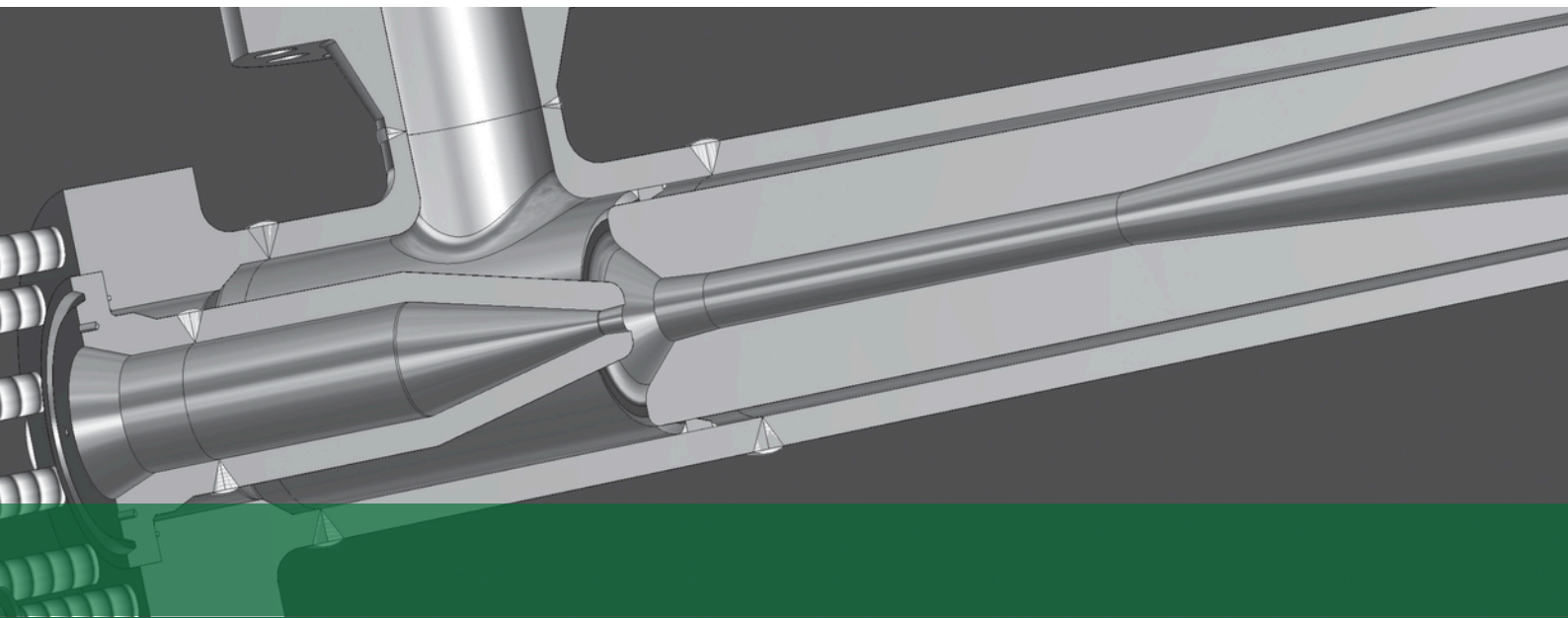
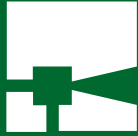


## Ejector Solutions





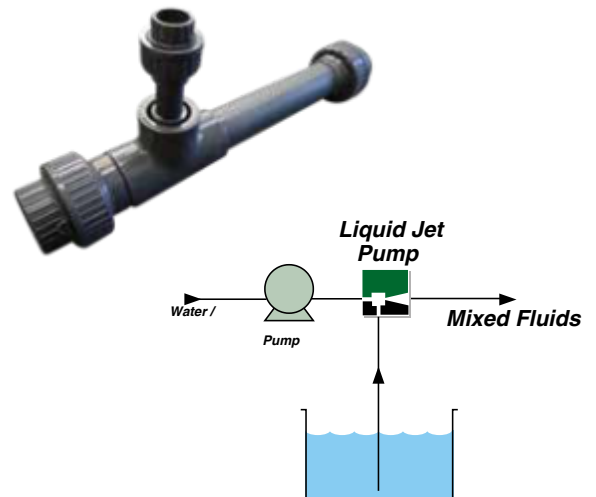
# Liquid Jet Pumps

Transvac has supplied thousands of units to the process and allied industries. Using liquid as the motive force, Transvac Jet Pumps can accurately entrain, mix and dilute a secondary liquid, eliminating the need for mechanical dosing pumps and mixers.

In operation, a high velocity jet of pressurised liquid discharged from the motive nozzle produces a region of low pressure in the suction chamber that entrains the secondary liquid. The two streams then thoroughly mix in the throat before the resulting mixture flows through the diverging cone to regain some pressure in order to overcome system discharge heads.

