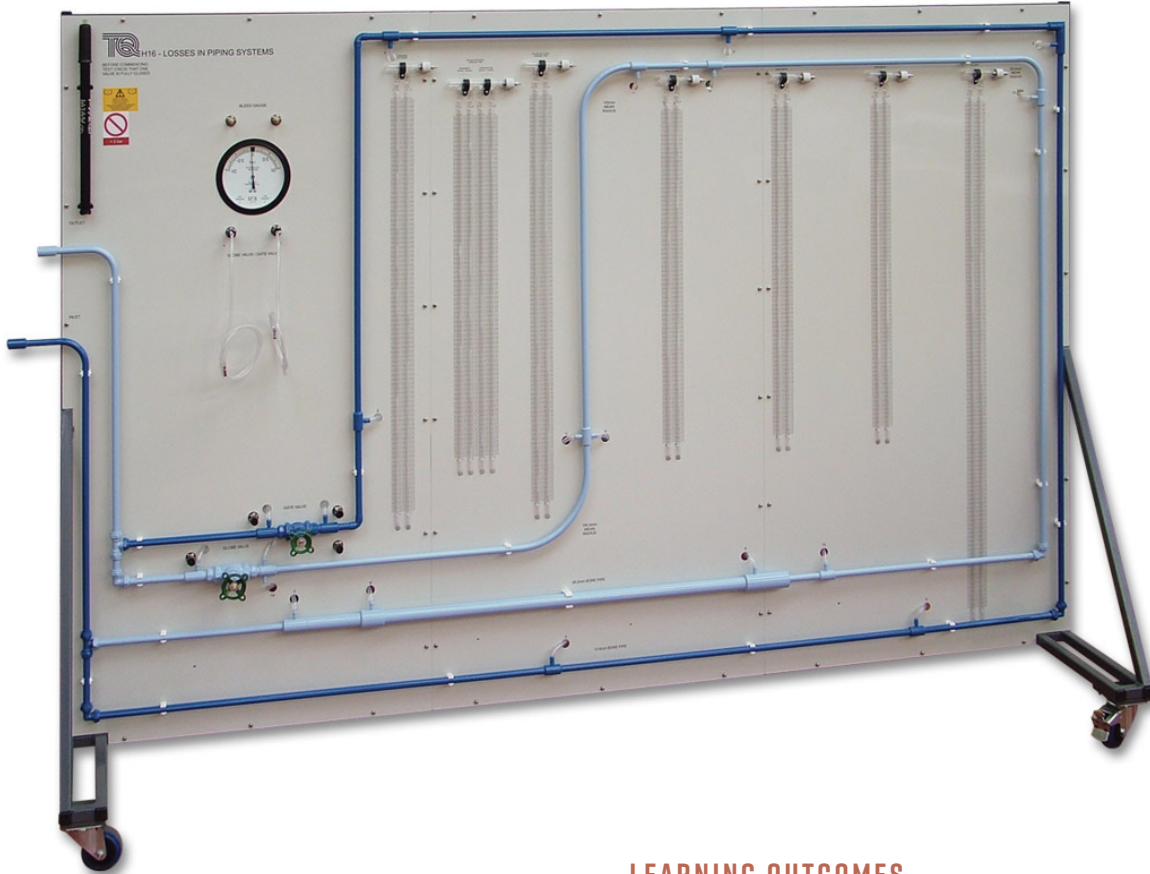




H16

## LOSSES IN PIPING SYSTEMS

Free-standing, mobile apparatus demonstrates pressure losses in several small-bore pipe circuit components, typical of those found in central heating systems.



