



## P7674 EJECTOR STEAM BENCH

### PRINCIPLE EXPERIMENTS

- ◆ To investigate the overall efficiency of the ejector over a range of working conditions
- ◆ To investigate the efficiency when used as a feed water heater under user variable temperatures and pressures
- ◆ To investigate the efficiency when used as a pump under working conditions set up by the student.

### FEATURES

- ◆ Compact modular design
- ◆ Low capital cost
- ◆ Easy installation
- ◆ Comprehensive instrumentation
- ◆ Pressure test certificates supplied for major components

### INTRODUCTION

A common use for steam ejectors is as a simple vacuum pump. They have the advantage of being inexpensive, small, have no moving parts to go wrong and are much more economical to operate than mechanical pumps in cases where exhaust steam can be put to effective use.

The principle of operation of an ejector is simple: a high velocity steam jet blows into the ejector throat and thereby produces a suction which draws a fluid into the throat at high velocity. The expanding cross section downstream of the throat causes the velocity head to be converted into a pressure head and the mixture of steam and water (or other fluid) emerge from the ejector at low velocity and higher pressure.

### DESCRIPTION

Cussons P7674 Ejector Steam Bench consists of a sturdy framework and panels of all steel construction, fitted with a student work surface, interconnecting back panel and adjustable feet.

Incorporating a typical commercially available steam ejector instrumented for the measurement of temperature and pressure at the steam inlet, suction inlet and delivery outlet. Two water tanks acting as a suction tank and a delivery tank respectively, are inter-connected in such a way that water can be returned to the suction tank to permit experiments with suction water at varying temperatures. Water supply to the suction tank is via a flow meter.

The apparatus is supplied complete with service facilities relating to water supply, blowdown and drainage together with a set of four

stainless steel flexible hoses which enable the bench to be connected to other steam benches to form a comprehensive system.

### STEAM HEADER ASSEMBLY

Mild steel steam header welded in accordance with BS2633 (1973) with a branch providing a steam supply to the ejector. The steam header is enclosed within a header box and fully insulated with mineral wool.

### CERTIFICATION

The steam header is pressure tested at 21 bar and is supplied complete with a test certificate.

### EJECTOR ASSEMBLY

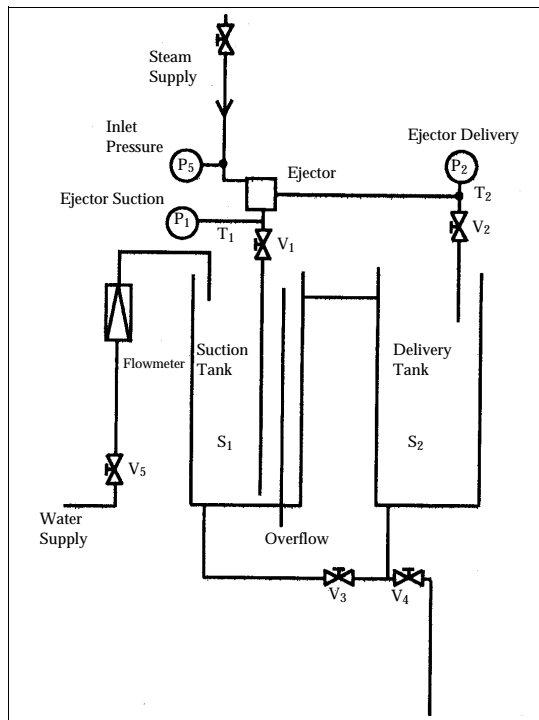
An industrial ejector fitted with steel pipe work for steam supply line, suction line and delivery line. Each line incorporates a temperature measuring point complete with type K thermocouple, a pressure measuring point and a combined isolating and control valve.

### EJECTOR INSTRUMENTATION

Pressure measurement is via Bourdon type pressure gauges scaled 0-16 bar for ejector steam supply, -1 to 3 bar for ejector suction and 0-4 bar for ejector delivery. The suction and delivery gauges are each fitted with overload protection valves set for 3 bar and 4 bar respectively. Temperature measurement is via a 0-250°C analogue temperature indicator connected to each of the type K thermocouples through a multi-position switch.