## Typical Applications

- u Chemical dosing & dilution
- u Polyelectrolyte production
- u Ion exchange resins
- u Activated carbon / lime
- u Sludge & slurry handling



# Liquid Jet Compressors

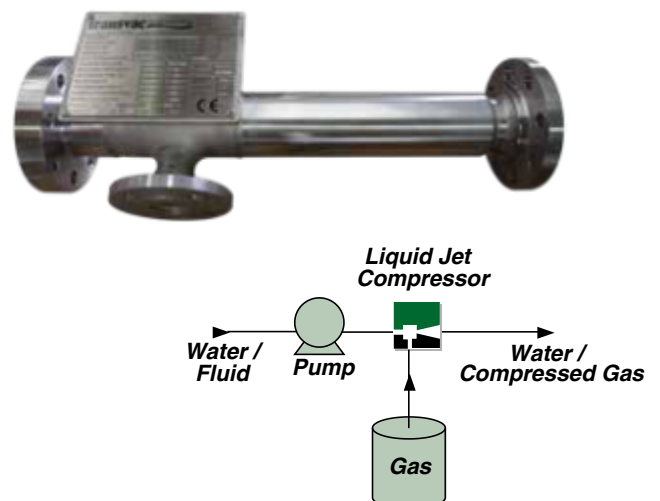
Transvac Liquid Jet Compressors have been extensively used for entraining ozone and atmospheric air in water treatment applications.

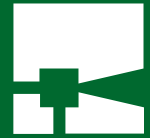
Using liquid as the motive force, Transvac Jet Compressors can accurately entrain and mix air or gas in-line and discharge against a back pressure.

In operation, a high velocity jet of pressurised liquid discharged from the motive nozzle produces a region of low pressure in the suction chamber that entrains the secondary gas. The two streams then thoroughly mix in the throat before the resulting mixture flows through the diverging cone to regain some pressure in order to overcome system discharge heads.

## Advantages:

- u Simple and reliable
- u No moving parts
- u In-line mixing
- u Custom designed
- u Materials to suit process
- u No maintenance





# Liquid Jet Solids Pumps

A versatile method of entraining, mixing and pumping solids into liquids. The Venturi principle offers many advantages over other types of high shear mixing equipment on the market. Robust and highly reliable with no moving parts to wear, the units are virtually maintenance free.

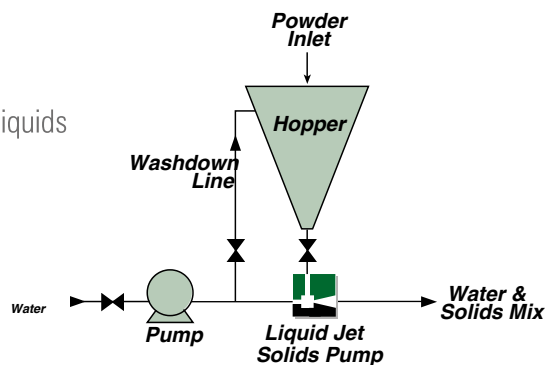
Available in either stationary, portable or mobile models, the custom designed Liquid Jet Solids Pump (LSP) units can be supplied as individual items or complete skid mounted systems including motive pump, valves etc. Powder can be loaded manually or automatically using screw feeders at ground level, thereby keeping powder handling at a minimum. In many cases fluid energy from existing pumps can be used which eliminates the need for additional power.

Depending upon the process conditions, operation can be on a once-through or recirculation basis



Advantages:

- u Reduced powder handling
- u No moving parts
- u Complete mixing of powders and liquids
- u Materials to suit process
- u Low level operation
- u Reduced batch times
- u No maintenance
- u Existing pumps can often be used





# TransPAC - a complete PAC dosing solution



When water standards slip, you need to act fast. The fully contained, mobile TransPAC dosing solution puts you back in control.

With minimal need for building or groundworks, TransPAC provides a safe and secure home for your dosing solution. Simply hook it up and away you go.

TransPAC provides once-through inline dosing, so there are no batch mixing tanks to contend with and the fully programmable HMI control panel provides accurate and efficient dosing. After all, no one likes wastage.

The TransPAC is also supplied with a silo adapter kit which can be easily fitted by the site operator to enable the system to receive carbon from a site silo, rather than a bulk bag.