### KEY FEATURES

- Mobile, space-saving panel that includes the common pipework parts used in domestic heating systems
- Includes two colour-coded water circuits
- Works with TecQuipment's Digital Hydraulic Bench (H1F)\* for easy installation
- Includes different pipe bends and valves to compare losses
- Fitted with a range of piezometers and a pressure gauge to give accurate pressure measurement
- Optional 'roughened pipe' ancillary to investigate flow characteristics in a roughened pipe

### LEARNING OUTCOMES

A comprehensive range of investigations into losses in a variety of pipes and pipe system components, including:

- Straight pipe loss
- Sudden expansion
- Sudden contraction
- Bends with different radii
- Valves
- Elbows
- Flow in a roughened pipe – needs the optional Roughened Pipe (H16p)

### KEY SPECIFICATIONS

- Two circuits
- Sudden expansion and contraction
- Gate valve and globe valve
- Elbow
- Mitre bend
- Three smooth 90-degree bends



# LOSSES IN PIPING SYSTEMS

## DESCRIPTION

The Losses in Piping Systems apparatus is a vertical panel with two separate hydraulic circuits, colour-coded for clarity. Each circuit includes various pipe system components. The unit has wheels for mobility, which also help when storing the apparatus.

TecEquipment's Digital Hydraulic Bench (H1F, available separately)\* supplies each circuit with a controlled flow of water. This allows students to study flow through the various pipe forms and components, and study and compare the pipe and component characteristics.

The circuits are made of small-bore copper pipe, used in a wide variety of applications such as domestic central-heating systems. The small bore allows the circuits to include many pipe bends and components, while preserving effective upstream and downstream test lengths.

To measure pressure loss across components, the panel includes piezometer tubes and a pressure gauge. The pressure gauge measures pressure loss across valves; the piezometer tubes measure pressure loss across the other components. Included is a hand-pump to adjust the datum position of the piezometers.

Both circuits have common inlet and outlet pipes, controlled by valves. The valves are at the outlet to minimise flow disruption.

TecEquipment offers the optional 'roughened pipe'. This can fit to the Losses in Piping Systems apparatus or be used by itself (fitted to a wall and connected to a hydraulic bench). It includes a pipe with a roughened internal bore, and pressure tapping points connected to a manometer. The manometer measures the pressure drop due to the pipe. Students compare their experimental results with Moody and Nickuradse charts.

## STANDARD FEATURES

- Supplied with a comprehensive user guide
- Five-year warranty
- Manufactured in accordance with the latest European Union directives
- ISO9001 certified manufacturer

