AcornVac Inc.

VACUUM PLUMBING SYSTEMS

A Versatile Plumbing And Waste Solution That Saves Time and Money

A Vacuum Plumbing System eliminates the need for floor sinks for a more aesthetic finish

VACUUM PLUMBING AND GREASE WASTE TRANSPORT SYSTEMS FOR SUPERMARKETS • CONVENIENCE STORES • WHOLESALE CLUBS

ACORN FAMILY OF COMPANIES

What is a Vacuum Plumbing System?

Vacuum plumbing systems are a simple and reliable alternative to underground drainage piping that combine gravity for above slab collection and vacuum for overhead transport of waste, eliminating any penetration of the floor.

Hundreds of vacuum drainage systems are in operation around the world and are accepted by code authorities as both viable and environmentally sound solutions as documented in the latest edition of the IPC and UPC Codes.

AcornVac Offers Cost Saving and Flexible Alternatives to Gravity Plumbing

While a vacuum plumbing system can be used on virtually any project, certain design and construction conditions may make it the most cost effective solution available. Here are some examples:

Cost Savings Benefits of Vacuum Plumbing

CONSTRUCTION COSTS
Eliminates or significantly reduces potential floor cutting and saves weeks in the overall construction cycle.

POST TENSION SLAB OR STRUCTURAL SLAB RENOVATION
Eliminates the costly expense of having to x-ray the slab to find specific locations that are free of cables where a hole or trench could be cored for piping or waste pipe connection.

WATER SAVINGS
Reduces water consumption for toilets by as much as 68% and reduces sewage waste discharge with a ½ gallon toilet flush.

INSTALLATION MATERIALS AND LABOR
Labor and material costs are reduced since the installation is above ground and smaller diameter water and waste piping are used. The costs associated with vent stack piping and expensive roof penetrations are also eliminated. The above-ground installation saves construction or remodel time and labor. On remodel work, the savings can be substantial depending on the size of the existing facility and the length and depth of trenching required for gravity waste pipe tie-in. Typical savings are 30% and in some cases much higher.

Construction Benefits of Vacuum Plumbing

RENOVATION AND HISTORICAL PROJECTS
Accommodates restrictive site and structural concerns, no trenching or cutting of slab. The piping system provides flexibility in plumbing fixture layout and building design.