## A Containerised TransPAC Dosing System Includes

Secure, vandal-proof container with lighting	✓
Transvac PAC Ejector, in-line wet mixing / pumping system	✓
Flexicon powder handling / metering system (bulk bag or silo fed option)	✓
Clean water, pressure booster pumps	✓
Water header tank	✓
Site specific control panel with alarm interface	✓
Interconnecting pipework and valves (manual or automated)	✓
Instrumentation	✓
Optional compressor	✓
Silo feed adapter kit	✓
Dust extraction system	✓

For more detailed information on TransPAC, see our [TransPAC brochure](#) or visit [www.carbondosing.com](http://www.carbondosing.com)



*The silo feed adapter kit makes the system flexible to your site requirements and provides ultimate flexibility*



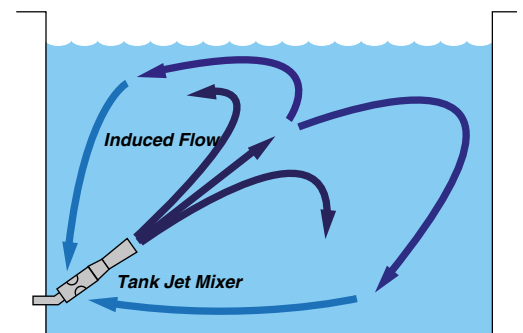
# Tank Jet Mixers

Transvac Tank Jet Mixers are a mass momentum exchange device which uses the energy of pressurised liquid to entrain, mix and pump a secondary liquid. The principle is used for many process applications including blending, solids suspension, dilution and heat distribution.

In operation, pressurised motive liquid is discharged through the jet nozzle into the suction chamber. The change from pressure energy to kinetic energy (velocity) creates a region of low pressure that entrains liquid from within the process vessel via the open suction ports. The motive and suction liquid streams combine and mix under high shear conditions in the venturi diffuser. The resulting mixture is then discharged into the bulk of the process liquor as a high velocity turbulent jet.

## Advantages:

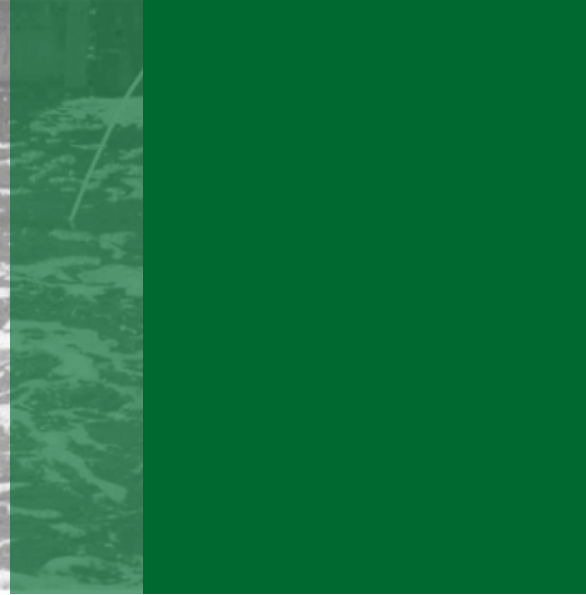
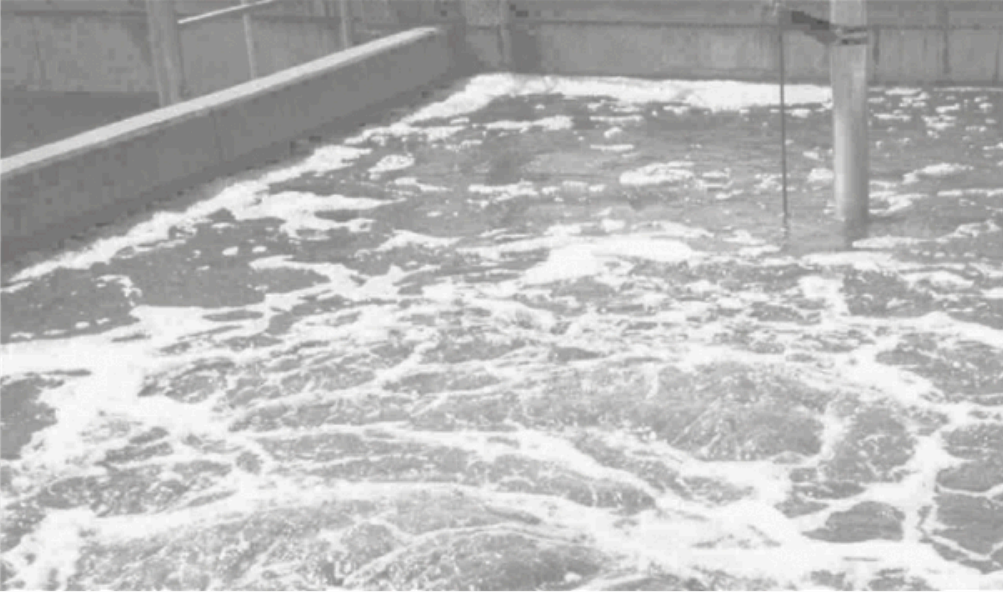
- u No moving parts
- u No splashing or aerosol created
- u Operates at variable depths
- u No bridges or bearings used
- u No in-tank maintenance needed
- u Evenly distributes mixing
- u Controllable mixing
- u Simple, reliable and robust



Standard Transvac Tank Jet Mixers entrain 3 parts suction liquid for every 1 part motive liquid with the discharge jet of 4 parts inducing further secondary mixing.

