



## P7677

### WATER TREATMENT STUDIES BENCH

#### FEATURES

- ◆ Compact modular design
- ◆ Low capital cost
- ◆ Easy Installation
- ◆ Removal of dissolved minerals, dissolved gases and suspended matter by current techniques

#### PRINCIPLE EXPERIMENTS

- ◆ To demonstrate the abilities and combined effects of the base exchange, de-alkalinising and de-mineralisation units.

#### INTRODUCTION

Raw water supplied for steam raising plant can contain impurities which can be harmful to the equipment, and it therefore requires treatment to minimise these detrimental effects. The bench has a dual function of demonstrating the basic principles of water treatment, and as a service module to supply treated water to P7670 Steam Boiler Bench.

#### DESCRIPTION

Cussons P7677 Water Treatment Studies Bench consists of a sturdy framework and panels of all steel construction, fitted with a student work surface, interconnecting back panel and adjustable feet.

The studies bench comprises five interchangeable, clear PVC filter columns, each of which can be filled with a sand filter or ion exchange medias. These are fitted with top and bottom quick release couplings. Two of the columns may be used at any one time in a system of interconnecting UPVC pipework and selection valves, set to allow the columns to be circulated with dosed or untreated water either independently, in parallel, in series or in reverse, and with a backwash connection from the service water line. A panel with tubular supports is provided for storing filter columns not in use. Dosed or untreated water is transferred from the sample tank to the filter system by a centrifugal feedwater pump at reduced pressure and a metered rate; treated filtered water is either collected in a portable 25 litre storage tank or passed to the Steam Boiler Bench, depending on the use of the unit.

A variable chemical dosage system, comprising a dosage pump and a chemical additive mixing vessel, is supplied to inject diluted additive at a controlled rate to either a portable 25 litre sample tank or the boiler feedwater tank on the Steam Boiler Bench. Pressures at the inlet and outlet of either filter column are indicated on separate 0-2.5 bar Bourdon tube pressure gauges. Sample cocks are included in the system to enable water samples to be collected for analysis by test kits supplied with the unit.

A control box, suitable for either 110V or 240V a.c. supplies, provides separate ON-OFF switches and associated indicator lamps for each pump and a switch to select the pumps for either Water Treatment Studies or Feed Water Service to the Steam Boiler

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Bench.

### **FILTER COLUMNS**

Five interchangeable clear PVC tubes each fitted with a fixed top cap and a removable bottom end cap bolted to the flange end of the tube, both caps being fitted with quick release couplings. Each column can be filled with a filter or ion exchange medium contained between top and bottom sets of water distribution discs and foam filter pads. Media supplied for the columns comprises:

- IR 120 base exchange resin
- IRC 84 de-alkalinising resin
- MB 11 mixed bed colour change resin
- filter sand

### **FILTER PIPEWORK SYSTEM**

UPVC pipework with solvent welded joints, including four 3-way valves and a 2-way valve which can be positioned to select the required inter-connections between the two filter columns.

Fittings:

- pressure measuring points at the inlet and outlet of each filter column, each inlet and outlet pair driving a 0-2.5 bar pressure gauge, via a 3-way selector valve.
- two sample cocks, one in each pressure gauge line.
- pressure relief valve, set to 1.5 bar and fitted in supply line to the top of the column.
- water supply line, including a flowmeter with a 10-120 litres/hr graduated scale and incorporating a needle valve, set to give a flow rate of 1 litre/min., a pressure reducer valve, with a 0-100psi dial gauge, set at 1 bar, an isolating valve in the centrifugal pump delivery and a branch to the main water service line, including an isolating valve.
- 3-way discharge valve with flexible plastic pipe connections to one of three portable 25 litre storage tanks.

### **SAMPLE TANK**

A portable 25 litre plastic container with top filling point for dosed or untreated water and fitted with a low level float switch and outlet UPVC pipework, including a large particle strainer/drain and a non-return valve.

### **FEEDWATER PUMP**

A centrifugal pump driven by either a 110V or 240V, 50Hz motor, used only for Water Treatment Studies to transfer water to the filter system from the storage

tank.

### **DOSING SYSTEM**

A chemical additive system which includes a diaphragm type dosing pump, driven by either a 110V or 240V, 50Hz motor, and incorporating a variable delivery control which provides a maximum output of 0.9 litres/hr. The additive supplied is DM4-1 concentrate, a non-flammable liquid with a pH value of 4.5 and specific gravity 1.13, diluted and stored in a 10 litre mixing vessel with lid, from which it is pumped to the sample tank via flexible plastic tubing.