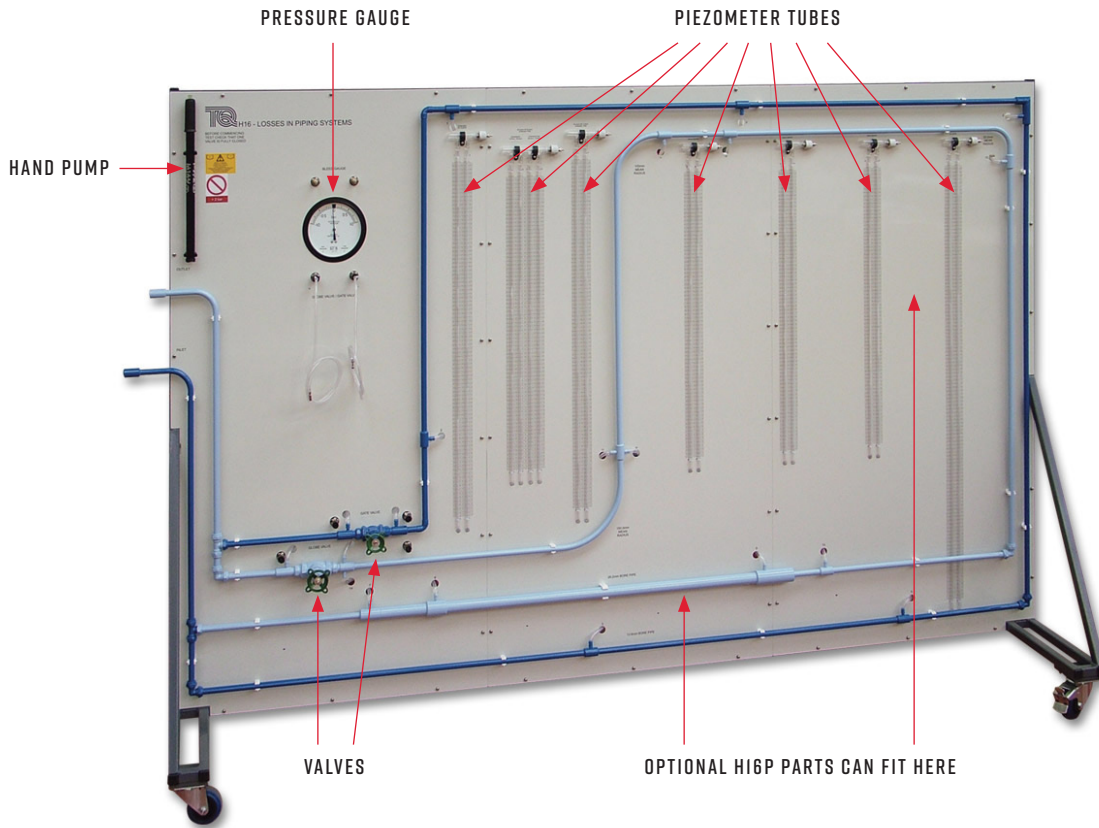
## ESSENTIAL BASE UNIT

- Digital Hydraulic Bench (H1F)\*

\*This product will also work with existing TecEquipment Gravimetric and Volumetric Hydraulic Benches (H1 and H1D)

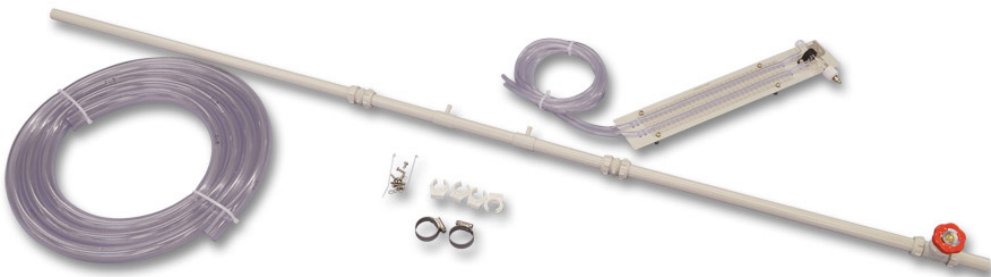


# LOSSES IN PIPING SYSTEMS



## RECOMMENDED ANCILLARIES

- Roughened Pipe (H16p)