Each Tank Jet Mixer is designed to suit the process mixing requirement and single mixers or a number of mixers mounted on an intank manifold are available. Transvac can offer the basic mixers or a complete system including pipework, pumps and valves.

Materials of construction are chosen to suit the process conditions, common materials include stainless steel, carbon steel, Polypropylene, PVCu, PTFE, and GRP. Hygienic designs are available for the food / pharmaceutical industry



## Venturi Aerators

Transvac Venturi Aerators are a mass momentum exchange device which uses the energy of pressurised liquid to entrain, mix and pump air into a secondary liquid.

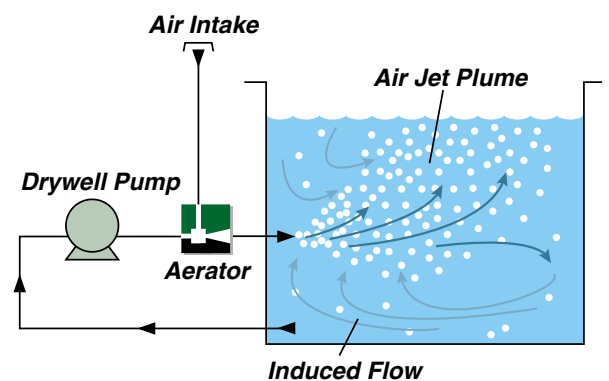
Standard self aspirating units can operate at tank depths of up to 7 metres and offer typical efficiencies between 1.2 and 1.8 kgO<sub>2</sub>/kWh at standard conditions. High alpha factors, simplicity, reliability and low cost make the Transvac Venturi Aerator competitive with other forms of aeration equipment available on the market.

The action of the Venturi Mixer / Aerator is ideal for mixing balance tank effluent on industrial plants. The unit not only provides effective liquid / liquid mixing, but it also entrains atmospheric air to further enhance mixing and transfer oxygen into effluent.

The system works successfully with varying liquor depths and for keeping solids in suspension. A connection into the tank from the air stack also enables the unit to operate as a liquid / liquid mixer with no air entrainment.

With no parts within the tank requiring maintenance and with corrosion resistant materials of construction available, the Transvac Venturi Aerator is an ideal mixing device for plants handling aggressive hazardous effluent.

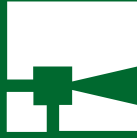
The oxygen transfer feature of an Aerator is used to it's full potential on food waste balance tank mixing because it can keep the effluent 'fresh', avoiding unpleasant odours.



Advantages:

- u No moving aerator parts
- u High oxygen transfer
- u High alpha factors
- u Minimal maintenance
- u Virtually silent operation
- u No aerosol spray
- u Simple to install and retrofit
- u Materials to suit the process





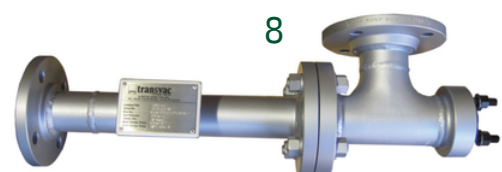
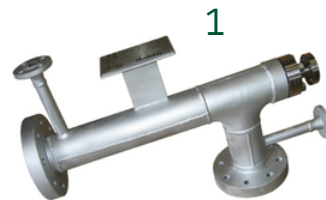
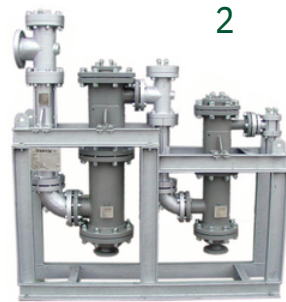
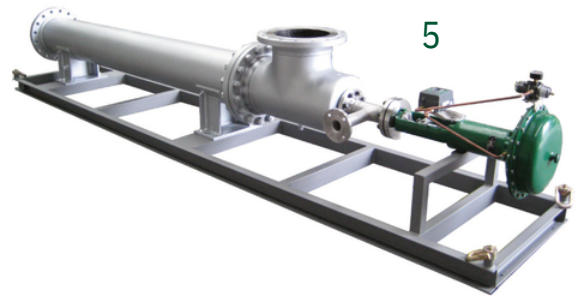
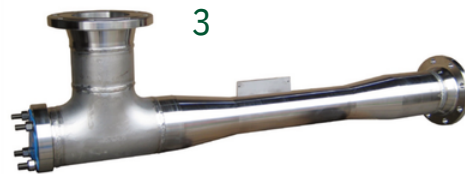
# Steam Jet Ejector Systems

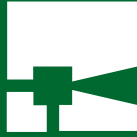
Transvac design and manufacture Steam Jet Ejector Systems in both standard and exotic materials. From single stage Ejectors to fully packaged multi-stage Ejector Systems all Transvac products are custom designed to meet the client's specific requirements.