### **CONTROL BOX**

Mild steel fabrication containing fuses, for either 110V or 240V 50Hz mains supplies, control circuits for the centrifugal and dosing pumps and a plug for connection to the Steam Boiler Bench electrical control panel for automatic switch on of the dosing pump. Fitted with a hinged lockable cover with a 3-position, centre OFF, function selection switch and two 2-position, ON-OFF pump switches and associated amber indicator lamps.

### **TEST SETS**

Two test sets are supplied:

- a boiler Test Set Kit in a portable case, containing all equipment necessary to analyse samples, using Houseman Palm methods of testing.
- a Yes/No Water Hardness Test Kit.

### **SERVICE SYSTEMS**

The bench is equipped with independent service lines relating to water supply (untreated), blowdown and drainage. These lines can interconnect with similar facilities on the Steam Boiler Bench P7670 to provide common service facilities.

### **INTER-CONNECTION OF STEAM BENCHES**

*The bench may only be connected to the left hand side of the Steam Boiler Bench (when viewed from the front).*

To enable the bench so be linked to a Steam Boiler Bench for the supply of treated water and also to form a system utilising common service system the bench is supplied complete with:

- An interconnecting back panel and work surface.
  - A set of 3 stainless steel flexible hoses for the service connections.
  - A length of clear PVC tube for connecting treated water from the filter to the Steam Boiler Bench feedwater tank.
  - A length of flexible nylon tube, complete with an injector assembly for connection from the dosing
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pump to the Steam Boiler Bench feedwater tank.

## TENDER SPECIFICATION

Dual purpose bench designed to demonstrate the basic principles of water treatment by filtration and chemical means, or to supply treated water to a Steam Boiler Bench P7670. The bench includes five interchangeable clear PVC filter columns each of which can be filled with either filter sand or one of three ion exchange media which are supplied loose. Any two columns can be included in a system of UPVC inter-connecting pipework, including one 2-position and five 3-position selection valves and a pressure relief valve set as 1.5 bar, and fitted with filter inlet and outlet pressure measuring points driving corresponding 0-2.5 bar Bourdon type pressure gauges via 3-position selection valves. The raw or untreated water supply system comprises a portable 25 litre plastic sample tank fitted with a low level float switch, a centrifugal feedwater pump driven by a 110V or 240V a.c. motor, and UPVC interconnecting pipework including a strainer/drain, a non-return valve, a pump delivery isolating valve, a pressure reducer valve set at 1 bar, a flowmeter with a 10-120 litre/hr graduated scale and incorporating a needle valve, and a water service line branch, including an isolating valve. A dosing pump with variable delivery control, and driven by a 100V or 240V a.c. motor is supplied to inject chemical additive from a portable 10 litre vessel, with lid to the sample tank via flexible plastic tubing. Controls, including a function select switch, two pump control switches and two indicator lamps are provided on a control box which also contains fuses for 110V and 240V a.c. supplies, pump control circuits and plug for connection to the Steam Boiler Bench electrical control panel. Apart from the chemical additive mixing vessel, the foregoing are installed on a sturdy frame and panels of steel construction complete with service facilities relating to water supply, blowdown and drainage. To enable the unit to be connected to a Steam Boiler Bench P7670 and be integrated into a steam bench system it is supplied with an inter-connecting back panel, work surface, a set of 3 stainless steel flexible inter-connecting hoses, a length of clear PVC flexible inter-connecting tube and a length of flexible nylon tubing complete with a dosing injection assembly. Also supplied with the unit are: a Boiler Test Set Kit in a portable case, a Yes/No Water Hardness Test Kit, three portable 25 litre

plastic storage tanks, a 9 litre container of DM-4 concentrate for the dosing system, two 25 litre bags of IR 120 base exchange resin, a 50 litre bag of IRC 84 de-alkalisation resin, a 50 litre bag of MB 11 mixed bed colour change resin, a 50 kg bag of filter sand and a 250 ml graduated cylinder.

## SERVICES

*Electrical supply:-*  
110V or 240V, 1Ph 50Hz

Water supply, when linked to a Steam Boiler Bench.

## SHIPPING DETAILS

Case size: 2.8m<sup>3</sup>  
Gross weight: 520 Kg  
Nett weight: 408 Kg

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