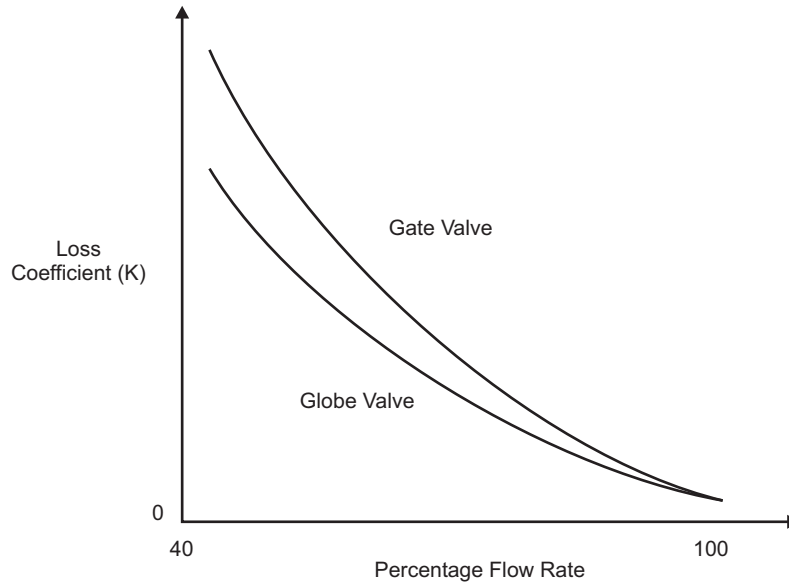


# LOSSES IN PIPING SYSTEMS

## TYPICAL WORK ASSIGNMENTS

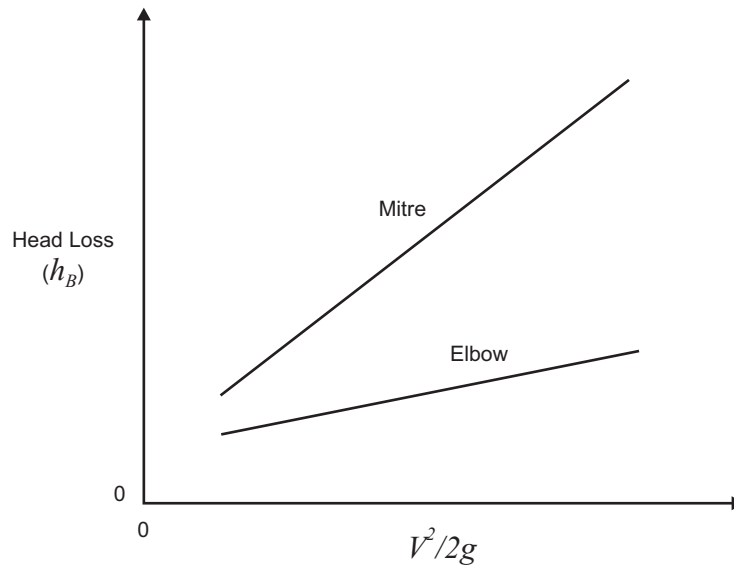
### GLOBE AND GATE VALVE LOSS COEFFICIENTS

This experiment takes results of the pressure losses across the two valves at different flow rates and converts them to loss coefficient (K) values for comparison. The chart compares them by plotting the results against percentage flow rate.



### ELBOW AND MITRE HEAD LOSS

This experiment compares the losses across the elbow and mitre bends at different flow rate and converts them to bend loss ( $h_B$ ) by excluding other losses. The chart compares them by plotting the results against  $V^2/2g$  which produces fairly linear results.



# LOSSES IN PIPING SYSTEMS

## DETAILED SPECIFICATION - H16

TecQuipment is committed to a programme of continuous improvement; hence we reserve the right to alter the design and product specification without prior notice.

### NETT DIMENSIONS AND WEIGHT:

2600 mm x 800 mm x 1700 mm, and 95 kg

### APPROXIMATE PACKED DIMENSIONS AND WEIGHT:

4.3 m<sup>3</sup> and 150 kg

### PARTS:

- Small-bore straight pipe (nominally 13.6 mm bore copper)
- Larger-bore straight pipe (nominally 26.2 mm bore copper)
- Sudden expansion (13.6 mm to 26.2 mm)
- Sudden contraction (26.2 mm to 13.6 mm)
- 90-degree mitre bend (no radius)
- Elbow (13.6 mm radius)
- Small radius, smooth 90° bend (50 mm radius)
- Medium radius, smooth 90° bend (100 mm radius)
- Large radius, smooth 90° bend (150 mm radius)
- Gate valve and Globe valve

## DETAILED SPECIFICATION - H16P

TecQuipment is committed to a programme of continuous improvement; hence we reserve the right to alter the design and product specification without prior notice.

### NETT DIMENSIONS AND WEIGHT:

1200 mm x 200 mm x 200 mm, and 3 kg

### APPROXIMATE PACKED DIMENSIONS AND WEIGHT:

0.05 m<sup>3</sup> and 5 kg

### INTERNAL COATING THICKNESS:

300 µm to 600 µm

### PIPE DIAMETER:

19 mm

### SPACE NEEDED (H16P):

Fitted to the H16 or 1.5 m x 0.3 m of wall

## OPERATING CONDITIONS

### OPERATING ENVIRONMENT:

Laboratory

### STORAGE TEMPERATURE RANGE:

-25°C to +55°C (when packed for transport)

### OPERATING TEMPERATURE RANGE:

+5°C to +40°C

### OPERATING RELATIVE HUMIDITY RANGE:

80% at temperatures < 31°C decreasing linearly to 50% at 40°C