



Discover Better.tm

We are Airvac. We create solutions that utilize vacuum technology to move liquids and wastewater ecologically and economically for municipalities and industries throughout the world.

The world leader in vacuum sewer collection technology.

As the market leader of vacuum sewer collection technology, Airvac has worked for many decades with city planners, municipalities, architects, construction companies, consulting engineers, project developers, and many more. Our unique mix of engineering expertise, quality products, and best-in-class services, set us apart.

Founded in 1969, Airvac was an early pioneer of vacuum sewer collection technology. Our legacy is built on industry-leading innovations and outstanding customer service. Our company culture is "customer first", backed by a staff that is passionate, experienced, and committed. Airvac systems have provided efficient and affordable sewer service to communities all around the world since 1972. There are more than 400 Airvac vacuum systems in the Americas, and nearly 1,000 systems installed worldwide including North America, South America, Europe, Africa, Middle East, Asia, and Australia.

Quality Certification

Our quality policy is to strive for total client satisfaction through defect free products and services, available on time, and that meet requirements. To achieve this, we maintain an effective quality system and a culture of continuous improvement.

Airvac is ISO-9001:2015 Certified

ISO-9001:2015 is the international standard for quality management systems ("QMS"). It addresses the design, development, production, installation, and service of the company products. This demonstrates our ability to consistently provide products and services that meet customer and regulatory requirements and demonstrates our commitment to continuous improvement.





Crystal River Works to Save Manatees and the Local Economy

This is an excerpt taken from the article "Crystal River Works to Save Manatees and the Local Economy" published in Informed Infrastructure, September/October 2015. Crystal River, Florida, is the self-proclaimed "home of the manatee." An estimated 300,000 tourists visit Crystal River each year, many of them to see and experience the graceful manatees.

Challenge

The geography and ecology of the Crystal River region is perfect for manatees. The city of Crystal River is located on Kings Bay, which is connected to the Gulf of Mexico by the Crystal River. Kings Bay, about five miles inland, is fed by numerous small and large springs and maintains a year-round temperature near 72° F, which is perfect for manatees. The iconic manatees, pleasant climate, scenic beauty and fishing afforded in Crystal River make it a haven for outdoor enthusiasts and snowbirds. The economy is built on naturalism and tourism, so when it became apparent the local ecosystem was being threatened by pollution, community leaders acted decisively to "clean up their act" and reverse the tide of degradation. They took a thorough approach and addressed several problems that were polluting their waterways.

"The algae growing in Kings Bay floats at the surface for a few days and then settles to the bottom to form a mat that contains high concentrations of nitrogen," says David Burnell, Crystal River's city manager. "This mat, which can be six inches to four feet thick, prevents the normal growth of sea grass and other vegetation that manatees like to eat. It destroys their natural habitat and will eventually cause the manatees to die off. It's also harmful to other aquatic life."

Solution

An important step in the Kings Bay restoration effort was a two-phase vacuum sewer installation. The project's goal was to rid the area of nearly 600 aging septic tanks that were contaminating groundwater and contributing to nitrogen buildup in the bay. In Crystal River, as in many coastal communities, the water table is high and the terrain very flat. Gravity sewers require sufficient grade or multiple lift stations to move wastewater. This can mean digging deep trenches, dewatering, and a lot of disruption for home and business owners.

Vacuum sewers presented a significant benefit for Crystaal River: they don't leak. Collection lines maintain constant vacuum pressure, so there's no infiltration or exfiltration; no sewage escapes into the environment, and no groundwater enters the collection system. If a leak occurs, it can be quickly located and isolated, and because the lines are in shallow trenches, repairs can be made quickly.

What is a Vacuum Sewer Collection System?

A vacuum sewer collection system is a mechanized method of transporting wastewater. Differential air pressure creates flow rather than gravity or pressure. Essentially, a vacuum sewer collection system is a vacuum-assisted gravity sewer system.