Transvac Steam Ejectors (also Atmospheric Air Ejectors) are often run in combination with mechanical vacuum pumps (liquid ring). Transvac also offers a trouble-shooting / maintenance / training service covering all makes of Steam Ejector Systems.

## Typical Applications:

- u Sulphur Pit Steam Ejector - 1
- u PTFE multi-stage Ejector Set for pharmaceutical plant - 2
- u Titanium Steam Ejector for chemical Reactor - 3
- u Two stage Ejector System for vacuum drying - 4
- u Thermocompressor for autoclave steam recovery - 5
- u Hastelloy Ejector for sulphuric acid processing - 6
- u Steam Ejector / Liquid Ring Pump Systems for batch Reactor - 7
- u Steam Ejector for distillation process - 8





# Steam Jet Ejector Systems

## Steam Ejector Trouble-shooting:

Using a wealth of knowledge amassed over 35 years Transvac offers the following services for all makes of Steam Ejectors:

- u Operation & maintenance training for plant engineers
- u Supply of spare parts for all makes of Ejectors
- u Troubleshooting operational problems
- u Service Contract Plans, including periodic 'health checks'
- u Assessment of existing mechanical Vacuum Pumps

## Advantages of Ejectors:

- u No moving parts
- u Simple to install and operate
- u No ATEX issues
- u Negligible maintenance
- u Proven reliability
- u Corrosion resistant designs

## Typical Materials:

- u Carbon steel
- u Stainless steel
- u Graphite
- u Hastelloy
- u Titanium
- u PTFE

## Design Codes / Standards:

- u ASME B31.3
- u ASME VIII PD
- u 5500
- u PED

## Quality Assurance:

Transvac are accredited to ISO 9001:2015 and certified to module H of the PED.



# Steam Jet Thermocompressors

## Introduction

Transvac Steam Jet Thermocompressors are energy saving devices that compress low pressure steam, often waste steam, to a higher useable pressure.

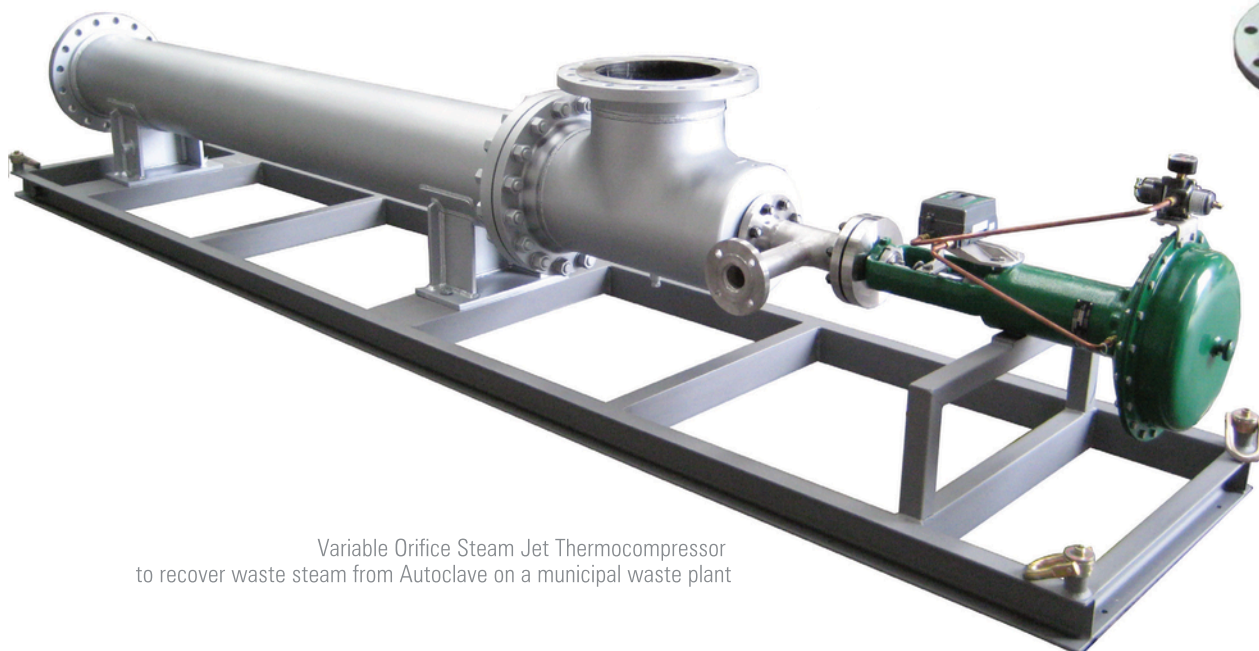
Transvac has been designing Steam Jet Thermocompressors for over 43 years and each unit is designed specifically to suit a customer's process requirements to ensure maximum operating efficiency.

