionally, mobile homes are often relocated, which means their HVAC systems must be robust enough to withstand transportation stresses.

Another challenge is dealing with older units that may not meet current energy efficiency standards or regulatory requirements. Retrofitting such units to improve efficiency or replace outdated components can be complex and costly but necessary for compliance and environmental considerations.

This is where EPA 608 certification comes into play. As per U.S. regulations, any technician who handles refrigerants must be certified under Section 608 of the Clean Air Act. This certification ensures that technicians are knowledgeable about safe handling practices for refrigerants that deplete ozone layers if released improperly into the atmosphere.

The path to obtaining an EPA 608 certification involves understanding various types of certifications available: Type I (for small appliances), Type II (for high-pressure appliances), Type III (for low-pressure appliances), and Universal Certification (covering all types). Candidates must pass a test covering topics like ozone depletion theory, regulations related to refrigerant management, recovery techniques, safety standards, and proper disposal methods.

Preparing for this test requires thorough study and understanding of both theoretical concepts and practical applications in real-world scenarios involving HVAC systems. Many resources are available online or through training programs offered by community colleges or technical schools that focus specifically on preparing candidates for this examination.

In conclusion, mastering mobile home HVAC systems involves comprehending their unique challenges alongside acquiring essential certifications like EPA 608. By focusing on these areas from understanding system components to meeting regulatory requirements technicians can effectively navigate this specialized field while contributing positively towards environmental sustainability through responsible refrigerant management practices.

Factors Influencing Labor Costs in Mobile Home HVAC Repairs —

Navigating the path to EPA 608 certification is a crucial step for individuals seeking to work with refrigerants and air conditioning systems in the United States. The Environmental Protection Agency (EPA) established this certification under Section 608 of the Clean Air Act, aiming to reduce ozone depletion by regulating the handling and disposal of refrigerants. Understanding who can apply for this certification is essential for anyone aspiring to enter this field.

First and foremost, eligibility for EPA 608 certification does not demand formal education prerequisites such as a degree or specific coursework. This accessibility allows a broad spectrum of applicants, from seasoned technicians seeking to formalize their skills to newcomers eager to establish themselves in the HVAC industry. However, it's important that applicants possess a fundamental understanding of refrigeration principles and safety protocols, as these are central components of the certification exams.

The application process begins with selecting the appropriate type of certification needed based on your professional goals. There are four types: Type I covers small appliances; Type II is for high-pressure appliances; Type III pertains to low-pressure appliances; and Universal Certification encompasses all three categories. Each type requires passing a specific exam that tests knowledge pertinent to its category. Thus, determining which type aligns with your career aspirations is vital before applying.

Moreover, while there are no legal age restrictions imposed by the EPA itself, individual test providers may have their own requirements regarding minimum age or identification documentation. Therefore, prospective applicants should verify these details with their chosen testing center prior to scheduling an exam.

Preparing for the exam involves diligent study and comprehension of various topics including environmental impact regulations, leak detection methods, recovery techniques, and safe handling practices for different refrigerant types. Numerous resources-ranging from online courses and practice exams to workshops hosted by industry professionals-are available to assist candidates in mastering these subjects.

Once you feel adequately prepared, registering through an approved testing organization is the next step. These organizations administer proctored exams either online or at designated locations nationwide. Successfully passing any level's exam certifies your ability to responsibly manage refrigerants according to federal standards-a credential highly regarded by employers within HVAC industries.

In conclusion, EPA 608 certification serves as both a regulatory requirement and a testament to one's competence in managing substances critical to environmental protection efforts. While open broadly in terms of educational background requirements, success hinges on comprehensive preparation tailored towards understanding complex technical content related directly to real-world applications within HVAC spheres. For those committed enough-to not only meet but exceed regulatory expectations-the journey toward achieving this certification offers both professional credibility and personal fulfillment derived from contributing positively towards sustainable environmental practices.

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Steps to Accurately Estimate Labor Expenses for HVAC Repair Services

Preparing for the EPA 608 Exam: Study Tips and Resources Specific to Mobile Home HVAC Systems

Navigating the steps toward obtaining your EPA 608 Certification can seem daunting, especially if you're focusing on mobile home HVAC systems. This certification is crucial for anyone who wants to work with refrigerants in the United States, as it ensures that technicians are knowledgeable about handling these substances safely and responsibly. Here's a guide to help streamline your preparation process, tailor your study efforts towards mobile home HVAC systems, and ultimately succeed in passing the exam.

Understanding the Importance of EPA 608 Certification

The EPA 608 Certification is divided into three main types - Type I, Type II, and Type III - along with a Universal certification that covers all three types. Each type corresponds to different equipment categories: Type I for small appliances, Type II for high-pressure appliances (including residential air conditioning), and Type III for low-pressure appliances. For those focusing on mobile home HVAC systems, which typically employ high-pressure refrigerants due to their compact size and efficiency requirements, Type II certification is most relevant.

Key Study Tips

1. Familiarize Yourself with Core Concepts: Before diving into specifics about mobile homes, ensure you have a solid understanding of basic refrigeration principles. This includes knowledge about pressure-temperature relationships, thermodynamics of refrigerant cycles, superheating, subcooling, and system components like compressors and condensers.

2. Focus on Regulations: The exam will test your understanding of EPA regulations regarding ozone-depleting substances. Pay particular attention to rules related to leak detection and repair, recordkeeping requirements for refrigerant handling, and disposal regulations.

3.

Tailor Your Studies to Mobile Home Systems: While much of the content will be applicable across various settings, focus on aspects unique to mobile homes such as space constraints which affect system design and maintenance practices.

4. Use Practice Exams: Taking practice exams is one of the most effective ways to prepare. It helps familiarize yourself with the format of questions you'll encounter and identifies areas where further study might be needed.