Vacuum sewer collection systems require a vacuum station. Vacuum pumps maintain vacuum on the collection mains. To maintain this vacuum, a valve at each sewage input point seals the system. The valve opens automatically when a given quantity of sewage accumulates in a collection sump. This valve is entirely pneumatic in its control and operation. Differential pressure between local atmospheric pressure and the vacuum pressure provides the thrust needed for liquid transportation.

Vacuum sewer collection systems are applicable for:

- Residential connections.
- Commercial connections..
- Private developments.
- Areas where failing septic tanks are causing pollution.
- At least 25 connections. We also have systems serving more than 10,000 connections!
- Flat topography or moderate elevation change.
- Subsurface difficulties to overcome including high groundwater tables, sandy and unstable soils, rock, restricted construction conditions, acid sulfate soils (A.S.S), and sensitive eco-systems.



Why Use a Vacuum Sewer Collection System?

Cost-effective, Efficient, and Reliable

Airvac vacuum sewer collection systems are clean, efficient, easy to maintain, easy to install and typically less expensive than other collection systems. It is a proven technology with a long history of success and reliability. Airvac vacuum sewer collection systems use smaller diameter pipes installed in narrow, shallow trenches, reducing excavation, dewatering and surface restoration. The vertical and horizontal flexibility of the system allows for underground utility conflicts to be avoided, preventing cost overruns. Additional cost savings result when multiple lift stations are replaced by one vacuum station. Overall, the cost savings potential of using an Airvac system can be as great as 60% when compared to gravity or low-pressure systems.

Environmentally Friendly

Our completely closed vacuum collection system prohibits the infiltration and inflow of groundwater from the valve pit to the vacuum station, protecting our environment from exfiltrating wastewater. It is one of the most environmentally friendly solutions available.

Safe for Operators

With an Airvac vacuum sewer collection system, operators are not exposed to raw sewage or work in confined areas, minimizing their risk of exposure to viruses, bacteria, parasites, or harmful gases such as methane and hydrogen sulfide. With our newest technologies, they also experience noise and heat reduction at the vacuum pump stations. This provides them with a more safe and comfortable work environment.

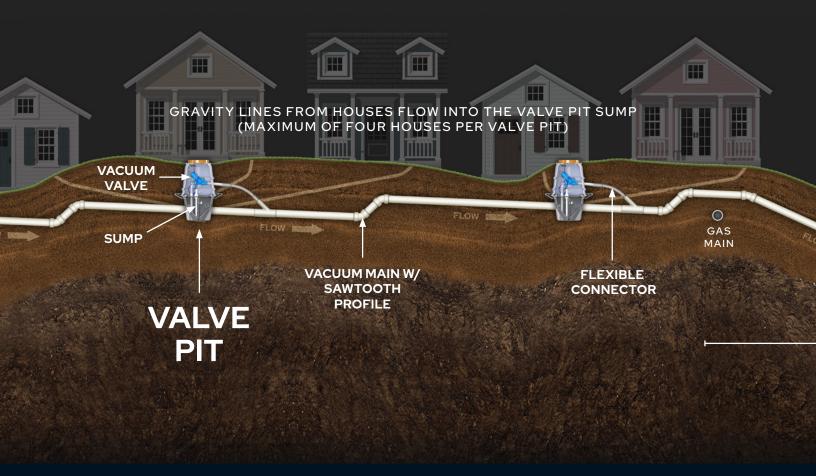
Less Disruptive to Communities

The fast and simple excavation required for an Airvac vacuum sewer collection system creates shallower trenches, uses smaller diameter pipes, and smaller excavation equipment. Roads can remain fully or partially opened, creating far less disruption to your community than traditional gravity sewers. You will experience significantly reduced restoration, construction, and energy costs as well.