## Advantages:

- u No moving parts
- u Minimal maintenance
- u Simple to operate & install
- u Low capital cost
- u Custom designed
- u Virtually silent operation
- u Available in most materials
- u Suitable for hazardous areas



Steam Jet Thermocompressors for a Swedish Paper Plant

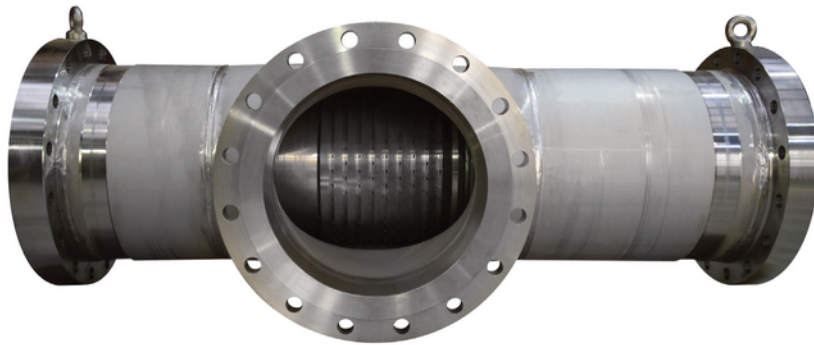


Variable Orifice Steam Jet Thermocompressor to recover waste steam from Autoclave on a municipal waste plant



## Instantaneous Jet Heaters

Transvac's range of Instantaneous Jet Heaters provide a simple, low cost, silent and reliable method of heating a liquid inline. By bringing the steam into direct contact with the cold liquid, both the sensible and latent heat of the steam is fully dissipated within the liquid, making the Jet Heaters very efficient. Transvac Jet Heaters are also designed to perform this operation silently to prevent undue noise and wear normally associated with steam 'collapse'.



### Typical Applications

- u General process water heating
- u Reactor jacket water heating
- u Vegetable blanching
- u Chemical heating

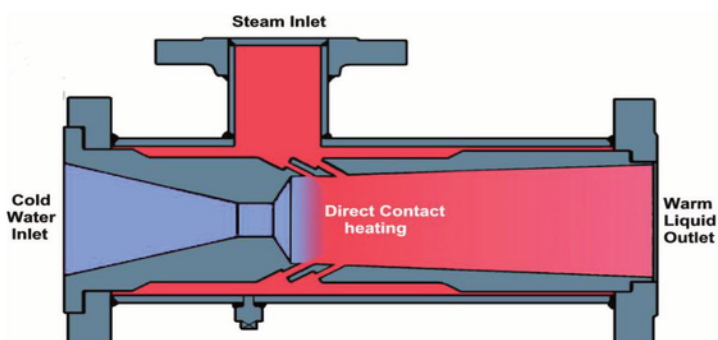
### Advantages

- u Custom designed
- u Simple to install
- u Silent in operation
- u Compact
- u No residence time
- u No flame proofing necessary
- u Materials to suit process
- u Rapid response to automatic control



### Principle of Operation

Pressurised cold liquid is introduced to the Heater and is immediately accelerated through the combining nozzle, resulting in a local pressure drop. Pressurised steam enters the unit and is discharged into the liquid at high velocity, via a number of jets around the combining tube. This method of combining steam and liquor prevents 'backing up' should the steam be under a much higher pressure than the liquid. The two streams combine and mix intimately fully condensing the steam silently and instantaneously.





# Desuperheaters

Transvac has been designing and manufacturing Desuperheaters for the Power, Food, Chemical and Process Industries for over 35 years. Transvac direct contact Desuperheaters typically reduce super heated steam temperatures to within 3°C of the saturation temperature. To cool the superheated steam, a medium (usually water) is entrained and flashed into vapour by absorbing heat from the steam.

## Desuperheater Range

### Venturi Desuperheater -1

- u Constant or variable load handling duties
- u Turndowns upto 10:1

### Steam Atomising Desuperheater -2

- u Variable load handling up to 50:1

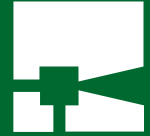
### Spray Type Desuperheaters

Standard -3, Nozzle -6, Wafer (Single Nozzle -5, Multi Nozzle -4)

- u Relatively constant load handling duties
- u Turndowns up to 4:1



# Desuperheaters



## Applications

- u Turbine by-pass systems on Power Plants for Heat Exchangers, Dump Stations etc.
- u Steam for indirect contact Heat Exchangers, Reactor Heating Jackets etc.
- u Steam for direct contact heating - Food Kettles, Inline Steam Heaters, Tobacco Drying Plant and Paper Mills.

