Advantage

MEDICAL/SURGICAL CENTRAL VACUUM SYSTEMS
WHY BECKER?
With the many types of vacuum pumps—reciprocating; water, or oil sealed liquid ring; rotary screw; claw-type; multi-stage regenerative blowers; and oil-less, lubricated, or oil flooded rotary vane—that are available for use in medical facilities for their medical/surgical vacuum systems, it is difficult to know what type of pump to choose. Furthermore, there are many sources of supply for these pumps, ranging from packagers to distributors of medical equipment to pump manufacturers.

One type of pump—the rotary vane—has remained popular since the beginning, while others types have come and gone in popularity. They are efficient, very easy to service, and are field repairable.

Becker introduced the Advantage-L oil-flooded vacuum systems for medical facilities over a decade ago. The Advantage-L system was, and remains, the most advanced central vacuum system on the market, offering features no other system has.

After several years of testing, in 1994 Becker introduced the medical industry to the first new development in pump design for use in central vacuum systems in decades—the 100% oil-less vacuum pump.

Becker invented the oil-less pump nearly a century ago, but they were never available in sizes large enough for use in central vacuum systems until recent years. Then, Becker began testing them for suitability in medical applications. Their acceptance has been remarkable, and because of this success Becker made an oil-less version of the Advantage-L system, which we call the Advantage-D.

Advantage-D systems are probably the most maintenance-free systems currently on the market. They are available in a wide range of capacities to fit the needs of most medical facilities. And, no pump is as easy to service in the field as our oil-less pumps.

The next innovation was the introduction of the oil-less pump in a version specially constructed for waste anesthetic gas evacuation (WAGD). These systems are termed Advantage-A, and the pumps are cleaned to be free of hydrocarbons, and assembled using a bearing grease that is inert in the presence of oxygen and halogenated hydrocarbons.

Becker offers true choice of types of pumps and systems for use in your facility—Oil-flooded or Oil-less in either tank mounted or modular/expandable designs. Of course, all our medical systems are designed to meet the current requirements of the NFPA 99 standard.

You need to look no further than Becker for the answer to your needs.

SIZING
The NFPA no longer makes sizing recommendations for health care facilities, leaving the final determination up to the manufacturers, design engineers, or health care staff.

There are several methods available for sizing central systems for hospitals, each resulting in different—and often widely varying—results. Choosing the proper sizing method, therefore, is important. Results may vary by as much as 2:1, so careful consideration of the proper sizing method is critical to patient and staff.

Becker’s sizing method is based on experience gained from over a thousand installations, and includes up-to-date terminal requirements that are found in many of today’s health care facilities.
In facilities with newborn intensive care units, terminal requirements in a newborn nursery (full-term) may be reduced.

**SIZING EQUATION**

Vacuum Pump Size (SCFM*) =

\[(N_A \times UF_A \times 0.25) + (N_B \times UF_B \times 0.25) + (N_OR \times 1.5) + (N_WAGD \times 1.6)\]

Where:

- \(N_A\) = Number of A Type Terminals
- \(N_B\) = Number of B Type Terminals
- \(N_OR\) = Number of Operating Rooms
- \(N_WAGD\) = Number of WAGD Terminals**
- \(UF_A\) = Use Factor for A Type Terminals
- \(UF_B\) = Use Factor for B Type Terminals

* SCFM at 19" Hg (or the lead vacuum switch set point).

** Add this factor only when the WAGD needs are being included in the Medical/Surgical system. When sizing dedicated WAGD systems, use 1.6 SCFM per terminal.