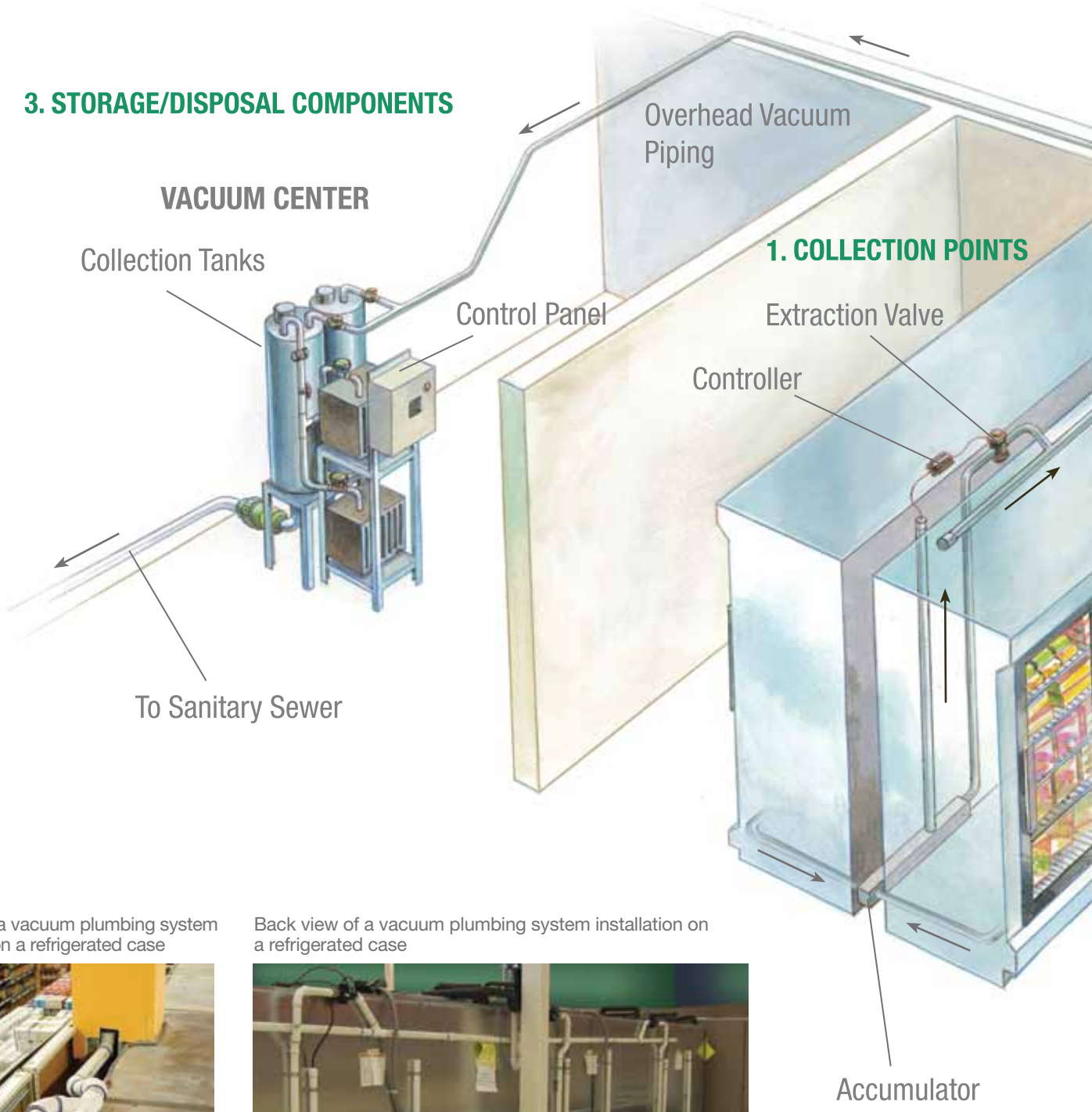
REMODELS
Installation is quick and easy. It can be performed after-hours, eliminating customer inconvenience and liability issues. Since the plumbing is done within the envelope of the building there is no washed out concrete slab or rain delays. There is no cutting into the existing electrical, refrigeration or sewer lines.

OPEN ARCHITECTURAL DESIGN
Enhances space utilization as it requires less space to install. The piping system is installed overhead with other mechanical or electrical systems. It eliminates the need to provide vent and waste stacks, thus reducing material and labor costs.

FIXTURE PLACEMENT
In an existing building plumbing fixtures and refrigeration systems can be relocated or added to any part of the building. The space can be adapted to new occupant or design needs. Turn any space into valuable space with a versatile plumbing system!

A Vacuum Plumbing System eliminates a saw cut floor

A Vacuum Plumbing System eliminates the mess associated with trenching or cutting of the slab



Top view of a vacuum plumbing system installation on a refrigerated case

Back view of a vacuum plumbing system installation on a refrigerated case

An AcornVac Plumbing System Can Be Completed in a Confined Space with No Disruption to Shoppers or Staff

Components of a Typical Vacuum System in a Grocery Store

For illustration purposes only

How an AcornVac System Works:

1. COLLECTION POINTS

Condensate from refrigerated cases and coils, or waste water from plumbing fixtures, such as sinks and hand wash basins, flows via gravity into an ACCUMULATOR (collection point), typically located behind or below the equipment.

2. A CONVEYANCE SYSTEM

When the waste reaches a pre-determined level in the Accumulator, the controller automatically opens the normally closed extraction valve, allowing vacuum to evacuate the collected waste into the overhead piping (conveyance network) for delivery to the Vacuum Center storage and disposal components. Overhead piping can be routed where convenient in the ceiling space.