5. Develop Efficient Test-Taking Strategies: Time management during exams is crucial. Practice answering questions efficiently without sacrificing accuracy by reading each question carefully but swiftly identifying key information needed.

Resources Specific to Mobile Home HVAC Systems

1. Manufacturer Manuals: Review manuals from manufacturers specific to mobile home HVAC units as they often cover installation considerations unique to these environments.

2. Online Courses or Workshops: Some organizations offer specialized training sessions or webinars focused specifically on mobile home HVAC systems which can provide valuable insights beyond standard preparatory materials.

3. Community Forums or Networks: Engage with online communities or forums where professionals discuss challenges faced in maintaining or repairing mobile home units; real-world experiences can be incredibly informative when studying theoretical concepts.

4. Technical Guides or Textbooks: Look for textbooks that include sections dedicated specifically towards smaller-scale residential systems like those found in mobile homes; they can offer tailored advice on troubleshooting common issues encountered in this niche market segment.

In conclusion, while preparing for the EPA 608 Exam requires dedication and thorough study across several topics pertinent under federal guidelines governing refrigerant use within various sectors - including specific nuances associated uniquely within realm dealing primarily among modular living spaces such as modern manufactured housing solutions - success ultimately hinges upon how well candidates blend foundational knowledge concerning general operational principles alongside deeper comprehension regarding special cases represented therein like optimized spatial efficiency demands necessitated therein throughout every step involved along way towards achieving ultimate goal securing coveted credentials required perform vital services safely competently anytime anywhere industrywide today tomorrow

Tools and Software for Estimating Labor Costs in Mobile Home HVAC Repairs

The process of becoming certified under the EPA 608 Certification is an essential step for technicians working with refrigeration and air conditioning systems in the United States. This certification is mandated by the Environmental Protection Agency (EPA) to ensure that individuals handling refrigerants do so responsibly, minimizing harm to the environment. Navigating the registration process can seem daunting at first glance, but a clear, step-by-step approach can simplify your journey towards achieving this crucial credential.

First and foremost, understanding the different types of EPA 608 certifications is essential. The certification is divided into four types: Type I for servicing small appliances; Type II for servicing high-pressure appliances; Type III for low-pressure appliances; and Universal Certification, which covers all three categories. Determining which certification you need depends on the equipment you plan to work with, so take time to evaluate your career goals and job requirements before proceeding.

Once you've decided on the type of certification you require, the next step involves finding an approved testing organization. The EPA does not administer these exams directly but rather works through various government-approved organizations that offer training and administer tests. Research thoroughly to select a reputable provider that offers both preparation courses and exams either online or in-person, depending on what suits you best.

After selecting a provider, it's advisable to enroll in a preparatory course. These courses are designed to equip candidates with comprehensive knowledge about safe refrigerant handling practices, recovery procedures, leak detection methods, proper disposal techniques, and environmental regulations related to refrigerants. A thorough understanding of these topics is critical not only for passing the exam but also for performing responsibly in your professional role.

With adequate preparation under your belt, you're ready to register for the exam itself. Registration processes vary slightly among providers but generally involve filling out an application form and paying an examination fee. Some providers allow online registration while others may require physical forms or phone calls-be sure to confirm these details well ahead of time.

On exam day, bring any required identification as specified by your testing organization along with confirmation of your registration details. The test format typically includes multiple-choice questions tailored to assess your knowledge across various relevant categories depending on whether you're pursuing Type I, II, III or Universal Certification.

Patience plays a key role after taking your exam as results may take some time due to processing periods involved with certification issuance. Upon passing the exam successfully-and congratulations if you've reached this stage-you'll be granted an EPA 608 Certification card signifying your qualification status within specific categories.

In conclusion, while navigating through EPA 608 Certification steps might initially appear complex given regulatory standards involved plus study commitments required-approaching it methodically makes it manageable plus rewarding professionally afterwards when equipped legally handling refrigerants within industry settings sustainably plus safely following completion overall!

Case Studies: Examples of Labor Cost Estimation in Various Repair Scenarios

The journey to becoming a proficient Mobile Home HVAC Technician involves mastering various skills and knowledge areas, one of which is navigating the EPA 608 Certification steps. This certification is crucial as it ensures technicians are qualified to handle refrigerants safely and responsibly, a key aspect of their profession. Understanding the exam format and structure can significantly enhance a candidate's confidence and performance on test day.

The EPA 608 Certification exam is structured into four distinct sections: Core, Type I, Type II, and Type III. Each section targets specific competencies that are vital for different aspects of HVAC work. The Core section lays the foundation by testing basic knowledge of ozone depletion, refrigerant properties, recovery techniques, safety protocols, regulations, and more. This part is mandatory for all certification levels.

Type I certification focuses on small appliances that contain five pounds or less of refrigerant. It emphasizes understanding proper handling procedures for small-scale equipment typically found in mobile homes. Type II certification covers high-pressure systems commonly used in commercial settings but also relevant to larger mobile home installations that require robust cooling solutions.

Type III certification pertains to low-pressure systems often employed in chillers found in large residential complexes or industrial environments. While not directly applicable to mobile homes, having this certification can expand a technician's versatility and open doors to broader career opportunities.

On test day, candidates can expect a multiple-choice format with questions designed to assess both theoretical knowledge and practical skills relevant to each section's focus area. It's essential for candidates to manage their time efficiently across these sections while ensuring they comprehend each question thoroughly before responding.

To prepare effectively for the EPA 608 Certification exam, aspiring technicians should engage in comprehensive study sessions using available resources such as textbooks, online courses, practice exams, and workshops offered by training centers or employers. Familiarity with real-world scenarios through hands-on experience can also greatly aid in understanding how theoretical concepts apply practically.

Understanding the structure of the EPA 608 Certification exam helps alleviate some test-day anxiety by providing clarity on what will be assessed. It empowers candidates to tailor their preparation strategies accordingly-focusing on weak areas while reinforcing strengths-and approach the exam with confidence.