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**USAGE TYPE A TERMINALS**

<table>
<thead>
<tr>
<th>Location</th>
<th>Recommended No. of Terminals</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Operating Room</td>
<td>3</td>
</tr>
<tr>
<td>Orthopedic Surgery</td>
<td>3</td>
</tr>
<tr>
<td>Surgical Cystoscopy and Endoscopy</td>
<td>3</td>
</tr>
<tr>
<td>Critical Care (General)</td>
<td>3</td>
</tr>
<tr>
<td>Isolation (Critical)</td>
<td>3</td>
</tr>
<tr>
<td>Coronary Critical Care</td>
<td>2</td>
</tr>
<tr>
<td>Pediatric Critical Care</td>
<td>3</td>
</tr>
<tr>
<td>Newborn Intensive Care</td>
<td>3</td>
</tr>
<tr>
<td>Cardi/o, Ortho, Neurological</td>
<td>3</td>
</tr>
<tr>
<td>Post-Anesthesia Care Unit</td>
<td>3</td>
</tr>
<tr>
<td>Caesarean/Delivery Room</td>
<td>3</td>
</tr>
<tr>
<td>Recovery Room</td>
<td>3</td>
</tr>
<tr>
<td>Labor/Delivery/Recovery (LDR)</td>
<td>2</td>
</tr>
<tr>
<td>Birthing Rooms</td>
<td>2</td>
</tr>
<tr>
<td>Triage Area</td>
<td>1</td>
</tr>
<tr>
<td>(Definitive Emergency Care)</td>
<td>1</td>
</tr>
<tr>
<td>Exam/Treatment Room</td>
<td>1</td>
</tr>
<tr>
<td>Definitive Emergency Care, Holding Area</td>
<td>1</td>
</tr>
<tr>
<td>Trauma/Cardiac Room</td>
<td>3</td>
</tr>
<tr>
<td>Cardiac Catheterization Lab</td>
<td>2</td>
</tr>
<tr>
<td>Special Procedures (Anesthetizing)</td>
<td>3</td>
</tr>
<tr>
<td>Special Procedures (Non-Anesthetizing)</td>
<td>2</td>
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<tr>
<td>Additional Anesthetizing locations</td>
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**USAGE TYPE B TERMINALS**

<table>
<thead>
<tr>
<th>Location</th>
<th>Recommended No. of Terminals</th>
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<tbody>
<tr>
<td>Patient Rooms (Medical and Surgical)</td>
<td>1 (Accessible to ea. bed)</td>
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<tr>
<td>Examination and Treatment Room</td>
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<tr>
<td>(Medical, Surgical, Postpartum Care)</td>
<td>1</td>
</tr>
<tr>
<td>Isolation (Infectious and Protective; Medical and Surgical)</td>
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<tr>
<td>Security Room</td>
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<td>(Medical, Surgical, Postpartum)</td>
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<tr>
<td>Newborn Nursery (Full-Term)*</td>
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<tr>
<td>Pediatric Nursery</td>
<td>1</td>
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<tr>
<td>Pediatric and Adolescent</td>
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<tr>
<td>Seclusion Treatment Room</td>
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<tr>
<td>Anesthesia Workroom</td>
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<tr>
<td>Outpatient Recovery</td>
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<tr>
<td>Postpartum Bedroom</td>
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<tr>
<td>Labor Room</td>
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<tr>
<td>Labor/Delivery/Recovery/Postpartum (LDRP)</td>
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<td>1 (per workstation)</td>
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<tr>
<td>Orthopedic and Cast Room</td>
<td>1</td>
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<tr>
<td>Catheterization Labs</td>
<td>2</td>
</tr>
<tr>
<td>Autopsy Room</td>
<td>1</td>
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<tr>
<td>Surgical Excision Room</td>
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<tr>
<td>Dialysis Units</td>
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<tr>
<td>Respiratory Care</td>
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<tr>
<td>Central Supply</td>
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<tr>
<td>Equipment Repair, Calibration</td>
<td>convenience</td>
</tr>
<tr>
<td>Teaching</td>
<td>convenience</td>
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</tbody>
</table>

1 In facilities with newborn intensive care units, terminal requirements in a newborn nursery (full-term) may be reduced.
Automatic Alternation
The lead and lag pumps automatically alternate on a first on-first off basis; this ensures that all pumps share the duty cycle equally. The first pump will not run again until all other pumps in the system run. This extends the life of the pumps and the service interval.

Bleed Valves
On all Advantage-L systems, we include inlet bleed valves to vent the vacuum in the inlet line and permit removal of the inlet filter cover for service—something forgotten by most other brands (Advantage-D and Advantage-A systems are self-venting).