Severe Weather Ready

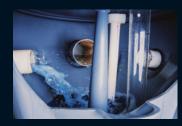
Because vacuum valves are pneumatically operated, the only source of power required for an Airvac vacuum sewer collection system is at the main vacuum station. Every Airvac vacuum station has a permanent back-up generator or a hook up for a portable generator, so power outages are never an issue.

Discover Better.tm



How an Airvac Vacuum Sewer Collection System Works

Our completely closed vacuum sewer collection system prevents infiltration and inflow of groundwater from the valve pit to the vacuum station, protecting waterways from exfiltrating wastewater.



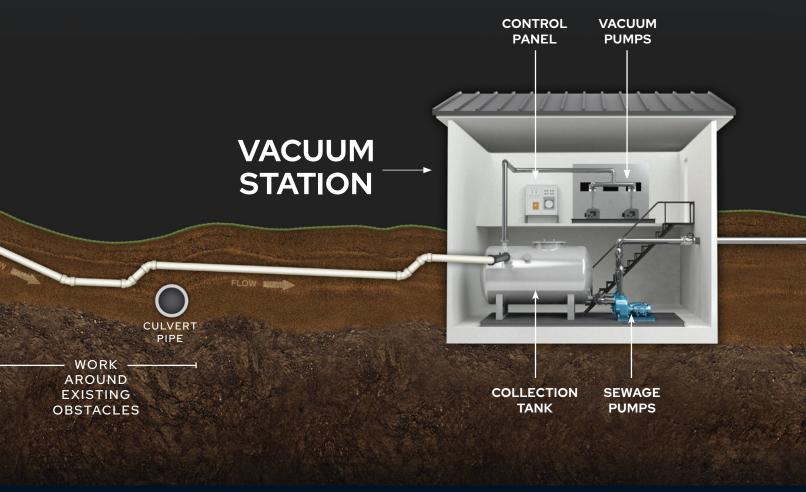
A traditional **gravity line** carries wastewater from a customer's home to an Airvac **valve pit** package.



The Airvac vacuum valve opens when 10 gallons of sewage collects in the sump and then differential pressure propels the contents into the vacuum main.



Scan this QR Code for a quick video.





Wastewater travels at 15 to 18 fps in a vacuum main, which is laid in a sawtooth fashion to ensure adequate vacuum levels at the end of each line.



At the vacuum station, **Vacuum pumps** cycle on and off as needed to maintain a constant level of vacuum on the entire collection system.



Wastewater enters the **collection tank** and fills to a predetermined level.



Sewage pumps then transfer the sewage to the treatment plant via a force main.



Core System Components The Valve Pit



The Valve Pit

The Airvac valve pit provides the interface between the vacuum collection system and the house. The top chamber of the valve pit houses the Airvac vacuum valve and the bottom chamber is a sewage sump into which the gravity lateral from the house connects. The two chambers are sealed from each other, preventing maintenance personnel from being exposed to raw sewage.

Each valve pit can accommodate sewage for up to four homes, although the most common configuration is one valve pit serving two adjacent houses. No special plumbing fixtures are required by the homeowner, and it is pneumatically operated so no electricity is required from the homeowner.



The Vacuum Valve

The Airvac 3" (78mm) vacuum valve is vacuum operated on opening and spring assisted on closing. System vacuum ensures positive valve seating. The valve has a 3-inch full-port opening designed for handling 78mm solids, is made of glass filled polypropylene, and has a stainless-steel shaft, delrin bearing, and elastomer seals.

The vacuum valve is equipped with a rolling diaphragm-type vacuum operator and is capable of overcoming all sealing forces, and opens using vacuum from the downstream side of the valve. All materials of the valve are chemically resistant to normal domestic sewage constituents and gases.

Vacuum valves are also available in 1.25", 1.5", and 2" models, which can be used for specific applications.



The Sump Breather

The Sump Breather operates through the use of a diaphragm that reacts to the breather pipe pressure. The sensor pipe pressure ranges from 0" (sump empty) to 6" (level where valve normally cycles).

