1.0 OBJECTIVES

To investigate the relationship between cooling load and cooling range

2.0 WATER COOLING TOWER APPARATUS (MODEL: HE 152)

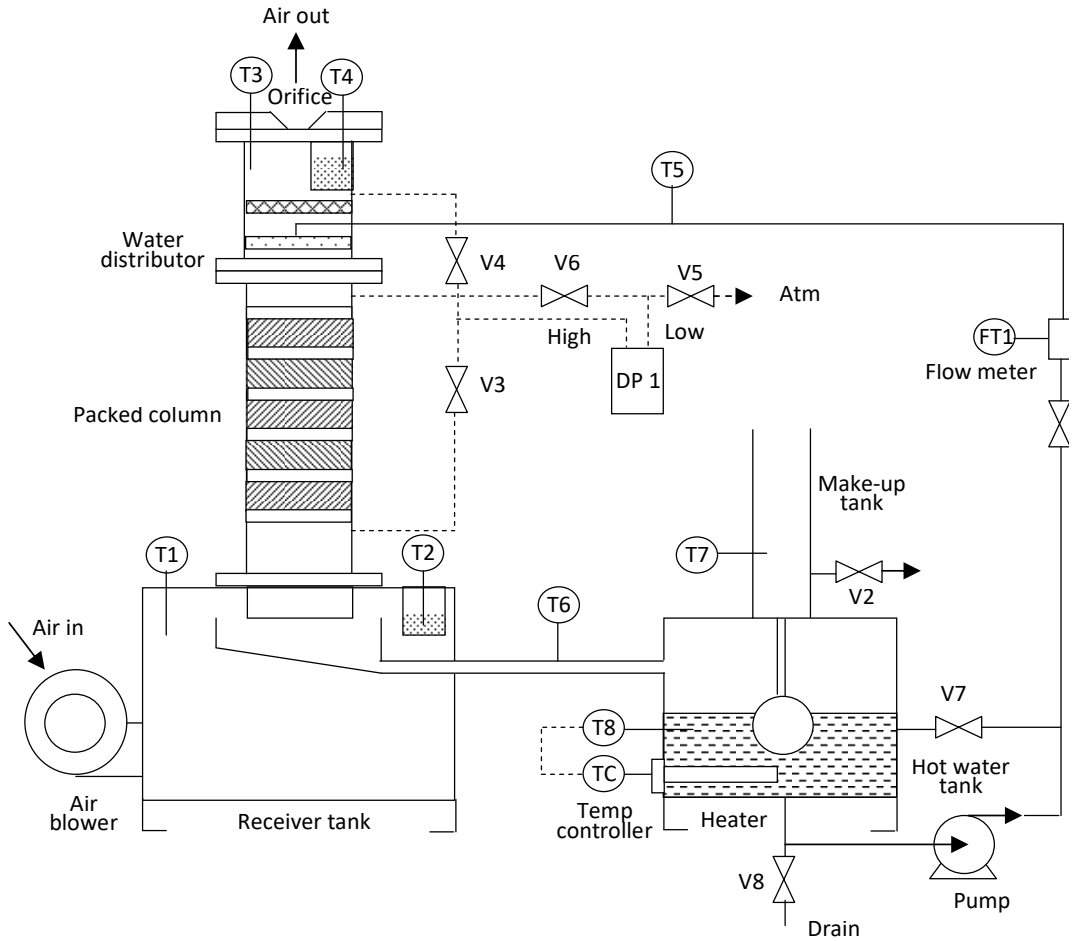

Figure 1 Schematic Diagram of the Water Cooling Tower

3.0 GENERAL PROCEDURES

3.1 General Start-Up Procedures

(a) Check to ensure that valve V1 to V6 are closed and valve V7 is partially opened.
(b) Fill the load tank with distilled or deionised water. It is done by first removing the make-up tank and then pouring the water through the opening at the top of the load tank. Replace the make-up tank onto the load tank and lightly tighten the nuts. Fill the tank with distilled or deionised water up to he zero mark on the scale.
(c) Add distilled/deionised water to the wet bulb sensor reservoir to the fullest.
(d) Connect all appropriate tubing to the differential pressure sensor.
(e) Install the appropriate cooling tower packing for the experiment.

(f) Then, set the temperature set point of temperature controller to 50°C. Switch on the 1.0 kW water heater and heat up the water until approximately 40°C.
(g) Switch on the pump and slowly open the control valve V1 and set the water flowrate to 2.0 LPM. Obtain a steady operation where the water is distributed and flowing uniformly through the packing.
(h) Fully open the fan damper, and then switch on the fan. Check that the differential pressure sensor is giving reading when the valve manifold is switched to measure the orifice differential pressure.
(i) Let the unit run for about 20 minutes, for the float valve to correctly adjust the level in the load tank. Refill the make-up tank as required.
(j) Now, the unit is ready for use.

3.2 General Shut-Down Procedure

(a) Switch off heaters and let the water to circulate through the cooling tower system for 3-5 minutes until the water cooled down.
(b) Switch off the fan and fully close the fan damper.
(c) Switch off the pump and power supply.
(d) Retain the water in reservoir tank for the following experiment.
(e) Completely drain off the water from the unit if it is not in used.

4.0 EXPERIMENTAL PROCEDURES

(a) Prepare and start the cooling tower with according to Section 3.1.
(b) Set the system under the following conditions and allow stabilizing for about 15 minutes.
    (i) Water flow rate : According to group
    (ii) Air flow rate : According to group
    (iii) Cooling load : 0.0 kW
    (iv) Column Installed : According to group
(c) After the system stabilizes, record a few sets of measurements (i.e. temperature (T1-T6), orifice differential pressure (DP1), water flowrate (FT1) and heater power (Q1), then obtain the mean value for calculation and analysis.
(d) Without cahnges in the conditions, increase the cooling load to 0.5 kW. When the system stabilized, record all data.
(e) Similarly, repat the experiment at 1.0 kW and 1.5 kW.

5.0 DATA

Provide a suitable table to record all measured data obtained for different values of cooling load.

6.0 CALCULATION AND ANALYSIS

(a) Plot a graph to show that the relationship between cooling load and cooling range.