Lead/Lag Operation
All multiplex systems feature a cascading control system enabling operation of only those pumps necessary to meet demand, thereby saving energy.

Redundant Transformers
While NFPA-99 requires redundant low voltage reducing devices, not all methods are truly redundant. Ours uses a relay to automatically switch from the failed unit to the backup unit; in addition, we provide an indicator light to warn when the system is operating on the backup transformer (something most other brands do not provide).

Pressure Transducer
All multiplex systems use a pressure transducer. This keeps the vacuum system operating between two fixed set points, unlike systems that use multiple mechanical vacuum switches, each of which has different set points. A transducer provides high accuracy and repeatability.

Expandable
All systems (other than tank mounted units) are expandable and grow as your facility grows, and all expand from duplex to sextuplex (6-pump system). Expansion can be done in about an hour, without shutting down the system, and no parts are discarded when expanding. Inexpensive control and pump modules are available from stock.

Inlet Filters
Every system includes inlet filters before each pump to prevent pump damage due to foreign particles.

Modular
Our expandable systems are modular, with no section wider than the opening of a standard 36" doorway, on most models. Modules quickly bolt together, and are designed to mix and match to meet specific requirements.
Meets NFPA 99
Each of our systems are designed and built to meet the current version of the NFPA 99 Health Care Facilities requirements for medical/surgical vacuum systems.

Programmable Controller Operated
All functions in every Becker multiplex system are controlled by a programmable controller. No new EEPROM is ever needed when expanding—once programmed, always programmed. If the PLC ever needs replacing, the system can be operated in manual mode.

High Efficiency Motors
Most of our pumps use heavy duty high efficiency motors with class-F insulation as standard equipment.

Optional Tank Drain Assembly
An optional manual or automatically operated tank drain assembly is offered. A full receiver bypass is standard, which permits servicing of the receiver without interrupting the vacuum supply. Meets current NFPA 99 specifications.

Convenient Service Points
All service points are easily accessible. No dangerous crawling over components is necessary.

Compact
Our expandable units have a footprint that is among the smallest of any system on the market, and expand vertically to save valuable space.

Vibration-Free
Smooth running rotary vane pumps require no special foundations; in fact, a nickle can be placed on edge on a running pump.

Air Cooled
All Becker pumps are air cooled, meaning no water is ever needed for cooling and operation.

Quiet
Rotary operation has no pulsations, and sound reducing technology is built-in, resulting in some of the quietest pumps in the world.

No Water
None of our systems use water for any reason. Water and sewer charges are eliminated and water pollution is never a problem. Furthermore, your dependence on another utility is eliminated.

Reserve Pump Alarm
An alarm, which signals when the reserve pump is in operation by a red light and steady 95 dBA tone, is standard equipment in our control panel. It can also indicate, with a flashing light, an optional low vacuum, low oil level, high exhaust filter pressure, high discharge temperature, or other alarm. A push-to-silence button is included. An auxiliary dry contact for remote signaling is standard equipment.

Emergency Stop Button
If an emergency should arise, the push of a single button will stop the operation of the entire system.

No Oil
Advantage-D and Advantage-A systems are 100% oil-less; therefore, there is no oil to fill, drain, change, or discard. No oil aerosols are ever present in the discharge air.

Meets NFPA 99
Each of our systems are designed and built to meet the current version of the NFPA 99 Health Care Facilities requirements for medical/surgical vacuum systems.
Our dry vacuum pumps have long had the best reputation in the industry. In 1994, we introduced the world’s first standard line of 100% oil-less rotary vane central vacuum systems, which quickly became the most popular type of system in the USA. Advantage-D systems are ideal for use where any of the following conditions are a concern:

- Where any oil mist, or aerosols, present in the discharge air could contaminate the workplace, or damage roofing membranes.
- Where oil filling, changing, and disposal is an inconvenience, or a hazard.
- If oil leaks persist.
- Where water and sewage charges add to your cost of operation.
- If water pollution is a concern.
- If you would like to minimize your maintenance requirements due to personnel downsizing.