In conclusion, mastering the steps required for EPA 608 Certification is an integral part of becoming a competent Mobile Home HVAC Technician. By knowing what to expect regarding the exam format and structure, candidates can streamline their study efforts effectively and maximize their chances of success on test day. With this certification under their belt, technicians demonstrate adherence to industry standards concerning environmental safety-a commitment crucial not only for career advancement but also for contributing positively towards sustainable practices within the field.

Tips for Managing and Reducing Labor Expenses Without Compromising Quality

Embarking on the journey of obtaining EPA 608 certification is a significant milestone for professionals in the HVACR industry. This credential not only validates one's expertise in handling refrigerants but also underscores a commitment to environmental responsibility and compliance with legal standards. However, achieving certification is just the beginning; maintaining it and staying abreast of industry changes are equally critical steps that ensure continued professional competence and adherence to evolving regulations.

Once certified, technicians must focus on maintaining their certification status. The EPA 608 certification does not expire, which provides professionals with a stable foundation for their careers. Nonetheless, this permanence should not be mistaken for complacency. It is paramount that certified individuals continuously hone their skills and knowledge base to remain effective in their roles.

Regularly reviewing core concepts and practices learned during the certification process can help maintain proficiency. Engaging in ongoing education such as workshops, seminars, or online courses can be invaluable. These educational opportunities not only refresh existing knowledge but also introduce new technologies and methodologies emerging within the HVACR field.

Staying updated on industry changes is another crucial aspect of post-certification life. The HVACR landscape is dynamic, with technological advancements and regulatory shifts occurring frequently. For instance, changes in refrigerant types due to environmental regulations necessitate that technicians stay informed about new products and techniques for safe handling and disposal.

Subscribing to industry publications or joining professional associations can provide access to cutting-edge information and trends. Networking with peers through these organizations also offers insights into practical applications of new technologies or regulatory updates that may affect day-to-day operations.

Moreover, participating in manufacturer training sessions can keep technicians up-to-date with specific equipment innovations or modifications-knowledge that is essential as companies strive to improve energy efficiency and reduce environmental impact.

In summary, while obtaining EPA 608 certification marks an important achievement, it represents merely a single step in an ongoing professional journey. Maintaining this credential requires dedication to continuous learning and adaptability amidst change. By actively seeking educational opportunities and keeping abreast of industry developments, certified professionals can ensure they remain competent, compliant, and competitive within the ever-evolving realm of HVACR services.

Navigating the EPA 608 Certification Steps: A Guide for Mobile Home HVAC Technicians

In the realm of mobile home HVAC maintenance and repair, possessing an EPA 608 certification is not just beneficial-it's essential. This certification, mandated by the Environmental Protection Agency (EPA), ensures that technicians are adequately trained to handle refrigerants in a manner that is safe for both people and the environment. As we delve into the practical application of this certification in mobile home settings, it becomes crucial to understand the steps involved in obtaining and utilizing this credential effectively.

The journey toward EPA 608 certification begins with a comprehensive understanding of its purpose. The EPA established this program under the Clean Air Act to reduce ozone-depleting emissions from refrigerants used in air conditioning and refrigeration systems. For technicians working on mobile home HVAC units, which often involve older systems more prone to leaks, having this certification signifies a commitment to environmental responsibility and safety.

The first step in navigating the certification process involves deciding which type of certification best fits your needs. There are four types: Type I for small appliances, Type II for high-pressure appliances, Type III for low-pressure appliances, and Universal Certification, which covers all three categories. Given that mobile homes often use various types of HVAC systems, obtaining Universal Certification might be most advantageous for comprehensive service capabilities.

Preparation is key when approaching the EPA 608 examination. Aspiring technicians should immerse themselves in study materials covering core topics such as ozone depletion, regulations surrounding refrigerants, safe handling practices, leak detection methods, and recovery techniques. Many resources are available online or through vocational training programs that offer practice exams and detailed guides tailored to each certification type.

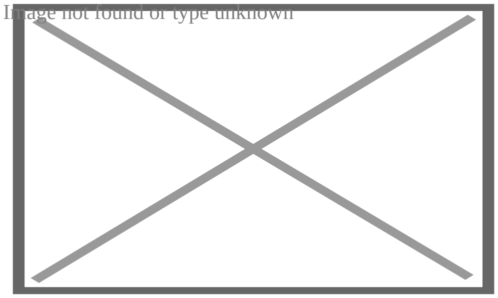
Once adequately prepared, scheduling and taking the exam is the next critical step. The test can be taken either online or at approved testing centers nationwide. It comprises multiple-choice questions divided into sections corresponding to different appliance types; passing requires both a solid grasp of theoretical knowledge and practical application skills.

After successfully passing the exam and receiving certification, technicians must focus on applying their knowledge in real-world scenarios typical of mobile home environments. This includes routinely inspecting HVAC units for leaks using advanced detection tools -a fundamental responsibility outlined by EPA regulations-and ensuring proper recovery of refrigerants during repair or disposal processes.

Moreover, staying informed about regulatory updates is vital as environmental policies evolve continuously. Certified technicians should engage in ongoing education opportunities to stay abreast of changes that may affect their work scope or introduce new compliance requirements.

In conclusion, navigating the EPA 608 certification steps demands dedication but rewards technicians with enhanced expertise crucial for maintaining efficient and environmentally-friendly HVAC operations within mobile homes. By embracing this structured approach-from selecting appropriate certifications through rigorous preparation to applying learned principles-technicians not only advance their professional competencies but also contribute significantly toward safeguarding our planet's atmosphere against harmful emissions.