3. STORAGE/DISPOSAL COMPONENTS

The Vacuum Center includes vacuum pumps that run automatically and only as needed to create vacuum pressure in the waste collection tanks and piping network. Waste is delivered from fixtures and equipment to the vacuum center stainess steel waste collection tanks via the piping network, where it is temporarily held before discharge, either to storm drainage, sanitary sewer mains or an appropriate grease interceptor as required by the application and local codes. Condensate and grey water are discharged to sanitary sewer mains through a code compliant air gap; grease waste is discharged to a code compliant grease interceptor. Systems providing drainage for toilet waste will discharge directly into the sanitary sewer and may include discharge pumps to pump waste from the collection tanks into the sewer.

AcornVac Prepackaged or Custom Designed Systems with Complete Turnkey Service

PLANNING

We offer comprehensive coordination with the engineer of record and owner during the design phase of the project to assist in system sizing, piping layout, and specification development. This includes a review of the scope of the project and drainage requirements, the creation of installation details and recommendations for piping layout.

If one of our Championship package systems (pages 9-12) is not right for your project, we can design, engineer and manufacture a vacuum system suitable for your application and design requirements. This is what we do; this is our expertise.

CONSTRUCTION AND COMMISSIONING

We help coordinate the commissioning of all areas of the system, along with diagnostic evaluation and recommendations for resolution of any areas of concern to ensure a functional and efficient installation.

INSTALLATION

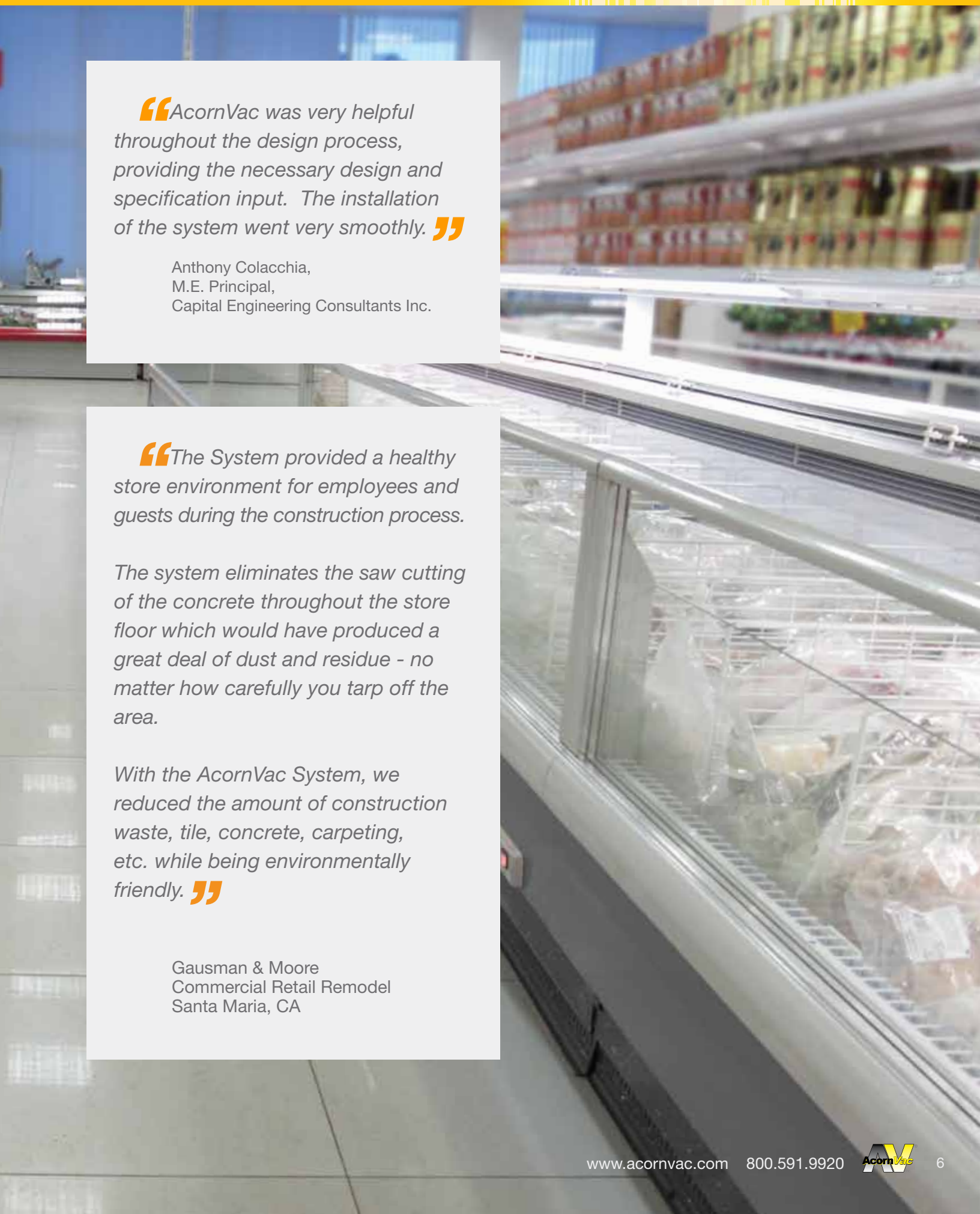
We offer comprehensive installation training for the installing contractor, covering system dynamics and proper installation requirements, supplemented by periodic inspection of the installation with detailed reporting regarding completion and correction of any installation deficiencies.

