

### **Objective**

One of the most common problems in fluid mechanics is the estimation of pressure loss. It is the objective of this experiment to enable pressure loss measurements to be made on several small bore pipe circuit components such as pipe bends valves and sudden changes in area of flow.

### **Description of Apparatus**

The apparatus is shown diagrammatically in Figure 1. There are essentially two separate hydraulic circuits one painted dark blue, and the other painted light blue, but having common inlet and outlets. A hydraulic bench is used to circulate and measure water. Each one of the two pipe circuits contain a number of pipe system components. The components in each of the circuits are as follows:

\_\_\_\_\_

1. Gate Valve
2. Standard Elbow Bend
3. 90° Mitre Bend



$A_2/A_1$	0	0.1	0.2	0.3	0.4	0.6	0.8	1.10
K	0.50	0.46	0.41	0.36	0.30	0.18	0.06	0

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a) \_\_\_\_\_

Considering Fig. 5, applying Bernoulli's equation between 1 & 2, gives:

$$Z + P_1 / g + V_1^2$$

Comparing equations 14 & 17:

$$h_L = 12.6 x \quad (18)$$

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1. Open fully the water control on the hydraulic bench.
2. With the globe valve closed, open the gate valve fully to obtain

- d) Discuss head losses in 90° Mitre and Standard Elbow bend.
- i) \_\_\_\_\_
- a) If head rise across a sudden expansion (13.7 mm / 26.4 mm) is given by expression  $h_L = \frac{0.396V_1^2}{2g}$ . Compare this head rise with the measured head rise. Plot the measured and the calculated head rise.

f	Friction factor
d	Diameter of pipe, (m)
L	Length of pipe, (m)
K	Loss Coefficient
$K_B$	Loss coefficient due to bends
Re	Reynolds Number

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Manometer	Unit



Date: \_\_\_\_\_

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Test #	Flowrate		Piezometer tube Readings (mm) water						U-Tube (mm) Hg
	Vol. (Liter)	Time (s)	1	2	3	4	5	6	Gate Valve
*1									
2									
3									
4									
5									
6									
7									
8									
9									
10									

\*Valve fully open

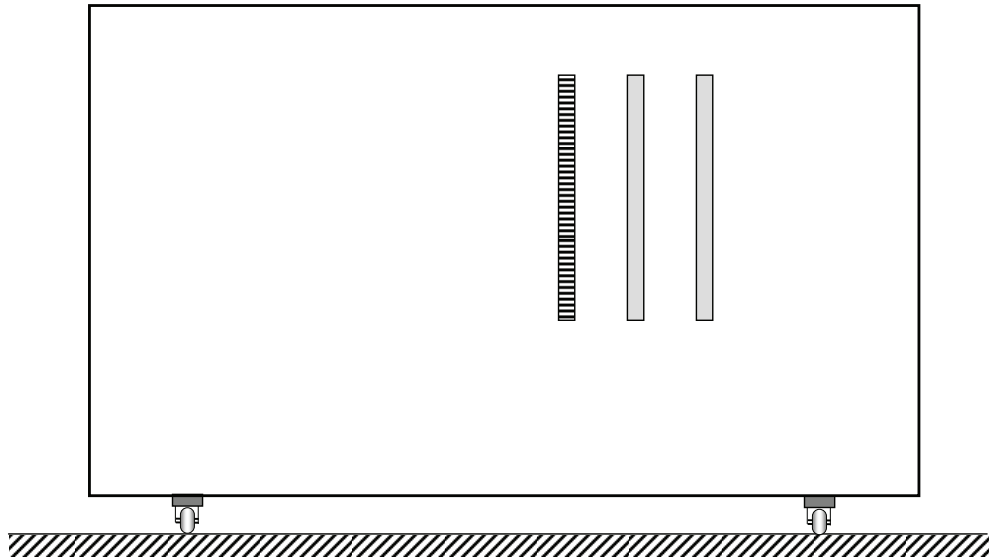
Water Temperature =

Date: \_\_\_\_\_

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Test #	Flowrate		Piezometer tube Readings (mm) water								U-Tube (mm) Hg		
	Vol. (Liter)	Time (s)	7	8	9	10	11	12	13	14	15	16	Globe Valve
*11													
12													
13													
14													
15													
16													
17													
18													

19



F5-11