**Modular/Expandable Models**

These are the premier Becker central vacuum systems. They are available as duplex, triplex, quadruplex, pentaplex, or sextuplex systems, with additional capacity upon request. Except for the latter, all are expandable, using standard factory modules, up to a sextuplex. As with the tank mounted units, all come with the basic accessories; mounting, however, is vertical. Each pump is mounted on its own stand, which stacks, one above the other. Each pump is connected to a central manifold, which is plumbed to a vertical receiver.

The control panel employs a programmable controller to determine the operating sequence of the pumps. Automatically alternating lead/lag, or “cascading”, controls operate on a first-on/first-off basis. This ensures that each pump will have approximately the same amount of running time. This even the wear on all pumps and prevents the reserve pump from deteriorating due to lack of use. Minimum run timers on all pumps prevent excessive wear on motors due to a high frequency of starts. Another feature of the control panel is the inclusion of a lag pump, or reserve pump, alarm, which can also serve as an alarm for other optional switches.
The entire system can be upgraded with additional capacity by adding a pump and electrical module. This can be performed in minutes with no interruption to the integrity of the vacuum system. Isolation valves are already installed for up to 6 pumps, and individual disconnects are provided for each motor. Since the system is vertically oriented, additional floor space may not be required. All service points are easily accessible without crawling over piping and pumps. All systems are compliant with the current version of the NFPA 99 standard.

Many medical facilities are being serviced by vacuum pumps that may not be the most ideal, simply because of the fact that there was no "ideal" solution. The majority of pumps used in the past required either oil or water for operation. Oil provides lubrication and cooling, but is not without its penalties. If operation is continuously below about 20" Hg, oil aerosols may be emitted, causing "smoking". This fouls equipment or discharge piping, and can be damaging to roof membranes. Water, on the other hand, requires dependence upon another utility, adding cost, and may cause contamination of the water supply. We often make compromises because there is no alternative.

The introduction of the Advantage-D dry central vacuum systems means that there is an alternative. One that can be operated at all vacuum levels from atmospheric to as high as 27" Hg, depending on model; one that is air cooled and requires no oil or water for operation; one that doesn't require oil filling, changes, draining or disposal; one that is self lubricated and minimizes any routine maintenance, thus freeing up personnel for other tasks.

Of course, not everyone prefers a dry system. Some prefer to operate at higher vacuum levels, and some may want a pump with higher efficiency—especially if operating at higher elevations. An oil flooded system, such as one of our Advantage-L systems shown on page 8 and 9, may then be a better choice. But, if your preference is for a system that requires a minimum of maintenance, then the Advantage-D may be the ideal choice.

A call to our factory will put you in touch with an expert to help you determine the exact system you need.
Our Dekatorr oil flooded vacuum pumps have long been a favorite in hospitals where quiet, dependable pumps are needed. Advantage-L systems employ the Becker Dekatorr pumps and are ideal for use where any of the following may apply:

- Where dry pumps may not be preferred due to slightly lower capacity at higher vacuum levels.
- Where water and sewage charges add to your cost of operation.
- If water pollution is a concern.

The Advantage-L systems are available in a wide variety of designs to fill any requirement you may have.

**Tank Mounted Models**

Systems are available in both simplex and duplex tank mounted versions. These are the most cost effective units, offering capacities adequate for many facilities. They are compact in design due to the pumps being mounted on top of the receiver. Included are all of the necessary accessories such as inlet check valves, isolation valves, inlet filters, flexible connectors and vibration isolators. A receiver bypass is standard, which permits servicing of the receiver without interruption to the system. All duplex systems employ a computer controlled automatic alternating controls for first-on/first-off, lead/lag operation.

**Modular/Expandable Models**

These are the premier Becker central vacuum systems. They are available as duplex through sextuplex systems, with additional capacity upon request. All are expandable up to a sextuplex, using standard factory modules. As with the tank mounted units, all come with the basic accessories; mounting, however, is vertical. Each pump is mounted on its own stand, which stack, one above the other. Each pump is connected to a central manifold, which is plumbed to a vertical receiver.

A standard receiver bypass line permits servicing of the receiver without interruption of the system, an NFPA 99 requirement. An optional tank drain, designed as an integral part of the system, allows draining of the receiver with no interruption to the vacuum system.

