



P7673

LAGGING EFFICIENCY STEAM BENCH

PRINCIPLE EXPERIMENTS

- ◆ Investigation of the efficiency of two types of lagging widely used in industry
- ◆ Calculation of lagging efficiency of each lagging
- ◆ To compare the energy loss from lagged tubes with that from unlagged tubes
- ◆ Calculation of the coefficient of thermal conductivity of the lagging

FEATURES

- ◆ Compact modular design
- ◆ Low capital cost
- ◆ Easy installation
- ◆ Comprehensive instrumentation
- ◆ Pressure test certificates supplied for major components
- ◆ Dividing panels so radiation does not effect thermocouple readings

INTRODUCTION

Lagging is applied to pipes carrying hot fluids as a means of reducing heat loss to the environment by both radiation and convection and to protect personnel from contact with high surface temperatures.

Lagging is important in reducing running costs, increasing efficiency and helping the environment, and as such is a major design feature which has to be considered in all applications.

DESCRIPTION

Cussons P7673 Lagging Efficiency 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.

The steam bench incorporates four similar mild steel tubes, each connected to a common steam supply via an inlet regulating valve and a common blowdown line via an outlet valve. Two of the tubes are unlagged but have differing finishes, namely a painted finish and a chromium plated finish respectively.

The remaining two tubes are lagged, one with glass fibre webbing tape and the other with a pre-formed fibre glass insulation jacket. Each tube is fitted with a sight glass and scale to enable condensate to be measured. Surface mounted thermocouples are used to measure the temperatures at the surface of each tube and also at the extended surface of the lagging. A thermocouple in the steam supply header is used to measure the steam temperature and a Bourdon type pressure gauge is used to measure the steam pressure. The measured temperatures are displayed on an analogue temperature meter via a selection switch. From measurements of temperature and condensate levels over a period of time, students are able to calculate the lagging efficiency and the coefficient of thermal conductivity of the lagging.

STEAM HEADER ASSEMBLY

Mild steel steam header welded in accordance with BS2633 (1973) to supply steam to each of the four experimental steam tubes and fitted with a thermocouple and pressure measuring point coupled to a 0 - 16 bar Bourdon type pressure gauge. The steam header is enclosed within a header box and fully insulated with mineral wool.

TUBES

Four mild steel tubes 850mm long, welded in accordance with BS2633 (1973). Each tube is designed for a working pressure of 10.4 bar and a maximum steam temperature of 235°C. Tube insulations/surface finishes are as follows:-

- Tube A: unlagged with paint finish.
- Tube B: fitted with pre-formed 19mm thick canvas covered fibre glass insulation jacket, in grey isogenic cladding.
- Tube C: wrapped with glass fibre webbing tape secured at each end
- Tube D: Chrome finish

Each tube is fitted with:

- Steam inlet line complete with combined isolating valve
- Blowdown line complete with combined isolating and control valve, connected to the bench blowdown line.
- Glass water level gauge with graduated scale and protective glass shield.
- Surface mounted type K thermocouple. A type K thermocouple is also mounted on the outer skin of tube B and C insulations.

TEMPERATURE DISPLAY

0-250°C analogue temperature indicator connected to each of the type K thermocouples through a multi-point switch.

CERTIFICATION

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

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.

SERVICES REQUIRED

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

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.

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; Comprising four experimental tubes each fitted with a different type of finish or insulation material as follows: paint finish; chromium plated finish; pre-formed 19mm thick canvas covered fibre

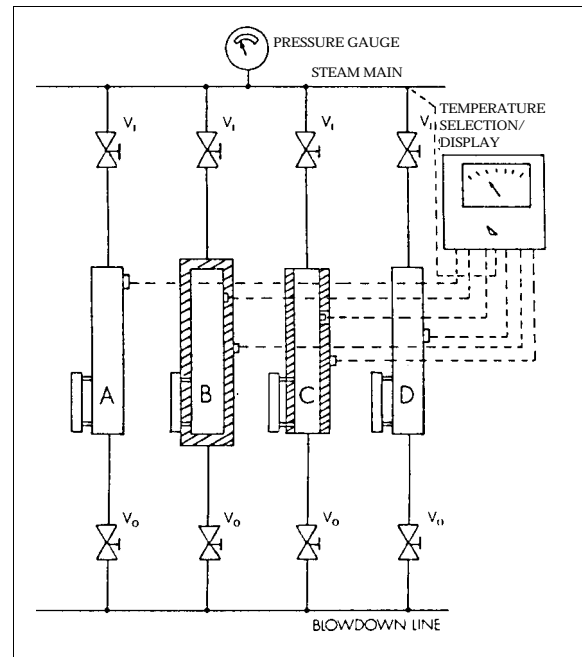


Fig. 1 Lagging Efficiency Steam Bench - Schematic Diagram

glass insulation jacket with isogenic cladding; glass fibre webbing tape. Each tube is to be of mild steel construction, welded in accordance with BS2633 (1973), designed for a maximum working pressure of 10.34 bar and a maximum steam temperature of 235°C and fitted with a condensate level sight glass complete with a 0-20cm scale and protective cover glass. Surface temperatures of each tube and of the outer surfaces of the insulating materials are to be measured by type K thermocouples and displayed on a 0-250°C analogue temperature indicator via multi-point selection switch. Steam supply to the tubes is to be from a fully insulated steam header fitted with type K thermocouple, a pressure measuring point coupled to a 0-16 bar Bourdon type pressure gauge and four steam branches each fitted with a combined isolating and control valve. Each tube is to incorporate a blowdown line fitted with combined isolating and control valve.

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.

SHIPPING DETAILS

Case size:	2.32 m ³
Gross weight:	230 Kg
Nett weight:	130 Kg