TRAINING, SUPPORT AND FOLLOW-UP

We offer on-site training for facility maintenance staff, including a complete overview of the dynamics of the vacuum system, and comprehensive training in basic maintenance and trouble shooting.

SERVICE

We offer technical support through our Sales Engineering and Technical Services Departments. Our staff and representatives are available to facility maintenance personnel for telephone consultation at no additional cost on an ongoing basis.



"AcornVac was very helpful throughout the design process, providing the necessary design and specification input. The installation of the system went very smoothly."

Anthony Colacchia,
M.E. Principal,
Capital Engineering Consultants Inc.

"The System provided a healthy store environment for employees and guests during the construction process.

The system eliminates the saw cutting of the concrete throughout the store floor which would have produced a great deal of dust and residue - no matter how carefully you tarp off the area.

With the AcornVac System, we reduced the amount of construction waste, tile, concrete, carpeting, etc. while being environmentally friendly."

Gausman & Moore
Commercial Retail Remodel
Santa Maria, CA

AcornVac Saves You Time and Money While Protecting the Environment—A Winning Combination

Benefits for Food Service Industry

- AcornVac systems eliminate the need for under slab gravity drainage in both the sales and prep areas.
- AcornVac systems provide an opportunity to easily convert existing buildings with limited drainage to a supermarket use when conventional waste plumbing upgrades are cost prohibitive because of site or structural conditions such as post tension slabs, bed rock, asbestos, methane ground contamination, high water tables, etc.
- Because trenching is eliminated, store remodel activities are less expensive, safer, more sanitary, and take less time.
- New construction projects can be completed faster, saving construction costs and allowing a facility to be brought online in a more timely fashion.
- AcornVac systems work in concert with the new “open” architectural store environment where electrical and refrigeration services are brought to display cases from overhead.
- AcornVac systems are completely adaptable to last minute merchandising changes and can easily accommodate seasonal display re-locations, even after the store opens.
- AcornVac systems create a cleaner environment and reduce health hazards associated with gravity drains.
- AcornVac equipment can be capitalized and taken with the owner if the facilities are abandoned.

“With our exposed concrete floor, vacuum technology allows Trader Joe’s the flexibility to move and add additional cases without saw cutting. This allows us to keep a consistent looking floor free of patches and trench lines.”