When the sewage level becomes abnormally high, the sensor pressure continues to rise. When 22" of pressure is present, the diaphragm will seal off the ports of the sump breather, protecting the controller from water and moisture damage. An internal switch will activate to provide a high sewage sump level signal for monitoring. As a result, high sewage sump floats are not required.

When the system operation problem is corrected, the valve will cycle, and the sewage sump will be emptied. The sensor pipe pressure will drop to 0" allowing the valve and controller to return to normal operation.



The HP (High Performance Controller)

The Airvac valve pit was designed so that a very repeatable, specific amount of liquid is withdrawn each cycle. This in turn helps control the Air-to-Liquid (A/L) ratio, ensuring proper system operation. The HP Controller is the key component that provides this function.

The HP Controller relies on three forces for its operation: pressure, vacuum, and atmosphere. As the sewage level rises in the valve pit sump, it compresses air in the sensor tube. This pressure initiates the opening of the valve by overcoming spring tension in the controller and activates a three-way valve. Once opened, the three-way valve allows the controller to take vacuum from the downstream side of the valve and apply it to the actuator chamber, to fully open the valve.



The Air Terminal

The air terminal provides the system with a source of atmospheric air, which is necessary for liquid transport. Airvac's 6" air terminal consists of a molded housing that is placed on 6" piping connected directly to a valve pit sump. The air terminal was designed to look like other utility boxes/structures typically seen in rights-of-way. The air terminal is supplied by Airvac and is installed by the contractor as part of the valve pit installation.



Core System Components

The Vacuum Station



PacVac Vacuum Stations

Airvac PacVac vacuum stations are ideally suited for small to medium-sized projects serving less than 550 connections and/or peak flows less than 350 gpm. Generally, the mechanical and electrical components are located on skids which includes the vacuum pumps, sewage pumps, collection tank and control panel. The skids are housed in a prefabricated building that can be supplied by Airvac.

For customers who need an inexpensive, small vacuum station for an initial phase of a larger system, Airvac can also house the vacuum station in a shipping container and make it available on a short-term lease basis.



Custom Vacuum Station

An engineered custom vacuum station is ideally suited for larger systems with more than 550 connections and peak flows greater than 350 gpm, but can be used with smaller systems as well.

With an engineered custom vacuum station, Airvac provides all internal components on a skid(s) which are housed in a building custom designed by an engineering firm. The Airvac skid(s) is typically housed in a two-story structure, with the vacuum pumps and control panel on the top floor, and the collection tank and sewage pumps on the lower floor.



Vacuum Pumps and Modulation

Vacuum pumps create negative pressure on the collection tank, which is then transferred to the entire piping network via the vacuum mains. The make and model of the vacuum pumps are selected by Airvac based on individual project specifications.

Modulation is Airvac's patent pending program logic that improves the functionality of your vacuum system.

The modulation sequence controls the speed of the vacuum pumps to maintain a tighter vacuum range, and speeds up and slows down, depending on the demand of the system. It is unusual for the pumps to ever operate at full speed. And since the pumps are not turning on and off as frequently, overall power consumption is reduced, and less heat and noise are created.



The Collection Tank and Sewage Pumps

Every project is unique based on customer needs.

Collection tanks will vary in size and number of available connections, based on individual project specifications.

The make and model of the sewage pumps are also selected based on individual project specifications.



Control Panels

Every control panel is custom designed by our engineers at Airvac. Our experience in vacuum technology has allowed us to create a control panel that is tailored to the specifics of vacuum sewer collection technology.

The interactive eCabinet provides a "real time" assessment of the vacuum sewer system. Prior to the interactive eCabinet, data was derived from system operators traveling to the job site, collecting data, analyzing, and developing a report. With the invention of the interactive eCabinet, key performance indicators are analyzed, computed, and displayed, in real time at the control panel.

See the Control Panel page for more details.

