Onion Paper

An Onion Enterprise Newsletter

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SCFM Vs ACFM

Do you know the Difference? Are you getting the flow rate and blower performance your site requires?
The answers to these questions are on page 2.

Vapor Extraction Systems

Onion Enterprises sells and rents vapor extraction technologies to cost effectively abate your vapor problems. OE provides these products or as components. Several of these technologies are listed below:

- **Regenerative Blowers**
- **Positive Displacement Blowers**
- **Liquid Ring Vacuum Pumps**
- **Rotary Vane-Vacuum Pumps**

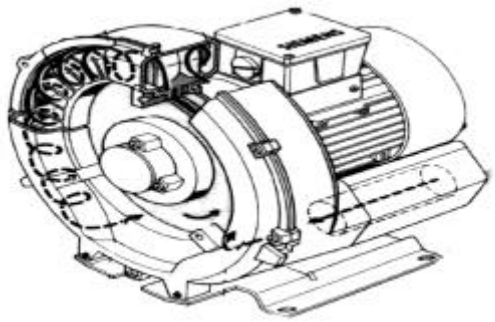
OE's typical vapor extraction system consist of a Blower, moisture separator, high tank shut-off, vacuum gage, inlet filter,silencer, skid or trailer mounted and control system. System can be specialty coated for aggressive or corrosive gasses. To help the OE team serve you better we have attached our simple vapor questionnaire that can either be faxed or mailed in.

If you have a vapor problem please contact the OE team of experts **Toll Free 877-566-7007** or

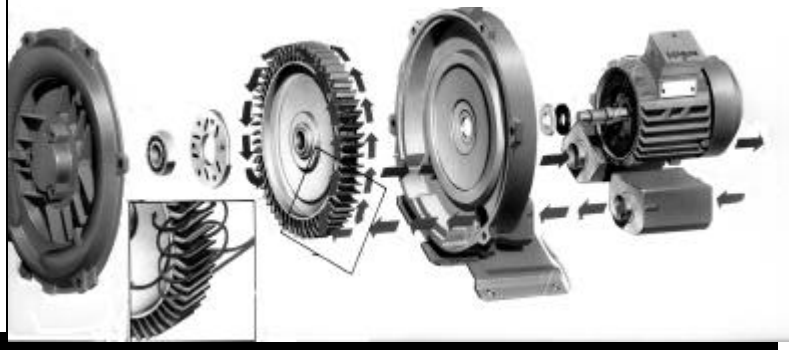
Vacuum Blowers The Facts

Regenerative Blowers- Regenerative blowers are the most recommended Vacuum pump for the soil vapor extraction applications. The blowers provide high performance efficiency and require virtually no maintenance.They are compact, simple machines that operate at low noise levels.

Principle of Operation-The impeller blade passes the inlet port drawing air or other air or gas into the blower. The impeller blades then, by centrifugal action accelerate the gas outward and forward into a side channel. In the side channel, this velocity is converted into pressure and is forced back towards the impeller blades. Here the air "regenerative " principle takes effect. Each "regeneration" imparts more pressure to the air. This spiral path continues until the gas exits the discharge port The pressures or vacuum generated by the spinning, non-contacting, oil-free impellers are equal to or greater than those achieved by many larger multistage or positive displacement blowers. ***Continued on page 2***



Imploded view and Schematic



Vacuum Blowers: The Facts

Regenerative Blowers

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New break through by companies like Siemens in the regenerative technologies have allowed the blowers to reach vacuums and pressures of a positive displacement blower. The new blowers have vacuums between 1'HgV(14" WC) and 16" HgV(220"WC). Blower sizes range between 10 cfm and 1200 CFM. Noise levels with a regenerative blower are relatively low between 65-80dB(A) depending on blower size.

New technologic Breakthroughs has increased the vacuum on regenerative blowers to 16" Hg

The advantages :

- **Low-No Maintenance**
- **Direct close coupled construction, no belts, compact design**
- **Low noise**
- **High Vacuum up to 16"Hg**

The Disadvantages:

- **Flow (environmental)limited to 1200 cfm**
- **Flow can not be geared up or down(requires VFD)**

Positive Displacement Blower s

Positive Displacement(PD)Blowers- are used communally in situations that required a vacuum greater then 6"Hg. Until recently the Regenerative blowers were only capable of up to 6"Hg. The PD blowers are efficient and by changing belt pulleys the RPM can be changed to allow for flexibility in the performance of the blower.

Principal of Operation

Two Figure-eight lobe impellers mounted on parallel shafts rotate in opposite directions. As each impeller passes the blower inlet, it traps a definite volume of air and carries it around the case to the blower outlet, where it is discharged. With constant speed operation, the displaced volume is essentially the same regardless of pressure temperature or barometric pressure. Timing gears control the relative position of the impellers to each other and maintain small but definite clearances. This allows operations without lubrication required. inside in the air casing. **Continued on 3>**

PD Blower Operations

ACFM Vs SCFM

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SCFM(Standard CFM) vs. ACFM (Actual CFM)

SCFM and ACFM cannot and should not be used interchangeably if blower performance problems are to be avoided.