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

[edit]

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
  horizontally
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  Diffused flow vortices from air nozzles

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  vortices from air
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  Diffused flow vortices due to roof vortices

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  Diffused flow
  vortices due to roof
  vortices

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

[edit]

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

[edit]

Ventilation rate procedure

[edit]

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

[edit]

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]

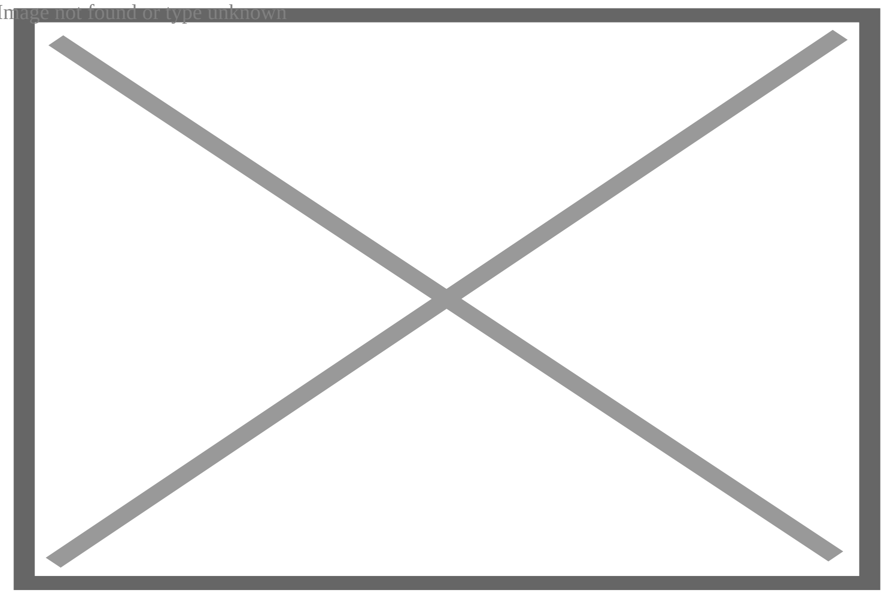
Natural ventilation is not practical in much of the infrastructure because of climate. This means that the facilities need to have effective mechanical ventilation systems and or use Ceiling Level UV or FAR UV ventilation systems.

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

[edit]
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)

[edit]

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

[edit]

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

[edit]

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 × VA × 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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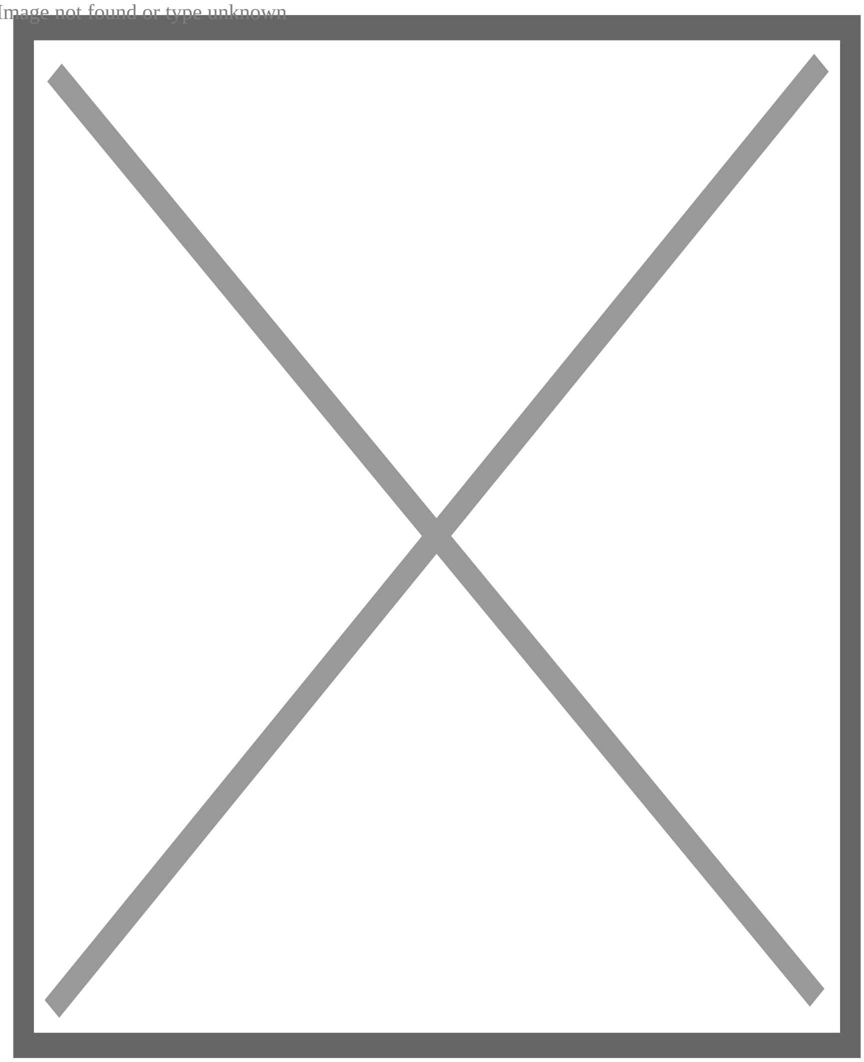


This ancient Roman house uses a variety of passive cooling and passive ventilation techniques. Heavy masonry walls, small exterior windows, and a narrow walled garden oriented N-S shade the house, preventing heat gain. The house opens onto a central atrium with an impluvium (open to the sky); the evaporative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