Vacuum Station Control Panels with Airvac's Proprietary Interactive eCabinet

Unique Features:

Interactive eCabinet

- The interactive eCabinet provides a "real time" assessment of the vacuum sewer system. Prior to the interactive eCabinet, data was derived from system operators traveling to the job site, collecting data, analyzing, and developing a report. With the invention of the interactive eCabinet, key performance indicators are analyzed, computed, and displayed in real time at the control panel.
- The interactive eCabinet displays helpful system information, including:
 - A preventative maintenance log.
 - A pump oil life calculator.
 - Modulation information and parameters.
 - Sewage pump efficiency.
 - System air-to-liquid ratio.
 - Preventative maintenance and troubleshooting tutorial videos.

Vacuum Pump Modulation

- Vacuum pump modulation uses a collection tank vacuum pressure transmitter, a programmable logic controller (PLC) and variable frequency drives (VFDs) to modulate vacuum pump speed and maintain a more constant vacuum level in the system. This typically results in significantly higher end-of-line vacuum levels.
- This technology can be retrofitted to existing systems, but may require the installation of Mink or Cobra type vacuum pumps and a new vacuum pump control panel.



Control Panel Function and Design

Every control panel is custom designed by engineers at Airvac. Our experience in vacuum technology has allowed us to create a control panel that is tailored to the specifics of vacuum sewer collection technology.

The control panel controls operations of the vacuum and sewage pumps. The standard control panel package for new vacuum stations is designed to use a vacuum pressure transmitter and a level transmitter on the collection tank, and a flow transmitter on the combined force main. The vacuum pressure transmitter controls vacuum pump operation and allows for Mink or Cobra type vacuum pumps to be modulated. The level transmitter controls the starting and stopping of sewage pumps, while the flow transmitter can control the sewage pump flow rate. A redundant level control system is included, in addition to the main level transmitter, for a collection tank high level lockout alarm. This provides added protection for the vacuum pumps.

The standard control panel package includes:

- PLC and VFDs
- An ethernet switch for convenient communication of the vacuum station parameters and alarms to a separate SCADA system.
- An operator interface screen that displays information, including:
 - System parameters such as collection tank vacuum level, collection tank sewage level, and sewage pump flow rate.
 - Vacuum and sewage pump information such as run time meters and run/fault status.
 - Vacuum level and sewage level setpoints to control vacuum and sewage pump operation.
 - Collection tank vacuum level trending data.
 - System alarms list.
 - Including the Interactive eCabinet can offer additional system parameters and preventative maintenance information.

Control panel design can be modified to best meet customer needs.

This can include:

- Use of starters instead of VFDs for starting and stopping pumps. (This will eliminate the ability to modulate vacuum pumps or control the sewage pump flow rate.)
- Use of relay logic instead of a PLC. (This eliminates the ability to modulate vacuum pumps or control the sewage pump flow rate. It also reduces the adaptability of controls if future system modifications are made.)
- For already existing systems, a replacement control panel may include the use of non-standard level controls (like level probes/relays), non-standard alarms communication (such as telephone dialers instead of a SCADA system), or non-standard collection tank vacuum level trending (physical chart recorder instead of vacuum trending through operator interface screen).



Airvac's Wireless Monitoring with our patented S.M.A.R.T. Technology

(Strategic Monitoring for Advanced Remote Transfer)

Proactively operate and maintain your system.

Airvac's wireless monitoring system, with our patented S.M.A.R.T. technology, can track trends and identify any abnormal conditions as soon as they occur. The data received from LoRa modules can be used to adjust the system, making certain that it continues to run at peak performance levels. If an issue occurs along the vacuum main or at a valve pit, the monitoring system will pinpoint the exact location and identify any necessary adjustments that need to be made. Airvac's system will monitor vacuum levels, valve status, high sump level, system trends, cycles, cycle time, and any instances of infiltration.