Dave Hetzel, Jr. –
Director of Construction
Trader Joe’s

Did You Know:
Depending on the depth of the sanitary sewer and the distance to a point of connection with existing sewer service, the cost of gravity waste pipe trenching can be expensive – in some instances over $225 per linear foot. After less than 100 linear feet, AcornVac provides a cost saving solution!

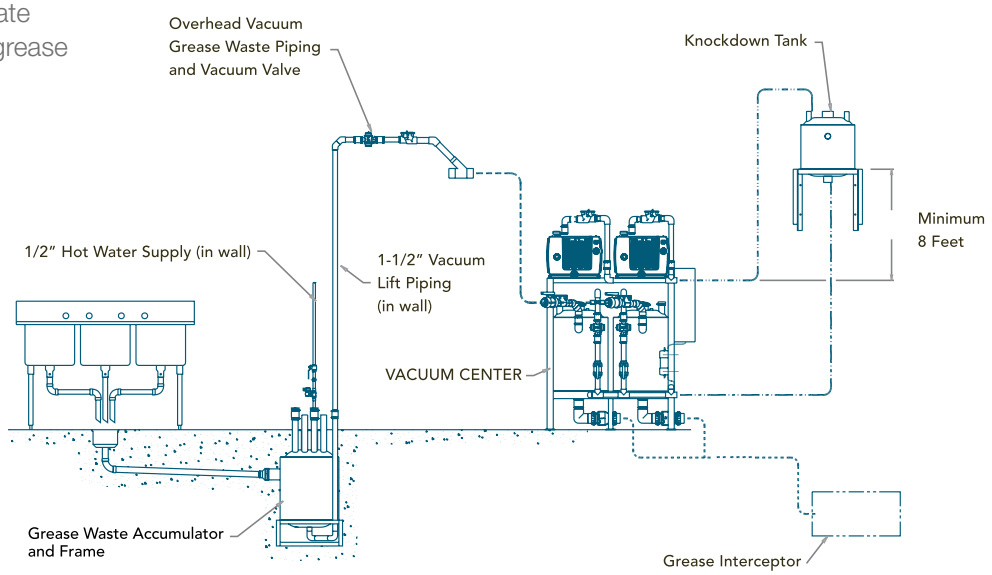
Grease Waste Transport System

AcornVac Solves Grease Waste Drainage Problems

Transportation of grease waste effluent from source to interceptor has long been an issue for anyone that creates or works with conventional grease waste plumbing systems. AcornVac has developed an effective, reliable mode of transportation that conveniently integrates conventional fixtures or floor drains and routes grease waste through a vacuum waste piping network located above grade or slab for direct drainage to a more conveniently located grease interceptor. The system virtually eliminates problems with conventional grease waste line clog and coagulation as well as placement, maintenance coordination and problems associated with local grease traps.

Vacuum drainage systems offer a number of benefits for a grease waste transport system:

- Vacuum transport systems eliminate the need for costly underground grease drainage piping in the sales area on renovation projects.
- AcornVac grease waste drainage replaces point-of-use grease interceptors from sales and prep areas with under-slab or above grade Vacuum Grease Accumulator(s). This eliminates the odor associated with grease trap maintenance and cleaning.
- The drainage piping network servicing a vacuum transport system can be installed vertically or horizontally, providing flexibility in layout and building design, thus the vacuum grease accumulator and grease interceptor can be placed anywhere in the building.



- The operational dynamics of a vacuum transport system result in significant reductions in grease waste build up in the waste piping network when compared to conventional gravity piping.
- AcornVac systems work in concert with the new "open" architectural store environment where electrical and refrigeration services are brought to display cases from overhead. Grease waste piping within the store can now follow these services, allowing for unprecedented flexibility in store layout.
- AcornVac systems are completely adaptable to last minute merchandising changes.
- New construction projects can be completed faster, providing a construction cost savings and allowing a facility to be brought online in a more timely fashion.

Championship Series — System 100-Series AV-20S-1.2-LR-BV

Product Description

Single frame factory assembled vacuum center consists of a 20 gallon T304 stainless steel waste collection tank, a 2 HP water sealed liquid ring vacuum pump, and a PLC driven automatic control panel.