SCFM is used to designate flow in terms of reference pressure, temperature and relative humidity. The ASME standards are 14.7 PSIA, 20 ºC,and 36% relative humidity. This converts to a density of 0.075 lbs./cu. ft for air. **Note: These conditions are normally stated at the inlet or outlet of the blower.**

To convert from SCFM to ACFM the following formula is used:

$$ACFM = SCFM \times \frac{P_s - (RH_s \times PV_s)}{P_b - (RH_a \times PV_a)} \times \frac{T_a}{T_s} \times \frac{P_b}{P_a}$$

Where:

P_S = Standard Pressure(PSIA)
P_B= = Atmospheric Pressure(PSIA)
P_A = Actual Pressure(PSIA)
RH_S = Actual Relative Humidity
RH_A = Actual relative Humidity
PV_S = Saturated vapor pressure of water @ T_S
PV_A = Saturated vapor pressure of water @ T_a
T_S = Standard temperature(ºR) Note ºR=ºF+ 460
T_A = Actual Temperature

From this formula a 25"Hg of mercury ACFM system can be **off by over a factor of 3 when** comparing to SCFM.

ONION ENTERPRISES

Vapor Extraction Technologies

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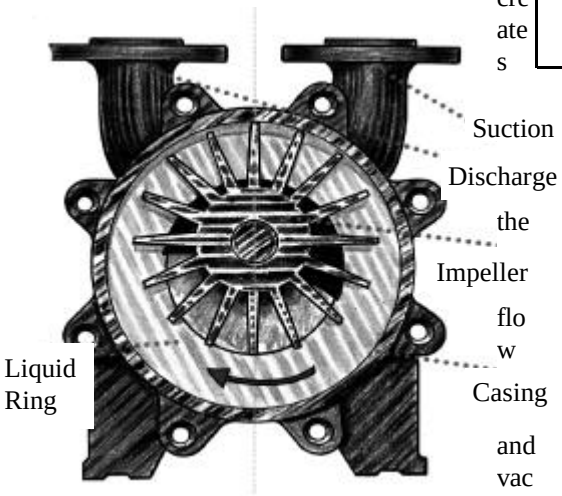
Liquid Ring Pumps-are used most commonly for dual phase extraction system or when high vacuum higher then 16" Hg is need during Vapor extraction. Liquid ring pumps are highly reliable because there is no metal to metal contact of parts inside the pump, it requires very little maintenance and enjoys extremely long service life. The systems run quietly with minimum heat build up.

Principle of Operations

Liquid ring pumps consist of a cylinder casing in which the rotor type impellers rotate eccentrically, moving the service liquid: this forms a liquid ring and is concentric to the pumps casing body.

At the pumps inlet port, gas is drawn in and enclosed between the impeller vanes. Because of the progressive immersion of the vanes into the service liquid, the gas is forced into a reduced volume, or compressed. The gas, along with a small part of the service liquid , is discharged through the pumps outlet. The physical action of the service liquid as it advances and retreats from the root of the impeller, creates a pumping action which creates



Advantages:

- **Very high vacuum over 26"Hg**
- **Quite operations**
- **Capable of Duel Phase Extraction**

Rotary Vane Vacuum Pumps-when high flows with high vacuum is needed rotary vane pumps are a good choose. These pumps can achieve greater than 500 cfm and 28"Hg. These pumps are oil sealed and air cooled which eliminates the expense of water and its disposal. Like the liquid ring pumps these pumps are highly reliable because there is no metal to metal contact of parts inside the pump. It requires little maintenance and enjoys a extremely long service life. These systems run quietly with little heat build up.

Principal of Operation

Rotary Vane pumps consists of free moving vanes that are inserted into slots in the pump rotor, which is mounted eccentrically in the pump cylinder. As the rotor turns, centrifugal force throws the vanes against the cylinder wall, creating several chambers in the compression space between the rotor and the cylinder. As these chambers pass the intake port, the air flows into them, and as the rotor continues to turn,the air is compressed owing to the eccentricity of the rotor,

Advantages:

- **Very high Vacuum over 28"Hg**
- **High flow over 500 cfm**
- **Capable of dual phase extraction**

Partial lists of products for sale and rent

Vapor Phase Treatment

Thermal Oxidizers
chlorinated and non
Catalytic Oxidizers
chlorinated and non
Regenerative CatOx
Carbon Vessels
Concentrators
Blowers
Liquid Ring Pumps
Moisture Separators
Dual Phase Extraction
Bio

Fluid Treatment

Air Strippers
Oil-water separators
Pumps
UV Oxidation, Cav-OX
Carbon Vessels
Tanks
Flow Indicators
Transfer Pumps
Bio-Oxidation

Onion Enterprises

Call us for your

Pre-Packaged Remediation Systems
All systems are designed to your site specific requirements. Each system is pre-wired, plumbed and tested prior to delivery to your site. These systems can either **skid or trailer** mounted. Explosion proof designs are also available.

Telecommunications and Controls
Let OE's design engineers bring your control panel into the 21st century with its advanced communication system. The control panels are assembled using UL listed part and bringing you the latest in control technologies