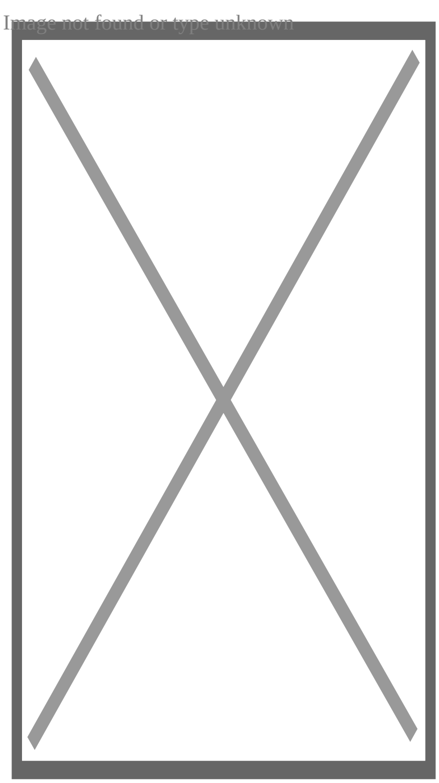
Primitive ventilation systems were found at the PloÃƒâ€žÃ‚Â•nik archeological site (belonging to the VinÃƒâ€žÃ‚Â•a culture) in Serbia and were built into early copper smelting furnaces. The furnace, built on the outside of the workshop, featured earthen pipe-like air vents with hundreds of tiny holes 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



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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External links

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Ventilation (architecture) at Wikipedia's sister projects

- Image not found or type unknown Definitions from Wiktionary
- Image not found or type unknown Media from Commons
- Image not found or type unknown News from Wikinews
- Image not found or type unknown Quotations from Wikiquote
- Image not found or type unknown Texts from Wikisource
- Image not found or type unknown Textbooks from Wikibooks
- Image not found or type unknown Resources from Wikiversity

Air Infiltration & Ventilation Centre (AIVC)

[edit]

- Publications from the Air Infiltration & Ventilation Centre (AIVC)

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

[edit]

- 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

[edit]

- 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
- Thermal insulation

- 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
- Ground-coupled heat exchanger

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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National

- Czech Republic

Other

- NARA

About Fenton, Missouri

Fenton, Missouri

City

Main Street in Fenton (February 2018)

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Main Street in Fenton (February 2018)

Location within St. Louis County, Missouri

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Location within St. Louis County, Missouri

Map

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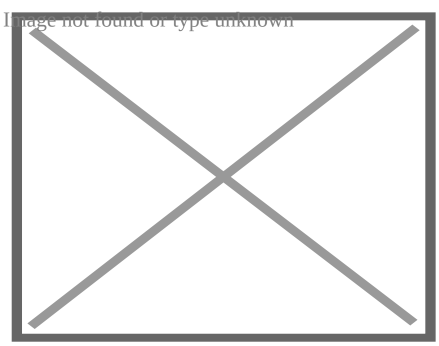
Interactive map outlining Fenton

Coordinates: 38°31?39?N 90°26?55?WÃƒÂ¯Ã‚Â»Ã‚Â¿ / ÃƒÂ¯Ã‚Â»Ã‚Â¿38.52750°N 90.44861°W

Country	United States
State	Missouri
County	St. Louis
Founded	1818
Incorporated	1948
Government	
• Mayor	Bob Brasses

Area [1]	
• Total	6.59 sq mi (17.07 km^2)
• Land	6.27 sq mi (16.24 km^2)
• Water	0.32 sq mi (0.83 km^2)
Elevation [2]	413 ft (126 m)
Population (2020)	
• Total	3,989
• Density	636.10/sq mi (245.58/km^2)
Demonym(s)	Fentonian, Fentonling
Time zone	UTC-6 (Central (CST))
• Summer (DST)	UTC-5 (CDT)
Zip code	63026
Area code	636
FIPS code	29-23950
GNIS feature ID	2394757[2]
Website	fentonmo.org



Bicycle party resting in Fenton, Missouri, September 12, 1897

Fenton is a city in St. Louis County, Missouri, United States, and a suburb of St. Louis County. The population was 3,989 at the 2020 census.

History

[edit]

Due to its proximity to fertile land and the Meramec River, the Fenton area has been inhabited for over 900 years. The earliest proof of ancient dwellers was excavated from the "Fenton Mounds", two conical earthen burial mounds located near the southwestern border of Fenton. Diagnostic pottery shards from the mounds indicate they date from the

Mississippian times, A.D. 1050 - 1400.[3] In 2001, the mounds were leveled, by developer Gary Grewe, for construction of a Walmart Supercenter.[4]

The Fenton territory was occupied by Native Americans and early settlers in the 1770s. William Lindsay Long founded the city of Fenton on March 23, 1818. The original eight-square-block area is now referred to as "Old Towne Fenton". The city remained unincorporated for the next 130 years. Garrett Hitzert was the city's first mayor after incorporation in 1948, and his leadership helped build the foundation that much of the city's ongoing prosperity has been based on. He conceived of Fenton's expansive commercial business and industrial district that is a centerpiece of the city's fiscal success.[5]

Geography

[edit]

Fenton is located approximately two miles south of I-44 along the west bank of the Meramec River. The intersection of Missouri routes 30 and 141 lies just to the west.[6]

According to the United States Census Bureau, the city has a total area of 6.38 square miles (16.52 km^2), of which 6.05 square miles (15.67 km^2) is land and 0.33 square miles (0.85 km^2) is water.[7]

Demographics

[edit]

Historical population

Census	Pop.	Note	%±
1900	160		—
1910	172		7.5%
1920	146		?15.1%
1930	237		62.3%
1940	171		?27.8%
1950	207		21.1%
1960	1,059		411.6%
1970	2,275		114.8%
1980	2,417		6.2%
1990	3,346		38.4%
2000	4,360		30.3%
2010	4,022		?7.8%
2020	3,989		?0.8%

U.S. Decennial Census
2011 estimate

2010 census

[edit]

As of the census[8] of 2010, there were 4,022 people, 1,549 households, and 1,176 families living in the city. The population density was 664.8 inhabitants per square mile ($256.7/km^2$). There were 1,611 housing units at an average density of 266.3 per square mile ($102.8/km^2$). The racial makeup of the city was 95.5% White, 0.4% African American, 0.2% Native American, 2.1% Asian, 0.2% Pacific Islander, 0.3% from other races, and 1.3% from two or more races. Hispanic or Latino of any race were 1.9% of the population.

