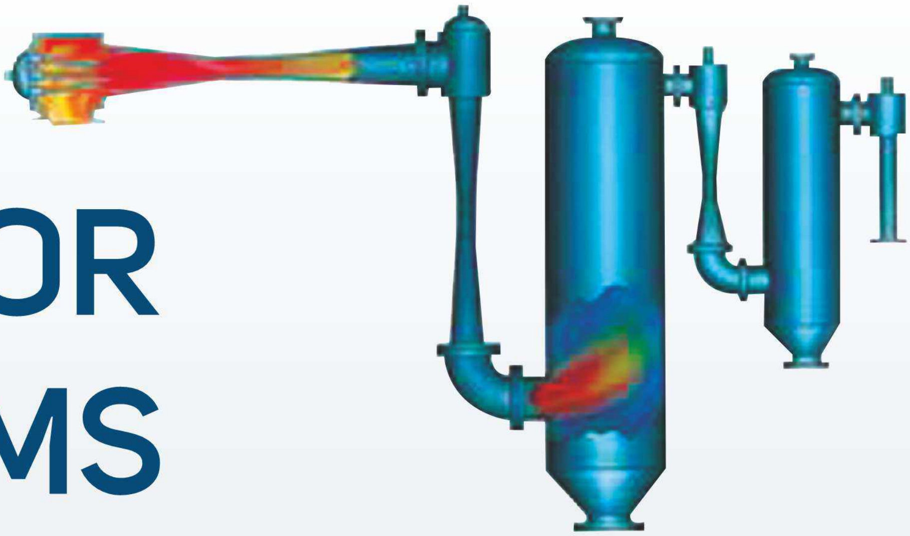
Meekaj is manufacturing
and suppling the world best
Vacuum system as per the
Design of most experienced engineer

meekaj
Techno App Services



EJECTOR SYSTEMS

www.meekaj.com

Most of our vacuum systems are performance tested in our facilities before shipment to assure reliability. Our experienced service engineers are available for system start-up assistance, and to solve customer vacuum system operating problems in short notice period

Now can say Meekaj is one of leader manufacturer and supplier especially the vacuum generating equipments as below and it is Manufacturing according to world's recognized code ASME For Mechanical Design, HEI for thermal, TEMA & ASME Codes for Heat Exchanger

1) Liquid ring vacuum pump
2) Steam jet ejector vacuum system
3) Educator
4) Tank mixer
5) Thermo compressor
6) Water refrigerating system
7) Inline heater
8) Silencer
9) Water jet ejector

Material of Construction

The Ejector System in below material of construction as per costumer requirement-stainless Steel, Carbon steel, Titanium, Graphite, alloy Steel, Hest alloy, Plastic material i.e. PP, FRP, Teflon Lined etc.

Application

1. Distillation, evaporation, drying, cooling, cooking etc. in chemical, pharma, paper, petrochemical, food, starch industries etc.
2. Vacuum De-Gassing in steel plant
3. Stem jet and Meg jet ejector system in Polyester plant
4. Bleaching, deodorization, stratification, autoclaves, fatty distillation etc in edible oil refinery plant
5. Soap drying, fatty distillation is soap Ind.
6. Water Chilling
7. Power Plant - Water cooled and Air cooled condenser exhausting, priming

- In the power plant the condenser exhauster operation consist of two phase Hogging (the initial evacuation) and Holding (continuous running)
- Condenser exhauster systems are used to remove the air from power plant condenser in order to maintain the lowest possible turbine back pressure

meekaj
Techno App Services

Ejectors may be installed at ant angle. However, to keep condensate and any entrained solids for collection, low points in the Vacuum piping system should be avoided during installation.If the ejector or piping is steam jacketed to prevent ice buildup, Its orientation will affect the operation drainage of the jackets. To keep the jackets from filling with condensate, all inlet and outlet piping should be installed so that the jacket can be sufficiently drained. In certain systems, vacuum processes produce varying amount of solid carryover, which can deposit inside the ejector system. During ejector placement, access for cleaning must be maintained, especially of the potential for deposits exists.