## Advantages

- u Low cost
- u No moving parts to wear
- u Minimal steam pressure drop
- u Flexible design options
- u Simple to install

## Materials of Construction

- u Carbonsteel, Stainlesssteel, Chrome Molybdenum

## Design & Construction

Transvac proprietary, ASME VIII div 1, ASME B31.3, PD5500 etc. and are CE marked where applicable.

Transvac are accredited to BS EN ISO 9001:2000 and certified to module H of the PED.



## Steam Jet Ejector & Liquid Ring Vacuum Pump Systems

Transvac offer a complete range of fully instrumented low level skid mounted systems, versatile in handling both wet and dry loads. Designed to user specifications and offering clear energy savings.

Systems are available with one, two or three stages of Steam Jet Ejectors combined with a single or two stage Liquid Ring Vacuum Pump. The Liquid Ring Pump is very effective at rapidly producing a coarse vacuum and the Steam Jet Ejectors are used to create higher vacuum levels.

- u Reliable with only one moving part
- u Energy efficient
- u Operates with very low steam pressures
- u Low level operation
- u Simplicity
- u Low noise levels
- u Custom designed
- u Easy to retrofit or uprate

## Atmospheric Air Jet Ejector & Liquid Ring Vacuum Pump Systems

Transvac manufactures a comprehensive range of Atmospheric Air Jet Ejectors used to extend the operating range of Liquid Ring Vacuum Pumps.

The inlet pressure of a Liquid Ring Pump is limited to approximately 30 mbar abs because of the vapour pressure of its seal liquid (usually water). The addition of an Atmospheric Air Jet Ejector enables the Liquid Ring Vacuum Pump to operate outside its cavitation range allowing operation down to nearly 4 mbar abs.

Transvac Atmospheric Air Jet Ejectors can be combined with Liquid Ring Vacuum Pumps to increase their ultimate vacuum levels.

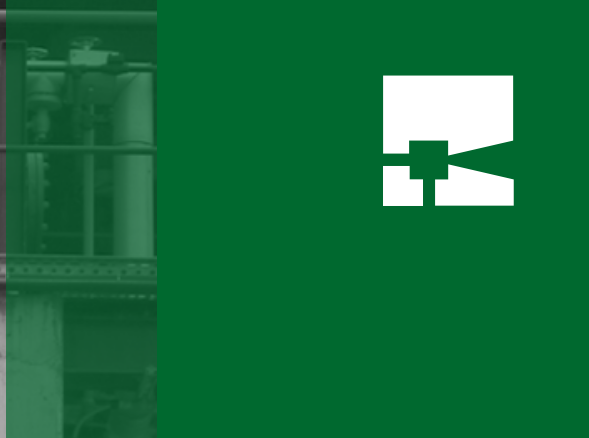
- u No additional energy source needed (atmospheric air)
- u Reliable
- u Ideal for retrofitting on small load duties