There were 1,549 households, of which 31.2% had children under the age of 18 living with them, 65.8% were married couples living together, 7.6% had a female householder with no husband present, 2.6% had a male householder with no wife present, and 24.1% were non-families. 19.2% of all households were made up of individuals, and 7.2% had someone living alone who was 65 years of age or older. The average household size was 2.56 and the average family size was 2.94.

The median age in the city was 46.7 years. 21.5% of residents were under the age of 18; 6.5% were between the ages of 18 and 24; 19% were from 25 to 44; 37.3% were from 45 to 64; and 16% were 65 years of age or older. The gender makeup of the city was 48.8% male and 51.2% female.

2000 census

[edit]

As of the census of 2000, there were 4,360 people, 1,587 households, and 1,239 families living in the city. The population density was 710.7 inhabitants per square mile ($274.4/km^2$). There were 1,631 housing units at an average density of 265.9 per square mile ($102.7/km^2$). The racial makeup of the city was 97.98% White, 0.39% African American, 0.16% Native American, 0.94% Asian, 0.18% from other races, and 0.34% from two or more races. Hispanic or Latino of any race were 0.80% of the population.

There were 1,587 households, out of which 35.2% had children under the age of 18 living with them, 68.7% were married couples living together, 6.7% had a female householder with no husband present, and 21.9% were non-families. 18.1% of all households were made up of individuals, and 5.7% had someone living alone who was 65 years of age or older. The average household size was 2.72 and the average family size was 3.11.

In the city, the population was spread out, with 25.5% under the age of 18, 7.5% from 18 to 24, 26.8% from 25 to 44, 29.1% from 45 to 64, and 11.1% who were 65 years of age or older. The median age was 40 years. For every 100 females, there were 96.5 males. For every 100 females age 18 and over, there were 92.0 males.

The median income for a household in the city was $74,708, and the median income for a family was $80,536. Males had a median income of $56,425 versus $34,514 for females. The per capita income for the city was $29,658. About 0.6% of families and 2.1% of the population were below the poverty line, including 1.8% of those under age 18 and 3.8% of those age 65 or over.

Economy

[edit]

Major corporations in the city include Tacony Corporation and Nooter Eriksen Corporation (makers of industrial equipment), Sachs Electric, UniGroup (owners of United Van Lines and Mayflower Transit, Wolff Shoe, Maritz, Fabick Caterpillar, and 8th Avenue Food & Provisions. Retail Technology Group, a major national point-of-sale supplier, is based in Fenton. Fenton contains a large industrial park and a newly developed logistics park located on the former Chrysler Assembly site.[*citation needed*]

Chrysler

[edit]
Main article: Saint Louis Assembly

The former Chrysler North and South assembly plants were located on North Highway Drive in Fenton. Opened in 1959 and easily visible from Interstate 44, the Chrysler plant was a cornerstone of the Fenton economy for decades. A residential area was even built near the plant with street names like Fury, Imperial, Dart, and Valiant. In its later years, the South plant assembled Chrysler minivans such as the Chrysler Town & Country and the Dodge Grand Caravan, while the North plant assembled the Dodge Ram truck. The South plant ceased operations in 2008, while the North plant shut down for good in July 2009. In 2013 the site was considered as a possible location for a new stadium for the St. Louis Rams if renovations to the Edward Jones Dome did not materialize.[9] In 2014 a local St. Louis real estate developer purchased the empty 300-acre lot to develop 240 acres of offices, businesses, and industrial buildings, with the remaining 60 acres primarily designated for retail use.[10]

Athletics

[edit]

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The immediate Fenton area is home to some of the most prestigious youth soccer clubs in the nation. The St. Louis Soccer Park abuts the Fenton city limits. It hosts multiple professional and semi-professional soccer matches. St. Louis Soccer Park has hosted several United States qualifier games for both the 1988 Summer Olympics and the 1990 FIFA World Cup. The Saint Louis FC of the USL Championship play their home games at St. Louis Soccer Park. St. Louis Soccer Park is home to SLSG, a soccer academy founded and coached by Scott Gallagher. In 2012, the U18 team from SLSG played a match against the US Soccer U18 team. Fenton itself is home to the Fenton Athletic Association. Ice hockey is also a popular sport in Fenton. The Fenton Forum is home to the Rockwood Summit Falcons ice hockey team as well as the Affton Americans youth and Tier II ice hockey clubs for many home games. Every year, the Missouri Fall Face-Off NCAA lacrosse competition takes place in Fenton.

Parks

[edit]

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Fenton is called the "City of Parks" owing to its extensive park and recreation system. The City has seven fully developed parks on 350-plus acres, including soccer fields, ball diamonds, sand volleyball courts, basketball courts, tennis courts, playgrounds, fishing ponds, and approximately three miles of bike/pedestrian paths through the City. The parks include: Fenton City Park, Bud Weil Memorial Park, Fenton Meramec Greenway, Olde Towne Plaza Riverside Park, Valiant Park, and Westside Park. Plans are being developed for the former Fabick property in the heart of the City. These plans include trails and some passive uses.[11]

Heroes Memorial

[edit]

In the spring of 2004 the Mayor of Fenton, Dennis J. Hancock, and the members of the Park Board (Board Chair Glen Scholle and members Jeff Bodi, Charles Jahneke, Mike Lucas, Steve Covault, Gregg Cleveland, Diana Biras and Nannette Clark) determined that their city should build a memorial to the victims of the terrorist attacks on September 11, 2001. It was also determined that the memorial would honor police, firefighters, EMS personnel, and all veterans.