The control panel utilizes a programmable controller to determine the operating sequence of the pumps. Automatically alternating lead/lag, or “cascading”, controls ensure that each pump will have approximately the same amount of running time. This evens the wear on all pumps. All pumps operate on a first-on/first-off sequence—a pump can not start again until all other pumps have run. Minimum run timers on all pumps prevent excessive wear on motors due to a high frequency of starts.

Another feature of the control panel is the inclusion of a lag pump, or reserve pump alarm. The entire system can be upgraded with additional capacity by adding a pump and electrical module. This procedure can be performed in min-
utes with no interruption to the integrity of the vacuum system. Isolation valves are already installed for up to 6 pumps, and individual disconnects are provided for each motor. Since the system is vertically oriented, additional floor space may not be required. All service points are easily accessible without crawling over piping and pumps.

Advantage-L central vacuum systems give you an alternative to liquid ring systems: they can be operated at vacuum levels from about 19” Hg to as high as 29.84” Hg (2 torr) with no danger of cavitation; they are air cooled and require no water for operation; they do not require dependence upon another utility; they do not foul or contaminate our water supply.

Not all facilities may want an oil flooded vacuum system. Some may prefer pumps that are more maintenance-free, or where changing oil periodically is not practical. In these cases you may want to consider one of our Advantage-D dry central vacuum systems that employs 100% oil-less pumps, shown on pages 6 and 7.

A call to our factory will put you in touch with an expert to help you determine the exact system you need.
Two methods are used for evacuating and disposing of waste anesthetic gas—the passive method, which uses the operating room exhaust of a non-recirculating air conditioning system; and the active method, which uses a vacuum producer. Active systems typically use the central medical/surgical vacuum system, or a dedicated central vacuum system for WAGD that uses a water sealed liquid ring pump. The reasons are that some anesthetic agents are oxygen rich, or are halogenated hydrocarbons; also, when a patient is recovering, pure oxygen may be administered for extended periods. Hydrocarbons and oxygen combine to cause violent reactions. The air conditioning system is safe because very little vacuum is required, and the gas is exhausted from the building. The central medical/surgical vacuum system is safe because the gas is diluted below any hazardous levels. A water sealed liquid ring is safe because water will not react with these gases. Before now, in dedicated systems, there was no real alternative to the liquid ring.

The current NFPA 99 standard states: “Producers used exclusively for WAGD use shall be designed of materials, and shall use lubricants where needed, that are inert in the presence of oxygen, nitrous oxide, and halogenated anesthetics.” After liquid ring pumps, most other types of pumps used in medical facilities use oil, thus they are not acceptable as an alternative to the liquid ring. Many A & E’s and hospital engineers prefer a dedicated system over using the main medical/surgical system, but don’t want to use a liquid ring because of water use. Becker is now providing the first alternative in many decades.

Becker’s Advantage-A systems are specially prepared versions of our highly successful Advantage-D Oilless Central Vacuum Systems. In order to meet NFPA 99 requirements for inert materials, the pumps are specially assembled using no hydrocarbons. The pumps use non-lubricated graphite vanes, and the bearings are lubricated with high temperature, high vacuum, PFPE (perfluorinated-polyether) grease that is inert in the presence of oxygen, nitrous oxide, and halogenated anesthetics.

All Advantage-A systems include pumps; motors; receiver w/ full bypass; inlet check valves; inlet filters; isolation valves; stainless steel flexible connectors; inlet pressure gauges; vibration isolators; and automatic alternating and cascading controls that include: PLC w/ dual EEPROM’s; motor starters w/ motor branch circuit disconnects; pressure transducer; process controller w/ digital pressure readout; high/low/low-vacuum switch point controls; dual, redundant transformers; reserve-pump-in-use alarm w/ auxiliary dry contacts; emergency stop switch; H-O-A switches; pump run lights; system power-on lamp; digital hour meters; and NEMA 12 enclosure. All Becker pumps are ISO 9001 certified and CE compliant, and all
Advantage-A systems are compliant with the current version of the NFPA 99 (WAGD, Level 1) code.