Descriptions						
Collection Tanks	Vacuum Pumps				Capacity*	
Qty	Volume (US Gal. Each)	Type	Qty	HP	Maximum "LPV"	Maximum Continuous Flow
1	20	Liquid Ring	1	2	10	5 GPM

**The maximum capacity of each system is based on maximum load point value or "LPV" and maximum continuous flow rate.*

Features:

- Compact Design:
  25"[63.5cm] Long x 18"[46cm] Wide x 5'[1.5m] Tall
- System Weights:
  - Dry: 200lbs [90kg]
  - Wet: 375lbs [170kg]
- 20 gallon T304 stainless steel waste collection tank has 2" pipe size top waste inlet connection and 2" swing check waste outlet connection.
- 2 HP vacuum pump has 1/2" water supply inlet. Pump runs only on-demand. Water flows only when pump is on.
- Industrial grade panel has PLC driven automation control of vacuum pump and waste collection and discharge cycles. Panel includes a main disconnect, an alarm light and an HOA switch.
- Available 3-Phase 60 Hz Voltages:
  - 208 VAC – 5.8 FLA
  - 480 VAC – 3.4 FLA
- Dial face analog vacuum pressure gauge.

Championship Series — System 150-Series AV-30S-2.2-LR-ST

Product Description

Single frame factory assembled vacuum center consists of a single 30 gallon T304 stainless steel waste collection tank, two 2 HP recirculating water sealed liquid ring vacuum pumps and a PLC driven automatic control panel.

Descriptions						
Collection Tanks	Vacuum Pumps				Capacity*	
Qty	Volume (US Gal. Each)	Type	Qty	HP	Maxi-mum "LPV"	Maximum Continuous Flow
1	30	Recir-culating Liquid Ring	2	2	20	5 GPM

**The maximum capacity of each system is based on maximum load point value or "LPV" and maximum continuous flow rate.*

Features:

- Compact Design:
  41"[104cm] Long x 27-1/2"[70cm] Wide x 5'-10"[1.8m] Tall
- System Weights:
  - Dry: 650lbs [300kg] -Wet: 1050lbs [475kg]
- 30 gallon T304 stainless steel waste collection tank has 2" pipe size side waste inlet connection and 3" swing check waste outlet connection.
- Dual 2 HP vacuum pumps each have a 1/2" water supply inlet for pump water jacket fill float valve and a 1/2" overflow outlet. Pump water is fully recirculated through a cooling system requiring no continuous water supply.
- Industrial grade panel has PLC driven automation control of vacuum pumps and waste collection and discharge cycles. Panel includes a main disconnect, an alarm light, HOA switches, and an operator interface with digital display which shows vacuum system pressure and alarm status.
- Available 3-Phase 60 Hz Voltages:
  - 208 VAC – 11.3 FLA
  - 480 VAC – 6.5 FLA
- UPC (USA) and CUPC (Canada) Approved.

Championship Series — System 200-Series AV-30S-2.2-LR

Product Description

Fully redundant factory assembled vacuum center consists of one frame having two 30 gallon T304 stainless steel waste collection tanks bolted to second frame having two 2 HP recirculating water sealed liquid ring vacuum pumps and a PLC driven automatic control panel.

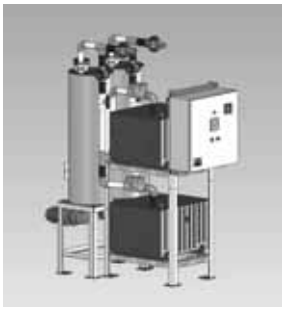
Descriptions						
Collection Tanks	Vacuum Pumps				Capacity*	
Qty	Volume (US Gal. Each)	Type	Qty	HP	Maximum "LPV"	Maximum Continuous Flow
2	30	Recir-culating Liquid Ring	2	2	35	15 GPM

*The maximum capacity of each system is based on maximum load point value or "LPV" and maximum continuous flow rate.