Our system not only monitors itself, but it also automatically makes real-time adjustments to optimize system hydraulics. This proactive approach of controlling a vacuum system's behavior results in optimum system performance, prevents problems from occurring, and reduces operation and maintenance costs.

Benefits

- Predictive and proactive: Potential problems are not only identified, adjustments are automatically
 made to correct them.
- More efficient system: System imbalances can easily be overcome, resulting in a more costeffective system.
- Airvac is connected 24/7: Airvac specialists can monitor the system in real-time, providing assistance to the operator.
- Built-in purge cycle: A "purge" cycle can be programmed into the logic controller that will
 automatically clear the vacuum mains at programmed times to prepare for potential high
 flow events.
- Automatic system updates: Airvac can remotely push programming updates to keep S.M.A.R.T. current.

S.M.A.R.T. Technology

Airvac's patented S.M.A.R.T. technology works in conjunction with the monitoring system. It proactively makes real-time adjustments, prevents problems from occurring, and it reduces operation & maintenance costs.

Using artificial intelligence (AI), S.M.A.R.T. communicates with the various vacuum station controls and will override pump control as necessary. S.M.A.R.T. software uses several modes to identify system imbalances and to provide recovery options. This may include monitoring various system vacuum levels, monitoring pump operating parameters, monitoring incoming flows, actuating remote vacuum valves, and adjusting vacuum levels at the station.

Dedicated Ports

Dedicated ports are integrated into the vacuum valve and sump breather, which makes connecting monitoring cables quick and easy.

No Magnets or Floats Required

Our vacuum valve monitoring does not require a magnet with newer model vacuum valves, minimizing the risk of failure due to misalignment, switch malfunction, or debris build-up. Sump levels are monitored through our new diaphragm breather instead of using a float. This minimizes the chance of failure due to the float getting stuck or hung up on internal wiring. (magnet switches and floats are still available for older systems)

Two-Way Communication

Two-way communication offers operators the ability to remotely cycle specific S.M.A.R.T. vacuum valves.

Monitoring Features Side-by-Side Comparison

	Airvac	Industry Standard
System Connections		
LoRa Modules	~	*
Cloud Data Storage	*	*
SCADA Connectivity	~	~
Main Gateways	~	✓
Remote Gateways	~	✓
Magnet Activated Sensors	~	✓
Sump Float	~	✓
Vacuum Station Control Panels	~	*

Types of Reporting		
Vacuum Levels	~	~
Valve Status	~	~
Sump Level High	~	~
System Trends	~	~
Cycles, Cycle Time	V	~
Infiltration	~	~

Latest Technology		
Dedicated Ports	~	
Modulation	V	
S.M.A.R.T. Technology	V	
Two-Way Communication	V	~
Interactive e-Cabinets	V	
No Magnets or Floats Required	V	

Airvac offers multiple services to keep your system running at optimal performance.

O&M Services

On-Site Airvac Trained Technicians operate your system 24/7, 365 days a year.

Annual Service Agreements

Customized service levels based on your needs for service by a Factory Certified Airvac Technician. Options include hours of coverage, response time, and any applicable parts discounts.

Block Hour Services

Choose the amount of hours pre-paid to utilize at your discretion at your site.

System Site Surveys

One day in-depth analysis of your system: evaluation of performance of the vacuum system (vacuum station & valve pits) and documented recommendations of operational improvement measures.

Regional Training Classes

Held at your site with focus on operator training and review of current parts and technology.

PM Services

Offered as Annual, Bi-Annual or Quarterly. Complete documented evaluation, adjustment, and recommendations for operation, repair or replacement of components. (Parts excluded)

Quarterly Service Package Specials.

(Contact Airvac Service Department for details)

Operator School

Offered monthly in Rochester, IN (free of charge)

Natural Disaster Prep Program

Minimize potential issues or downtime due to major weather events. Our documented preventative maintenance procedures were specifically created for preparing your system and your staff for these critical times.