Condensers :

In multi-stage systems, inter condensers are used between successive ejector stage to reduce the vapor load on later stages. These units condense steam and condensable vapors, and cool air and other non-condensable vapors. Typically, a steam-jet vacuum system uses either a direct-contact (or barometric) condenser, or a surface condenser, typically a shell-and-tube heat exchanger

Vacuum Piping

The Heat Exchange Institute's Standard for Steam Jet Vacuum Systems details the procedure for calculating pressure drop in vacuum systems. In general, the diameter of the piping between the process and the ejector system must be at least as large as the suction connection in the first-stage ejector. In a multiple-element ejector system, where the ejectors may be operated simultaneously, the piping area must be a least as large as the total cross-sectional area, which is determined by adding the total areas of all ejector intel connections. To minimize pressure drop, all piping between the process and the steam-jet vacuum system and between each successive stage of the vacuum system - should have as few valves and fittings as possible, and all connections should be kept as short as possible. Wherever possible, long-radius elbows should be used, and drains must be provided in all low points to prevent condensate buildup. When a pre condenser is used, the potential pressure drop across it must be calculated, to ensure that such pressure drop will not impede system performance. The ejector manufacturer should be consulted to determine the suitability of the installation.

UTILITIES

Steam supply

A source of dry steam - at or slightly above design pressures - must be available at the ejector nozzles at all time. Operating a steam-jet vacuum system at steam pressures lower than those specified in the system design will reduce system stability. The steam should be dry and saturated, unless the system specification call for superheated steam. To maintain the optimum velocity, and avoid excessive heat loss and pressure drop, all insulated steam lines should be sized to match the connections on the ejectors. For dry steam, the inlet line should be taken off the top of main stream header.

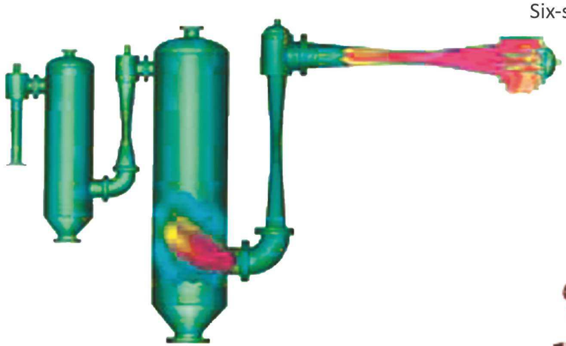
Steam should be dry around 97% at the saturated temp. Poor-quality if steam is threaten the system as well as it cause for erosion of the steam nozzle and diffuser.

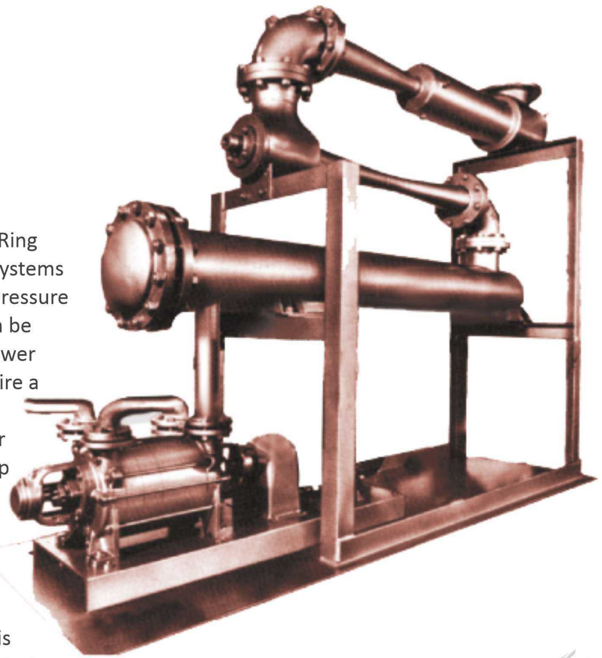
Cooling water supply

The specified quantity of water must be supplied ti the condenser, and it must be at or below the design temperatures. If the volume of cooling water drops, the temperature and pressure of the vapor in the condenser will rise and the system will cease to operate correctly. A temperature gauge at the cooling water outlet should be used to determine the adequacy of the cooling water flow.

Multiple-stage condensing Ejectors : These systems usually have two or three ejector stages separated by intercondensers to condense the condensible portion of the vapor mixture entering the intercondenser and reduce the load on the following stage. These systems are designed for low absolute pressures (5 to 100 TORR) and minimum operating costs.

Multiple-stage non-condensing Ejectors followed by multiple-stage condensing Ejector : This configuration is used with interstage condensing to achieve extremely low vacuums (.001 to 5 TORR) with economy. As many as six ejector stage in series are used to achieve pressures at the magnitude of .001 TORR. Six-stage ejectors are primarily used in vacuum metallurgy and space simulation.