Features:

- Fully Redundant & Compact Design:
  60-1/2"[154cm] Long x 32"[81cm] Wide x 6'-4"[1.9m] Tall
- System Weights:
  - Dry: 650lbs [300kg]
  - Wet: 1300lbs [600kg]
- Dual 30 gallon T304 stainless steel waste collection tanks each have a 2" pipe size top waste inlet connection and 3" swing check waste outlet connection.
- Dual 2 HP vacuum pumps each have a 1/2" water supply inlet for pump water jacket fill float valve and a 1/2" over flow outlet. Pump water is fully recirculated through a cooling system requiring no continuous water supply.
- Industrial grade panel has PLC driven automation control of vacuum pumps and waste collection and discharge cycles. Panel includes a main disconnect, an alarm light, HOA switches and an operator interface with digital display which shows vacuum system pressure and alarm status.
- Available 3-Phase 60 Hz Voltages:
  - 208 VAC – 11.3 FLA
  - 480 VAC – 6.5 FLA
- UPC (USA) and CUPC (Canada) Approved.

Championship Series — System 300-Series AV-30S-2.3-LR



Product Description

Fully redundant factory assembled vacuum center consists of one frame having two 30 gallon T304 stainless steel waste collection tanks bolted to second frame having two 3 HP recirculating water sealed liquid ring vacuum pumps and a PLC driven automatic control panel.

Descriptions						
Collection Tanks	Vacuum Pumps				Capacity*	
Qty	Volume (US Gal. Each)	Type	Qty	HP	Max. "LPV"	Maximum Continuous Flow
2	30	Recirculat-ing Liquid Ring	2	3	55	15 GPM

The maximum capacity of each system is based on maximum load point value or "LPV" and maximum continuous flow rate.

Features:

- Fully Redundant & Compact Design:
  65-1/2"[165cm] Long x 33"[84cm] Wide x 6'-8"[2m] Tall
- System Weights:
  - Dry: 750lbs [350kg]
  - Wet: 1450lbs [650kg]
- Dual 30 gallon T304 stainless steel waste collection tanks each have a 2" pipe size top waste inlet connection and 3" swing check waste outlet connection.
- Dual 3 HP vacuum pumps each have a 1/2" water supply inlet for pump water jacket fill float valve and a 1/2" over flow outlet. Pump water is fully recirculated through a cooling system requiring no continuous water supply.
- Industrial grade panel has PLC driven automation control of vacuum pumps and waste collection and discharge cycles. Panel includes a main disconnect, an alarm light, HOA switches and an operator interface with digital display which shows vacuum system pressure and alarm status.
- Available 3-Phase 60 Hz Voltages:
  - 208 VAC – 20.3 FLA
  - 480 VAC – 11.7 FLA
- UPC (USA) and CUPC (Canada) Approved.

Championship Series — System 500-Series AV-60S-2.5-LR-STK

Product Description

Fully redundant single frame factory assembled vacuum center consists of two 60 gallon T304 stainless steel waste collection tank, two 5 HP recirculating water sealed liquid ring vacuum pumps and a PLC driven automatic control panel.

Descriptions						
Collection Tanks	Vacuum Pumps				Capacity*	
Qty	Volume (US Gal. Each)	Type	Qty	HP	Max. "LPV"	Maximum Continuous Flow
2	60	Recir-culating Liquid Ring	2	5	75	30 GPM

**The maximum capacity of each system is based on maximum load point value or "LPV" and maximum continuous flow rate.*

Features:

- Fully Redundant Design:
  65-1/2"[165cm] Long x 36"[91.5cm] Wide x 7'-6"[2.3m] Tall
- System Weights:
  - Dry: 950lbs [450kg] - Wet: 2350lbs [1050kg]
- Dual 60 gallon T304 stainless steel waste collection tanks each have a 2" pipe size side waste inlet connection and 3" swing check waste outlet connection.
- Dual 5 HP vacuum pumps each have a 1/2" water supply inlet for pump water jacket fill float valve and a 1/2" over-flow outlet. Pump water is fully recirculated through a cooling system requiring no continuous water supply.
- Industrial grade panel has PLC driven automation control of vacuum pumps and waste collection and discharge cycles. Panel includes a main disconnect, an alarm light, HOA switches and an operator interface with digital display which shows vacuum system pressure and alarm status.
- Available 3-Phase 60 Hz Voltages:
  - 208 VAC – 34.5 FLA
  - 480 VAC – 19.9 FLA
- UPC (USA) and CUPC (Canada) Approved.