Education

[edit]

The City of Fenton is served by the Rockwood, Northwest, and Lindbergh school districts. Rockwood Summit High School is located in Fenton and is the primary high school for area students. One private school, St. Paul Catholic School, is located in Fenton.[12] Two others, Our Savior Lutheran School and Heritage Classical Christian Academy, are located adjacent to the city limits. The Meramec Valley Branch of the St. Louis County Library system is in Fenton,[13] although a new, larger facility is open just outside the city limits.[14]

Notable people

[edit]

- Josh Arnold, host on The Bob & Tom Show
- Brian Boehringer, former pitcher for the New York Yankees and San Francisco Giants
- Nicole Galloway, State Auditor of Missouri
- Joyce Meyer, Christian author and speaker
- Jackson Rutledge, pitcher for the Washington Nationals
- Ken Schrader, NASCAR driver
- Mike Wallace, stock car racing driver
- Brandon Williams, NFL defensive lineman

References

[edit]

1. **^** *"ArcGIS REST Services Directory". United States Census Bureau. Retrieved August 28, 2022.*
2. ^ ***a b*** U.S. Geological Survey Geographic Names Information System: Fenton, Missouri
3. **^** "2008 Bioarchaeological Analysis of the Fenton Mounds," Wescott, Daniel J., Missouri Archaeologist 68[*permanent dead link*]
4. **^** "Grave Losses: Lax laws and uncaring bureaucrats cause Missouri to erase another prehistoric mound" Batz, Jeannette. Riverfront Times. October 31, 2001
5. **^** "A Brief History of Fenton." Fenton Historical Society.[*permanent dead link*]
6. **^** *Missouri Atlas & Gazetteer,* DeLorme, 1st ed., 1998, p. 41 ISBN 0899332242

7. **^** *"US Gazetteer files 2010". United States Census Bureau. Archived from the original on January 25, 2012. Retrieved July 8, 2012.*
8. **^** *"U.S. Census website". United States Census Bureau. Retrieved July 8, 2012.*
9. **^** *Hunn, David (July 23, 2012). "A new stadium for the St. Louis Rams?". Stltoday. Retrieved January 13, 2013.*
10. **^** *"Plans set for new development on Fenton Chrysler plant". FOX2now.com. June 25, 2015. Retrieved April 25, 2016.*
11. **^** *"Fenton Area Chamber of Commerce - Parks Department". www.fentonmochamber.com. Archived from the original on April 14, 2016. Retrieved June 23, 2016.*
12. **^** *"St. Paul Catholic School". Retrieved December 6, 2018.*
13. **^** "Meramec Valley Branch Archived 2009-08-26 at the Wayback Machine." St. Louis County Library. Retrieved on August 18, 2009.
14. **^** *"Meramec Valley Branch - St Louis County Library". Retrieved December 6, 2018.*

External links

[edit]

- City of Fenton official website
- Fenton Historical Society
- Fenton-Missouri.html City Data
- Fenton Area Chamber of Commerce

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Municipalities and communities of St. Louis County, Missouri, United States

County seat: **Clayton**

Cities

- Ballwin
- Bella Villa
- Bellefontaine Neighbors
- Bellerive Acres
- Berkeley
- Beverly Hills
- Black Jack
- Breckenridge Hills
- Brentwood
- Bridgeton
- Charlack
- Chesterfield
- Clarkson Valley
- Clayton
- Cool Valley
- Country Club Hills
- Crestwood
- Creve Coeur
- Crystal Lake Park
- Dellwood
- Des Peres
- Edmundson
- Ellisville
- Eureka
- Fenton
- Ferguson
- Flordell Hills
- Florissant
- Frontenac
- Glendale
- Green Park
- Greendale
- Hazelwood
- Huntleigh
- Jennings
- Kinloch
- Kirkwood
- Ladue
- Lakeshire
- Manchester
- Maplewood
- Maryland Heights
- Moline Acres
- Normandy
- Northwoods
- Oakland
- Olivette
- Overland
- Pacific‡
- Pagedale

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Map of Missouri highlighting Saint Louis County

Towns

- Grantwood Village
- Norwood Court

Villages

- Bel-Nor
- Bel-Ridge
- Calverton Park
- Champ
- Country Life Acres
- Hanley Hills
- Hillsdale
- Mackenzie
- Marlborough
- Pasadena Park
- Riverview
- Sycamore Hills
- Twin Oaks
- Uplands Park
- Velda Village Hills
- Westwood
- Wilbur Park

CDPs

- Affton
- Castle Point
- Concord
- Glasgow Village
- Lemay
- Mehlville
- Oakville
- Old Jamestown
- Sappington
- Spanish Lake
- St. George

Other communities

- Ascalon
- Carsonville
- Earth City
- Glencoe
- Grover
- Peerless Park
- Pond
- Sherman
- Times Beach
- Vinita Terrace

Townships	○ Airport ○ Bonhomme ○ Chesterfield ○ Clayton ○ Concord ○ Creve Coeur ○ Ferguson ○ Florissant ○ Gravois ○ Hadley ○ Jefferson ○ Lafayette ○ Lemay ○ Lewis and Clark ○ Maryland Heights ○ Meramec ○ Midland ○ Missouri River ○ Normandy ○ Northwest ○ Norwood ○ Oakville ○ Queeny ○ Spanish Lake ○ St. Ferdinand ○ Tesson Ferry ○ University ○ Wildhorse
Footnotes	○ ‡This populated place also has portions in an adjacent county or counties

- Missouri portal
- United States portal

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National	○ United States ○ Israel
Geographic	○ MusicBrainz area
Other	○ NARA

About Royal Supply Inc

Photo

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Things To Do in Jefferson County

Photo

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Jefferson County Historical Village