Combination Steam Ejector and Liquid Ring Vacuum Pump systems : Combination systems are often used to educe energy costs. Pressure range from atmosphere to 50 TORR can be handled by liquid Ring Pumps alone. Lower absolute pressures (1 ro 50 TORR) require a combination with a steam jet ejector. When compared to an all-steam ejector system, Operating cost of vacuum pump combination system is lower. Other factors to consider include: Operating simplicity, ability to handle corrosive vapors, available space, and the cost and availability of spare parts. In many existing multi-stage vacuum systems it is advantageous to replace the final two Ejector stages with a Liquid Ring Vacuum Pump to reduce operating costs.

meekaj
Techno App Services

Meekaj Is offering the most economic combination as below according to requirement of vacuum level, application, site location etc:

1. Single-stage steam Ejector
2. Multiple-stage non-condensing ejectors
3. Multiple-stage condensing Ejectors
4. Multiple-stage non-condesong Ejectors followed by multiple-stage condensing Ejector
5. Combination Steam Ejector and Liquid Ring Vacuum Pump systems
6. Steam jet - water jet ejector combination

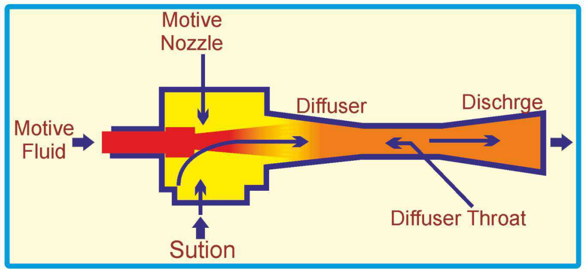
Advantages or benefits of Meekaj Ejector System

- Ejectors can be operated with many different motive fluids : steam, air, organic vapor and other gases.
- Can handle corrosive and slugging liquids, solid and abrasive suction fluids without damage.
- There is no moving or rotating part in ejector, it completely trouble free operation. Also no lubrication, no vibration, no bearing or seal problems and it is available with flanged or weld end connections. Explosion-proof construction.
- Ejectors can be installed indoors or outdoors with versatile mounting design
- Low initial cost, low maintenance cost, long life.
- It can handle high volumes of suction fluid at low absolute pressures

Steam jet vacuum system combine ejectors, condensers and inter connecting piping to provide relatively low cost and lower maintenance vacuum system. These systems operate on the ejector venture principle, which relies on the momentum of a high velocity jet of steam to move air and other gases from a connecting pipe or vessels.

Operation principle and arrangement of Ejector system

Ejector is consisting of mainly mixing chamber, Converging/Diverging nozzle, diffuser (converging inlet, Throat and diverging outlet). In steam jet ejector suction chamber is connected to the vessel or pipeline that is to be evacuated under vacuum. The Gas that is to be induced in to the suction chamber can be any fluid that is compatible with the steam and components materials of construction.



The steam nozzle discharges a high velocity jet across the suction chamber. This steam jet creates a vacuum which extracts air or gas from the adjoining vessel. As these gases are entrained in the steam, the mixtures travel through the ejector in to a venture shaped diffuser. In the diffuser, its velocity energy is converted into pressure energy, which helps to discharge the mixer against a predetermined back pressure, either to atmosphere to a condenser. Since the capacity of single ejector is fixed by its dimensions, a single unit has practical limits on the total compression and throughout it can deliver. For greater compression, two or more ejectors can be arranged in series. For greater throughput capacity of gas pr vapor, two pr more ejectors can be arranged in parallel.

In a multi-stage system, condensers are typically used between successive ejectors. By condensing the vapors before sending the Stream on to the next stage, the vapor load is reduced. This allows smaller ejectors to be used, and reduces steam consumption.

Ejectors are are generally categorized onto one of four basic types : single-stage, multi-stage non-condensing, multi-stage condensing and multi-stage with both condensing and non-condensing stages

Pre condensers can be added to reduce the load on the first-stage ejector, and allow for a smaller unit. An after condenser can also be added, to condense vapors from the final stage. Adding an after condenser will not effect overall system performance, but may ease disposal of vapors.

Ejector Efficiency

There are many accepted formulae to express ejector efficiency. Typically, efficiency involves a comparison of energy output to energy input. This ratio is of little value in the selection and design of ejectors. Since ejectors approach a theoretically isentropic process, overall efficiency is expressed as a function of entrainment efficiency. The direct entrainment of a low velocity suction fluid by a motive fluid results in an unavoidable loss of kinetic energy owing to impact and turbulence originally possessed by the motive fluid. This fraction that is successfully transmitted to he mixture through the exchange of momentum is called the entrainment efficiency.