### SUCTION AND DELIVERY TANKS

Mild steel fabricated tanks with a working capacity of 48 litres, each fitted with a sight gauge and a 0-50cm scale. An inter-connecting pipe between the tank tops provides an overflow facility from the delivery to the suction tank and the



**FIG. 1 Ejector Steam Bench - Schematic diagram**

suction tank is fitted with an overflow outlet. The tank drain lines are inter-connected and include two isolating valves which enable water to be re-circulated to the suction tank or discharged to the bench drainage line.

#### **WATER SUPPLY**

The water supply line from the bench service line to the suction tank incorporates a control valve and a flowmeter scaled 2-22 litres/min.

#### **SERVICE SYSTEMS**

The bench is equipped with independent service lines relating to water supply (untreated), blowdown and drainage. These lines inter-connect with similar facilities on other steam benches to provide a common service facility.

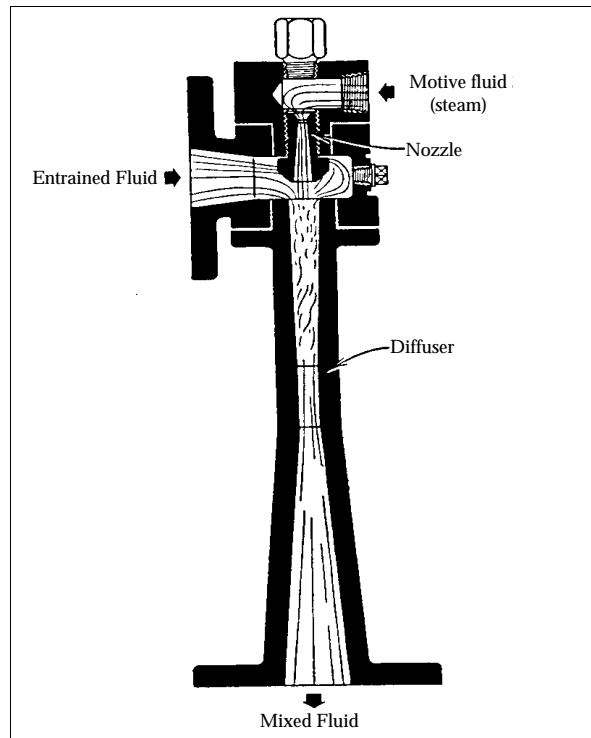
#### **INTERCONNECTION OF STEAM BENCHES**

To enable steam benches to be linked to form a system utilising a common steam supply and service system, the steam bench is supplied complete with:-

- An interconnecting back panel and student work surface.
- A set of 4 stainless steel flexible hoses for the steam and service connections.
- A section of aluminium clad lagging for the flexible steam hose.

#### **PIPE CLOSURE KIT**

If this steam bench is to be installed on a stand alone basis or is the last unit in a run of steam benches a P7682 Pipe Closure Kit will be required.



**FIG. 2 Longitudinal section of a steam-jet ejector**

## **TENDER SPECIFICATION**

To comprise a sturdy framework and panels of all steel construction including student work surface and fitted with a mild steel header assembly enclosed within a header box and fully insulated with mineral wool; an ejector will be fitted with steam supply line, suction line and delivery line, each fitted with a combined isolating and control valve, a temperature measuring point complete with a type K thermocouple and a pressure measuring point; 3 pressure gauges scaled 0-16 bar, -1 to 3 bar and 0-4 bar respectively for steam pressure, ejector suction and ejector delivery; a 0-250°C analogue temperature meter and multi-position selection switch for temperature display; mild steel suction and delivery tanks each with a working capacity of 48 litres fitted with a sight gauge, 0-50cm scale, overflow facility and drainage facility with isolating valves to enable re-circulation to the suction tank and system drainage; a water supply line complete with control valve and flowmeter scaled 2-22 litres/min

## **SERVICES**

#### *Steam Supply:-*

Maximum working pressure of 10.34 bar and maximum temperature of 235°C, which can be supplied by Cussons P7670 Steam Boiler Bench, a Cussons Steam Plant, or clients own steam line.

*Water Supply:-* From bench water service line.

## **SHIPPING DETAILS**

Case size: 2.32 m<sup>3</sup>  
Gross weight: 240 Kg  
Nett weight: 140 Kg

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