When sizing, Becker recommends calculating the flow requirements at 1.6 SCFM per WAGD terminal at the operating pressure. Many are aware that disagreement exists within the medical community as to the exact vacuum level at which a WAGD system should operate. The Becker Advantage-A WAGD system can meet the requirements of all sides in the debate. Some prefer operation very near atmospheric pressure (low vacuum); some believe a higher vacuum is preferable. The Advantage-A system can run, on a continuous basis, at any vacuum level from atmospheric to a maximum of 22 to 27"Hg (depending on model), without any negative effects.

Call the Becker factory for engineering assistance in selecting the Advantage-A system that best meets your needs.
# General Performance and Dimensional Details

## Advantage-L Lubricated Systems

<table>
<thead>
<tr>
<th>MODEL</th>
<th>CPM</th>
<th>15'Hg</th>
<th>24'Hg</th>
<th>37.5'Hg</th>
<th>Horsepower*</th>
<th>Tank (Gal's)</th>
<th>Overall Dim’s**</th>
</tr>
</thead>
<tbody>
<tr>
<td>ST20L</td>
<td>12.4</td>
<td>4.5</td>
<td>2.5</td>
<td>0.9</td>
<td>60</td>
<td>50</td>
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<td>ST40L</td>
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<td>10.5</td>
<td>5.7</td>
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<td>50</td>
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<td>9.6</td>
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<td>71</td>
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<td>41.0</td>
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<tr>
<td>ST190L</td>
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<td>71</td>
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<tr>
<td>ST250L</td>
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<td>61.0</td>
<td>32.9</td>
<td>10</td>
<td>240</td>
<td>88</td>
<td>32</td>
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</tbody>
</table>

## Horizontal Tank Mounted Simplex Systems

- **Modular/Expandable Simplex Systems**
  - DS20L3: 12.4, 4.5, 2.5, 0.9
  - DS40L3: 28.8, 10.5, 5.7, 2.4
  - DS70L3: 49, 17.8, 9.6, 3
  - DS100L3: 71, 25.8, 13.9, 5
  - DS165L3: 113, 41.0, 22.1, 5
  - DS190L3: 129, 47.6, 25.6, 7.5
  - DS250L3: 168, 61.0, 32.9, 10

## Horizontal Tank Mounted Duplex Systems

- **Modular/Expandable Duplex Systems**
  - DT20L3: 12.4, 4.5, 2.5, 0.9
  - DT40L3: 28.8, 10.5, 5.7, 2.4
  - DT70L3: 49, 17.8, 9.6, 3
  - DT100L3: 71, 25.8, 13.9, 5
  - DT165L3: 113, 41.0, 22.1, 5
  - DT190L3: 129, 47.6, 25.6, 7.5
  - DT250L3: 168, 61.0, 32.9, 10

## Modular/Expandable Triplex Systems

- **Modular/Expandable Quadruple Systems**
  - TS20L3: 24.8, 9.0, 5.0, 1.8
  - TS40L3: 57.6, 21, 11.4, 4.8
  - TS70L3: 98, 35.6, 19.2, 6
  - TS100L3: 142, 51.6, 27.8, 10
  - TS165L3: 226, 82.0, 44.2, 10
  - TS190L3: 258, 95.2, 51.2, 15
  - TS250L3: 336, 122, 65.8, 20
  - TS400L3: 580, 210, 113.6, 30
  - TS630L3: 880, 320, 172.4, 50

## Modular/Expandable Quadruplex Systems

- **Modular/Expandable Quadraplex Systems**
  - QS20L3: 37.2, 13.5, 7.5, 2.7
  - QS40L3: 86.4, 31.5, 17.1, 7.2
  - QS70L3: 147, 53.4, 28.8, 9
  - QS100L3: 213, 77.4, 41.7, 15
  - QS165L3: 339, 123, 66.3, 15
  - QS190L3: 387, 142.8, 76.8, 22.5
  - QS250L3: 504, 183, 98.7, 30
  - QS400L3: 870, 315, 170.4, 45
  - QS630L3: 1320, 480, 258.6, 75