That proportion of the motive fluid energy which is lost is transferred into heat and I absorbed by the mixture, producing therein a corresponding increase in enthalpy

Ejectors operate optimally under a single set of conditions. Ejector design can be classified either as critical or non-critical. Critical design means that the fluid velocity in the diffuse throat is sonic. In non-critical units the fluid velocity is subsonic. A steam ejector is of critical design when the suction pressure is lower than approximately 55% of the discharge pressure. Ejector designed in the critical range are sensitive to operating conditions other than those for which the unit was designed. The table below illustrates how changes in operation can affect ejector performance :

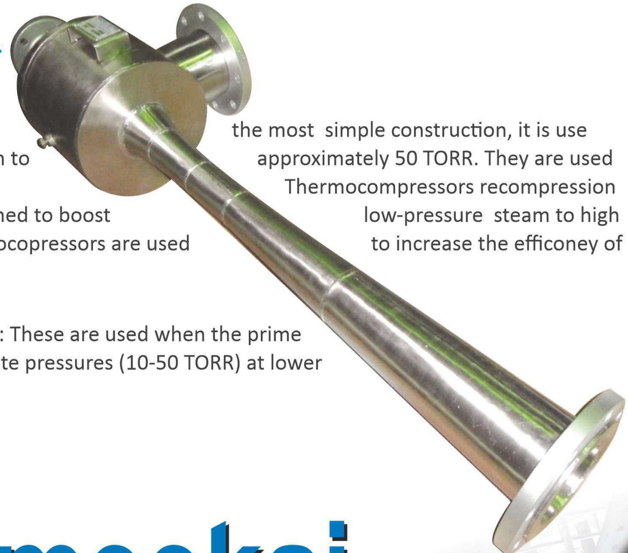
EFFECT OF OPERATIONAL CHANGES ON CRITICAL FLOW EJECTOR PERFORMANCE			
MOTIVE PRESSURE	DISCHARGE PRESSURE	SUCTION PRESSURE	SUCTION CAPACITY
Decrease	Constant	Increase rapidly	Decrease rapidly
Constant	Increase	Increase rapidly	Decrease rapidly
Constant	Constant	Increase	Increase
Constant	Constant	Decrease	Decrease
Increase	Constant	Constant	Decrease gradually
Constant	Decrease	Constant	Unchanged

In critical units it is possible to decrease the motivating pressure without a resulting change in the suction pressure if the discharge pressure is also decreased. The relation of a change between the motivating pressure and discharge pressure depends on the characteristics of the ejector design. Since an ejector is a "one point design" once a unit is designed and built to definite specifications of motivating pressure, discharge pressure and suction pressure, its suction capacity cannot be increased without changing the internal physical dimensions of the unit. The suction capacity is actually lowered by increasing the motivating pressure. Since the ejector nozzle is a fixed orifice metering device any change in the motivating pressure is accompanied by a proportionate change in the quantity of motive fluid.

In non-critical design units, changes in the motivating pressure and discharge pressure cause gradual changes in the suction pressure and capacity. It is still impossible, however, to increase the suction capacity in proportion to motivating pressure increases.

Where the motivating fluid is steam, the quality of steam, has an effect on the operation of the unit. Most units are designed to used dry and saturated high pressure steam as motive fluid. If the quality of the steam decreased below 97% a gradual decreases in suction pressure and suction capacity occurs. This phenomenon will be particularly noticed In units designed for high compression ratios and even more so un multi-stage units. Effective ejector compression ratios can be as high as 10:1 at close of (point of zero suction capacity) depending on motivating fluid pressure. Excessive steam superheat (higher that 50°F.) can also adversely affect the suction capacity of an ejector. it not only decreases the energy level ratio, but also the increase in specific volume tends to choke the diffuser. If an ejector is designed to use superheated motivating steam the latter can be overcome.

Ejector Efficiency



Single-stage steam Ejectors: These are the most simple construction, it is use to producing the vacuum level from Atm to approximately 50 TORR. They are used with or without precondensers. Thermocompressors recompression boosters are single-stage Ejectors designed to boost low-pressure steam to high pressure and temperature. Most thermocopressors are used to increase the efficoney of heaters, dryers or evaporators.

Multiple-stage non-condensing Ejector : These are used when the prime requirements are to achieve low absolute pressures (10-50 TORR) at lower suction capacity

meekaj
Techno App Services

www.meekaj.com

08,Nil Tenament, Part 2 Near Haridarshan Soc,
Nava Naroda-382330, Ahmedabad-382330.India

info@meekaj.com | meekajtechno.app@rediffmail.com

+91 - 7405825982

meekaj
Techno App Services

www.meekaj.com