Airvac Customer Portal

Contains troubleshooting videos, product data sheets, and other useful tools. The customer portal is available for all device platforms and is located at: https://portal.airvac.com (free of charge)





The Project Process

Airvac believes in the team approach. We are here to assist engineers, contractors, and owners in all phases of a project.

Planning

When planning and evaluating a potential sewer project, Airvac is here to assist. With specific information provided by the customer, Airvac will create a project layout and provide preliminary budget estimate for the project.

System Layout/Preliminary Design/Technical Information

A preliminary system layout that includes the sizing of the vacuum main, vacuum pumps, sewage pumps and the collection tank will be presented in a proposal package. The estimated quantities of the various system components will also be identified. Technical information will be included that summarizes the design assumptions, line and station sizing, and the valve pit quantities required for the project.

Budget Estimate

Upon receipt of some basic project information, Airvac engineers will assist consulting engineers with a budget estimate. The budget estimate will include an estimate of both capital costs as well as the annual operation and maintenance costs.

The client will receive a link, login, and password to access the digital landing page, which will include the information listed above. In addition, embedded videos, case studies of other vacuum projects, reference maps, and links to various other topics will also be provided.

Design

Airvac is available to help throughout the design phase of a project and will be involved as much or as little as a customer requires. From the design of the vacuum station equipment to the profiling of the vacuum mains, we are here to assist you. Airvac can also provide specifications and standard details for vacuum system installation and components.

Detailed Design Assistance

When a consulting engineer commences with the detailed system design, assistance will be provided by an Airvac Engineer for vacuum 101 training and hands-on design work. Furthermore, Airvac can support the engineer with design reviews at key milestones (25%, 50%, 75%, 90%, 100%)

Line Profiling Assistance

Airvac can provide assistance with vacuum main profiling. Typically, this includes assistance with profiling the most critical vacuum main. When completed, Airvac will review the line profiles and do a complete hydraulic analysis of both static and friction loss.

Plan and Profile Drawings

Each design firm has their own set of requirements for how much detail needs to be included in their plan and profile drawings. Information that is typically included in other utility designs should also be included in a vacuum sewer design. Certain vacuum-specific items need to be included as well and Airvac can provide that information.

Construction

Airvac can provide a field service representative during the construction phase of a project. This includes a vacuum installation 101 presentation, providing the contractor with a better understanding of how a vacuum sewer system works and how components are delivered, stored, and installed. The representative will provide tips and instructions for the key items including valve pit installation, vacuum main installation, and vacuum main testing. The field service representative will also help to ensure that the project is installed properly, which will lead to a successfully operating system.

Construction Field Services

In our over 50-year history, one simple fact stands out: No matter how good the design, a vacuum system that is not constructed or serviced properly will not operate at peak performance. A correct installation is vital to the ultimate success of a vacuum system. Airvac can provide skilled field representatives to advise and assist contractors and consulting engineers with the construction of the vacuum sewer system. In most first-time vacuum projects, Airvac recommends that a field representative be present during the entire construction phase. For repeat clients, or for projects where a consulting firm has vacuum experience, Airvac can provide field services as needed.

Interested in Learning More?

Whether you are a water and wastewater industry operator, a civil engineer, a public works manager, or decision maker, you owe it to yourself, your team, and your community to weigh all of the options for your next sewer system project.

Come to the Airvac Facility

For a real hands-on experience, we welcome site visits to our main facility in Rochester, Indiana. During your site visit, you will see, firsthand, all of the Airvac technologies in action, see our fabrication and production facilities, ask questions and get answers directly from the Airvac team.

We also have a Customer Solutions Center located in Tampa, Florida. Call 1-800-AIRVAC9.

Can't Make it to Rochester?