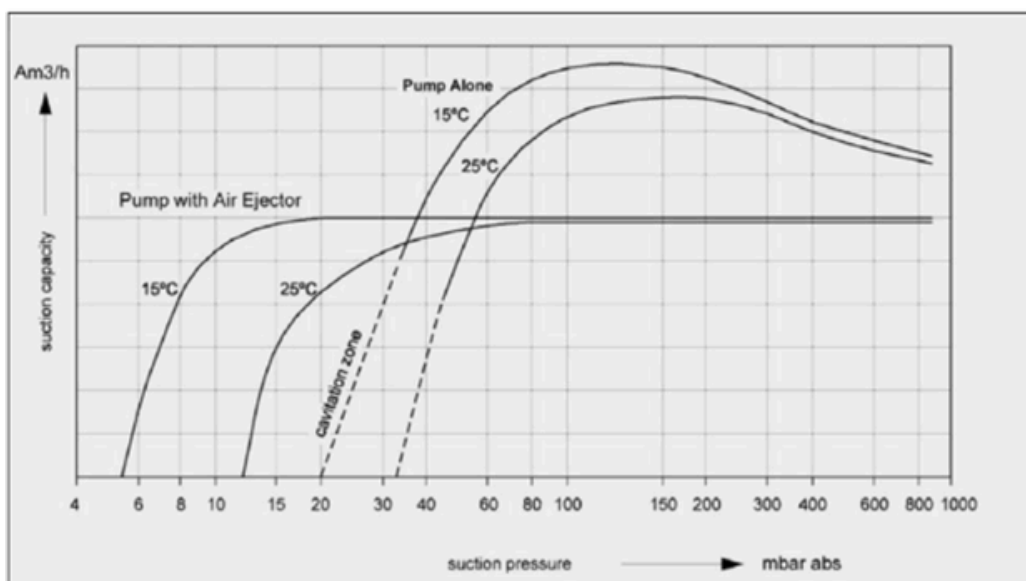
ATMOSPHERIC AIR JET EJECTOR  
IN STAINLESS STEEL



ATMOSPHERIC AIR JET EJECTOR  
IN CARBON STEEL



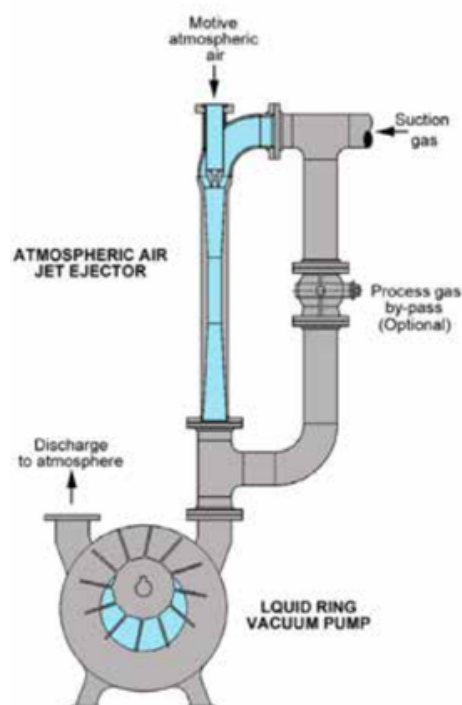
## Performance



The chart above shows the typical performance of a 2 stage Liquid Ring Pump operating alone with seal water at temperatures of 150C and 250C and when operating in combination with an Atmospheric Air Jet Ejector. A by-pass line can be installed around the Ejector when evacuation times are critical. All Transvac Ejectors are custom designed to suit each application to ensure maximum operating efficiency.

## Construction

Standard materials of construction include Carbon Steel, Stainless Steel, Polypropylene, PTFE and Titanium. Other materials are also available. Connections can be flanged or screwed. All of Transvac's design and manufacturing processes are designed to the latest European standards and quality assured and certified to BS EN ISO 9001:2015. Units are CE marked where applicable.





## 'Universal Design' Ejectors

We understand that production is not always predictable. Conditions change over time and facilities need to be able to deal with this.

Ejectors are fixed-design devices. Each of our Ejectors are custom designed to perform at specific operating conditions. That's why we invented our patented 'Universal Design' Ejector.

The patented Universal Design (UD) comprises an external pressure retaining shell into which are fitted two replaceable components which give the Ejector its operating characteristics. These two components are called the nozzle and the diffuser and in the Universal Design, they can be easily changed-out with different ones in order to give the Ejector different optimum operating characteristics.

Thus, as process conditions change over time, the internals can be replaced with new ones which are more suited to the changed conditions.

By changing-out the internals at recommended intervals, high performance efficiency can be maintained over the lifetime of the unit, thereby maximising gas recovery.



'Universal Design' nozzle and diffuser sections designed to allow the Ejector to operate at new production conditions



## Research & Development Test Facility

Transvac officially opened its R&D Test facility in April 2010. The state-of-the-art test facility primarily develops new oil & gas Ejector technology for subsea processing, flare gas recovery, sand slurry pumping and production boosting.

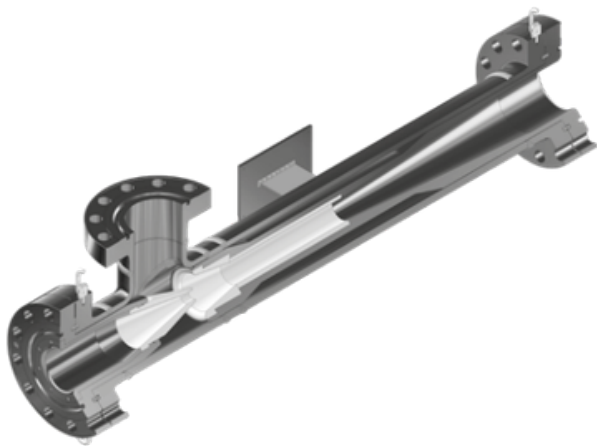
Ejector applications for the nuclear, bio-fuel, chemical and wastewater industries are also under development.

The R&D test facility includes high and low pressure equipment for handling water, gas, multi-phase and slurry.

Test programmes are supported by CFD studies and include fundamental University research.

The Transvac facilities include liquid flow lines for high, medium & low pressure testing (in excess of 350 bar (g)) and solids handling systems.

Transvac performs functional validation tests for Ejectors used in the oil & gas, nuclear and process industries.



*Why not visit Transvac head office and take a tour of the first-class R&D facility for yourself?*