Championship Series — System 1000-Series AV-60S-3.5-LR-3T-STK

Product Description

High Capacity fully redundant single frame factory assembled vacuum center consists of three 60 gallon T304 stainless steel waste collection tank, three 5 HP recirculating water sealed liquid ring vacuum pumps and a PLC driven automatic control panel.

Descriptions						
Collection Tanks	Vacuum Pumps				Capacity*	
Qty	Volume (US Gal. Each)	Type	Qty	HP	Max. "LPV"	Maximum Continuous Flow
3	60	Recirculat-ing Liquid Ring	3	5	95	60 GPM

**The maximum capacity of each system is based on maximum load point value or "LPV" and maximum continuous flow rate.*

Features:

- High Capacity Fully Redundant Design:
  90"[230cm] Long x 36"[91.5cm] Wide x 7'-6"[2.3m] Tall
- System Weights:
  - Dry: 1450lbs [650kg]
  - Wet: 3350lbs [1500kg]
- Triple 60 gallon T304 stainless steel waste collection tanks each have a 2" pipe size side waste inlet connection and 3" swing check waste outlet connection.
- Triple 5 HP vacuum pumps each have a 1/2" water supply inlet for pump water jacket fill float valve and a 1/2" overflow outlet. Pump water is fully recirculated through a cooling system requiring no continuous water supply.
- Industrial grade panel has PLC driven automation control of vacuum pumps and waste collection and discharge cycles. Panel includes a main disconnect, an alarm light, HOA switches and an operator interface with digital display which shows vacuum system pressure and alarm status.
- Available 3-Phase 60 Hz Voltages:
  - 208 VAC – 51.6 FLA
  - 480 VAC – 29.8 FLA
- UPC (USA) and CUPC (Canada) Approved.

VACUUM PLUMBING SYSTEMS

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Contact Sales Engineering for systems larger than the Championship Series.

Championship Vacuum Plumbing Products Series

Selecting the Right System

To select an appropriate Vacuum Center, you need to know the following:

- The type of equipment requiring drainage,
- The collective load point value of the fixtures and equipment requiring drainage
- Maximum anticipated continuous flow in gallons per minute, from all drainage combined.

If you need assistance, please contact AcornVac's Sales Engineering Department at 800-591-9920 or 909-902-1141, or by email at info@acornvac.com. You can find us on the web at www.acornvac.com.

Load Point Value	Project Data (Fill in the Blank)		
Fixture Type	LPV per Fixture	Quantity of Fixture Type	Total Item Value (Multiply Quantity By LPV Value)
Vacuum Toilet; .05 GPF	7		
Urinals	3		
Lavatory or Hand Wash Basin	1		
Floor Drains	5		
Mop or Utility Sink	5		
Multiple Bay Prep Sinks	10		
Misting Systems	1		
Refrigerated Case Equipment	.5		
AC Units	4		
Emergency Eye Wash	6		
Total Project Load Points Value			

Sizing Your Champion

1. Calculate the total fixture load requirement by adding the total point value for all equipment requiring vacuum drainage.

2. Refer to the Maximum LPV on the Championship Series pages 9-11 to select a system or use the calculator and see our systems on-line at www.acornvac.com.

3. Calculate the continuous flow rate for all fixtures combined. To do this, consider the normal use of the fixtures and equipment. Add the anticipated gallons per minute flow from all fixtures that might require drainage at the same time.

NOTE: Contact the factory for sizing assistance when the system includes grease or toilet waste.