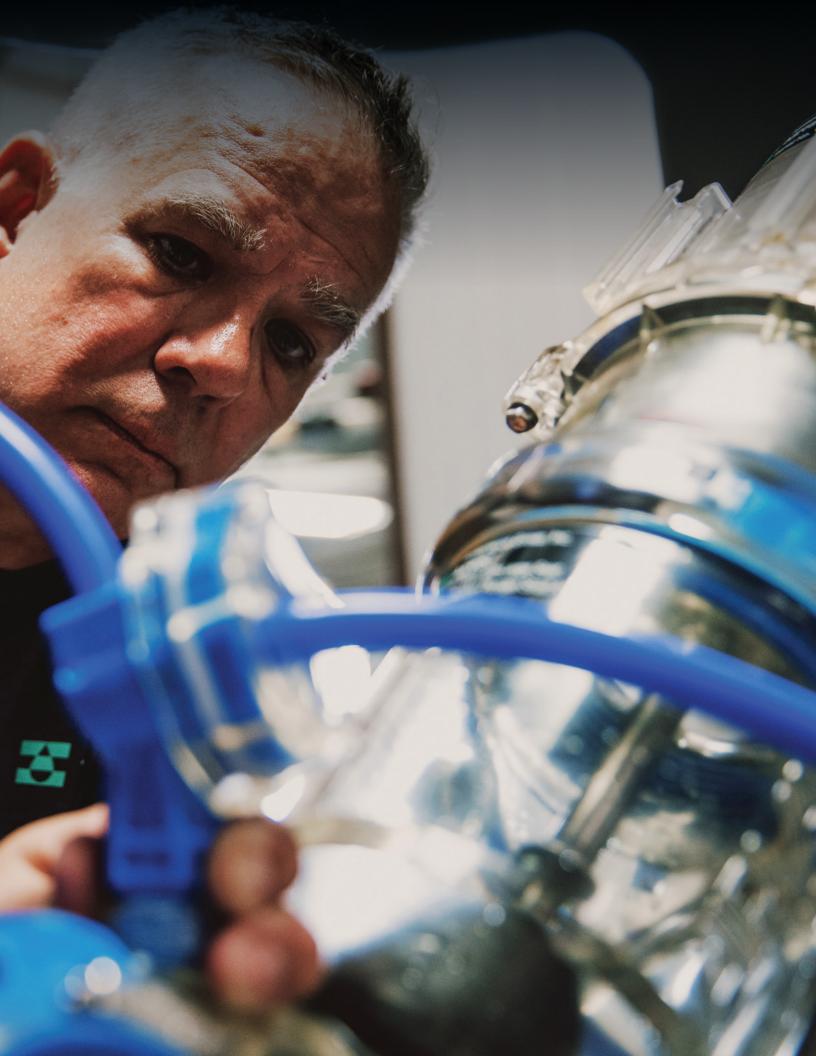
With more than 400 Airvac vacuum systems in the Americas, and nearly 1,000 systems installed worldwide, there is more than likely an Airvac installation within your proximity. Most of our clients are open to installation tours and can be scheduled through an Airvac representative. **Call 1-800-AIRVAC9**.

Schedule an In-person Seminar or Online Webinar

Set up an in-person seminar or online webinar for you and your team to learn about the advantages of today's vacuum sewer collection technology.

Airvac vacuum systems are used in various indoor and outdoor applications. Our seminars/webinars cover in-depth information about Airvac's vacuum systems and gives you the opportunity to ask questions in an open forum. **Call 1-800-AIRVAC9**.

Course completion certificates are awarded to attendees that can be used toward PDH Credits in most states.



Discover Better.tm

1-800-AIRVAC9

or visit airvac.com info@airvac.com

We provide FREE cost estimates & system layouts.



Want to share this brochure with someone? Scan this Q.R Code for a sharable PDF



A brand of Aqseptence Group 4217 N Old US Highway 31, Rochester, IN 46975

Phone: 1 574-223-3980 eMail: info@airvac.com Website: airvac.com

AV047.0-US-en-REV0123

Airvac @ is a registered trademark of Aqseptence Group, Inc. Copyright @ Airvac, Inc. 2023