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Photo

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Visit Jefferson County PA

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Photo

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Jefferson County Area Tourism Council

0 (0)

Photo

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Jefferson County Museum

4.6 (31)

Photo

Jefferson Barracks Park

4.8 (2321)

Photo

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Jefferson Landing State Historic Site

4.5 (95)

Driving Directions in Jefferson County

Driving Directions From JCPenney to Royal Supply Inc

Driving Directions From GameStop to Royal Supply Inc

Driving Directions From Stella Blues Vapors to Royal Supply Inc

Driving Directions From Kohl's to Royal Supply Inc

https://www.google.com/maps/dir/GameStop/Royal+Supply+Inc/@38.5077519,-90.4452054,14z/data=!3m1!4b1!4m14!4m13!1m5!1m1!1sChIJzVllQlzO2IcRgiJc0FQbko!2m2!1d-90.4452054!2d38.5077519!1m5!1m1!1sChIJQUY-I2XQ2IcReCWJfc6UEZo!2m2!1d-90.480394!2d38.4956035!3e0

https://www.google.com/maps/dir/Rent-A-Center/Royal+Supply+Inc/@38.5086516,-90.4476197,14z/data=!3m1!4b1!4m14!4m13!1m5!1m1!1sChIJnYnTf8bP2IcRXdjC1aME
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Driving Directions From Visit Jefferson County PA to Royal Supply Inc

Driving Directions From Jefferson Historical Museum to Royal Supply Inc

Driving Directions From Jefferson Barracks Park to Royal Supply Inc

Driving Directions From Rockford Park to Royal Supply Inc

Driving Directions From Jefferson County Convention & Visitors Bureau to Royal Supply Inc

Driving Directions From Jefferson Historical Museum to Royal Supply Inc

https://www.google.com/maps/dir/Cole+County+Historical+Museum/Royal+Supply+I
92.1693088,14z/data=!3m1!4b1!4m14!4m13!1m5!1m1!1sunknown!2m2!1d-
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79.0785874!2d41.1600033!1m5!1m1!1sChIJQUY-
I2XQ2IcReCWJfc6UEZo!2m2!1d-90.480394!2d38.4956035!3e1

Reviews for Royal Supply Inc

Royal Supply Inc

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Gidget McCarthy

(5)

Very knowledgeable, friendly, helpful and don't make you feel like you're inconveniencing them. They seem willing to take all the time you need. As if you're the only thing they have to do that day. The store is clean, organized and not cluttered, symmetrical at that. Cuz I'm even and symmetricals biggest fan. It was a pleasure doing business with them and their prices are definitely reasonable. So, I'll be doing business with them in the future no doubt.

Royal Supply Inc

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Toney Dunaway

(5)

This is another amazing place where we will do much more business. They are not tyrannical about the totally useless face diapers, they have a great selection of stock, they have very knowledgeable staff, very friendly staff. We got the plumbing items we really needed and will be getting more plumbing items. They also have central units, thermostats, caulking, sealants, doors, seems everything you need for a mobile home. We've found a local treasure and will be bringing much more business. Their store is clean and tidy as well!

Royal Supply Inc

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Ae Webb

(5)

Royal installed a new furnace and air conditioner just before we got our used mobile home. Recently, the furnace stopped lighting. Jared (sp?) made THREE trips to get it back to good. He was so gracious and kind. Fortunately for us it was still under warranty. BTW, those three trips were from Fenton, Missouri to Belleville, Illinois! Thanks again, Jared!

Royal Supply Inc

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Terry Self

(1)

Horrible workmanship, horrible customer service, don't show up when they say they are. Ghosted. Was supposed to come back on Monday, no call no show. Called Tuesday and Wednesday, left messages both days. Nothing. Kinked my line, crooked to the pad and house, didn't put disconnect back on, left the trash.....

Royal Supply Inc

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bill slayton

(1)

Went to get a deadbolt what they had was one I was told I'd have take it apart to lengthen and I said I wasn't buying something new and have to work on it. Thing of it is I didn't know if it was so that it could be lengthened said I didn't wanna buy something new I had to work on just to fit my door. He got all mad and slung the whole box with part across the room. A real business man. I guess the owner approves of his employees doing as such.

Navigating EPA 608 Certification Steps**View GBP**

Frequently Asked Questions

What is EPA 608 Certification, and why do I need it for mobile home HVAC systems?

EPA 608 Certification is required by the U.S. Environmental Protection Agency for technicians who handle refrigerants in air conditioning and refrigeration systems, including those in mobile homes. It ensures that technicians understand how to safely manage refrigerants without harming the environment.

What types of certifications are available under EPA 608, and which one do I need for mobile home HVAC systems?

There are four types of EPA 608 Certifications: Type I (small appliances), Type II (high-pressure appliances), Type III (low-pressure appliances), and Universal (all types). For mobile home HVAC systems, you typically need a Type II certification, as they usually involve high-pressure refrigerants.

How can I prepare for the EPA 608 Certification exam specific to working on mobile home HVAC systems?

To prepare for the exam, study materials provided by accredited training programs or online courses covering topics like refrigeration principles, safety practices, environmental impact regulations, and proper handling of high-pressure refrigerants. Practice exams can also help familiarize you with the test format.

Where can I take the EPA 608 Certification exam, and what should I expect during testing?

The certification exam can be taken at approved testing centers or through proctoring services offered by certain organizations. The test consists of multiple-choice questions divided into core content plus specific sections depending on the type of certification sought. Expect questions on safe handling practices and regulatory compliance.

Once certified, what steps should I follow to ensure compliance while working on mobile home HVAC systems?

After obtaining your certification, always follow best practices when handling refrigerants. Document all servicing activities accurately, maintain equipment in good condition to prevent leaks, adhere to recovery requirements during repairs or disposal processes, and stay informed about changes in regulations affecting refrigerant use.

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