## Advantage-D Dry Systems

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<th>MODEL</th>
<th>CPM</th>
<th>17'Hg</th>
<th>24'Hg</th>
<th>37.2'Hg</th>
<th>Horsepower*</th>
<th>Tank (Gal's)</th>
<th>Overall Dim’s**</th>
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<td>ST25D</td>
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<td>ST40D</td>
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## Horizontal Tank Mounted Simplex Systems

- **Horizontal Tank Mounted Duplex Systems**
  - DT25D3: 18, 5.32, 2.0, 1.2
  - DT40D3: 28, 8.27, 3.1, 2
  - DT60D3: 39, 12.5, 5.5, 3
  - DT80D3: 48, 15.4, 6.8, 5
  - DT100D3: 69, 22.1, 9.8, 5
  - DT140D3: 95, 30.4, 13.4†, 7.5
  - DT200D3: 130, 41.4, 18.4, 7.5
  - DT250D3: 173, 55.4, 24.5, 10

## Horizontal Tank Mounted Simplex Systems

- **Modular/Expandable Simplex Systems**
  - DS25D3: 18, 5.32, 2.0, 1.2
  - DS40D3: 28, 8.27, 3.1, 2
  - DS60D3: 39, 12.5, 5.5, 3
  - DS80D3: 48, 15.4, 6.8, 5
  - DS100D3: 69, 22.1, 9.8, 5
  - DS140D3: 95, 30.4, 13.4†, 7.5
  - DS200D3: 130, 41.4, 18.4, 7.5
  - DS250D3: 173, 55.4, 24.5, 10

## Modular/Expandable Simplex Systems

- **Modular/Expandable Duplex Systems**
  - TS25D: 36, 10.64, 4.0, 2.4
  - TS40D: 56, 16.54, 6.2, 4
  - TS60D: 78, 25.0, 11.0, 6
  - TS80D: 96, 30.8, 13.6, 10
  - TS100D: 138, 44.2, 19.6, 10
  - TS140D: 190, 60.8, 26.8†, 15
  - TS200D: 260, 82.8, 36.8, 15
  - TS250D: 346, 110.8, 49.0, 20

## Modular/Expandable Triplex Systems

- **Modular/Expandable Quadraplex Systems**
  - QS25D: 54, 15.96, 6.0, 3.6
  - QS40D: 84, 24.81, 9.2, 6
  - QS60D: 117, 37.5, 16.5, 9
  - QS80D: 144, 46.2, 20.4, 15
  - QS100D: 207, 66.3, 29.4, 15
  - QS140D: 285, 91.2, 40.2†, 22.5
  - QS200D: 390, 124.2, 55.2, 22.5
  - QS250D: 519, 166.2, 73.5, 30

† Performance stated at 22 in.Hg
Advantage-D Dry Vertical Tank Systems

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<th>MODEL</th>
<th>SCFM (NFPA Capacity*)</th>
<th>Overall Dim's**</th>
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<tr>
<td>ST80D-V</td>
<td>48 15.4 6.8 5</td>
<td>120 54 30 74</td>
</tr>
</tbody>
</table>

Vertical Tank Mounted Simplex Systems

** These dimensions are for estimates of the overall system envelope, and should not be depended on for installation details. The dimensions are subject to change without notice. Contact the factory for certified dimensional drawings.

WAGD systems are specially prepared versions of our Advantage-D systems for use on dedicated waste anesthetic gas disposal applications. See pages 10 – 11 for details.

† Performance stated at 22 in.Hg

* Except for simplex systems, data is for an NFPA 99 Level 1 system, which requires a reserve pump; thus, performance in this table is for the total number of pumps in the system, minus 1 i.e., a Triplex TS100D3 would be designed for 2 pumps with a total flow of 44.2 SCFM at 19'Hg, and total HP of 10. The reserve pump produces 22.1 SCFM and uses a 5 HP motor, and is not included in the tables presented on this page.

Becker Pumps Corp. reserves the right to alter data without notice.

Full specifications may be found on the Becker website at www.beckerpumps.com. Select the Downloads menu, then Specifications.
Overall Dimensions

Modular/Expandable Systems
Horizontal Tank Mounted Systems (ST, DT)

Vertical Tank Mounted Systems (ST-V, DT-V)