4.6 Simulation result

The mathematical model of the loop thermosyphon, can simulate any condition. But from the practical consideration, design of LTS should conform to the HPD.

The simulation results are:

The controll parameters:

- Working fluid is R-123
- Filling ratio, 75% of the volume of the evaporator section
- Inclination angle of 20 degrees.
- Evaporator section length of 410 mm.
- Condenser section length of 410 mm.
- Adiabatic section length of 1200 mm.
- Loop thermosyphon is made of copper tube with aluminum fin
- 10 mm, OD.
- Fin thickness 0.15 mm
- The heat transfer rate of 5.25 kW (this value is equal the evaporator of heat pump from chapter 3)

The variable parameters and result from the program are:

- Number of row (N_r) of 2 to 20 step up of 2
- Number of colum (N_c) of 1 to 10 step up of 1
- Number of fin 6 to 18 step up of 2
- S_t and S_l are vary follow condition of operation

The results from mathematical model were compared with Qexcess. Which equal the evaporator of heat pump dryer in chapter 3. It can be concluded that the heat transfer of loop thermosyphon is 5.25 kW. This value will use for design and simulation condition of the loop thermosyphon as follow:

- Working fluid is R-123
- Filling ratio, 75% of the volume of the evaporator section
- Inclination angle of 20 degrees.
- Evaporator section length of 410 mm.
- Condenser section length of 410 mm.
- Adiabatic section length of 1200 mm.
- Loop thermosyphon is made of copper tube with aluminum fin

- 10 mm, OD.
- Fin thickness 0.15 mm
- Number of row (N_r) of 4
- Number of column (N_c) of 6
- Number of fin 12 fin per inch
- S_t and S_l are 28 and 22 mm

4.7 Construction of the LTS

The loop thermosyphon was constructed from the simulation result and available material in Thailand. The sizes of condenser section and evaporator section were designed to match the size suitable with the duct of the heat pump dryer. It is shown in Figures 4.4 to 4.6.

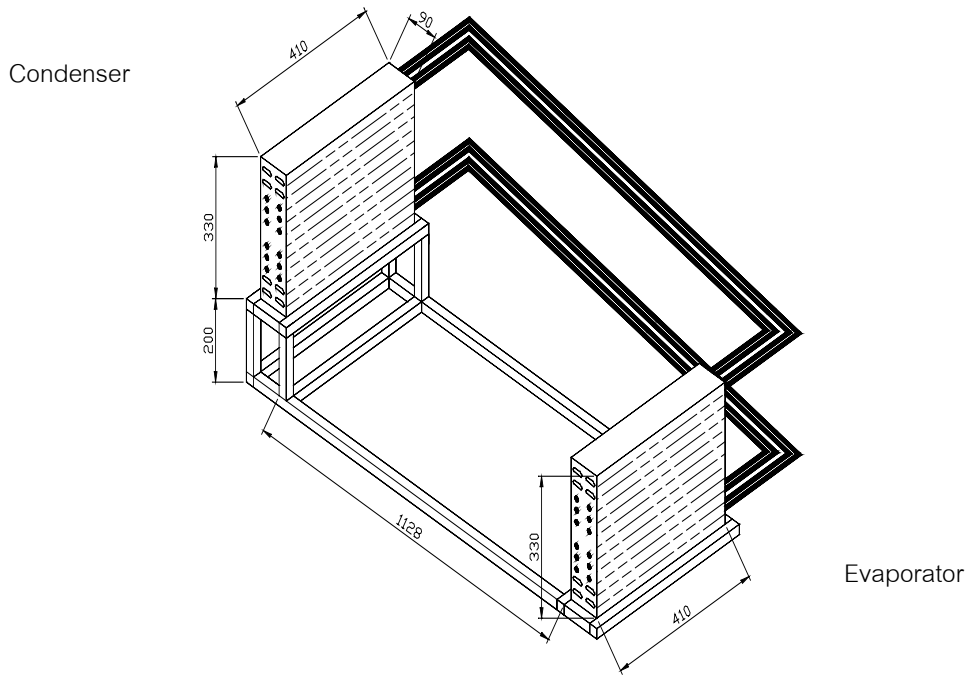

Figure 4.4 Schematic diagram of loop thermosyphon

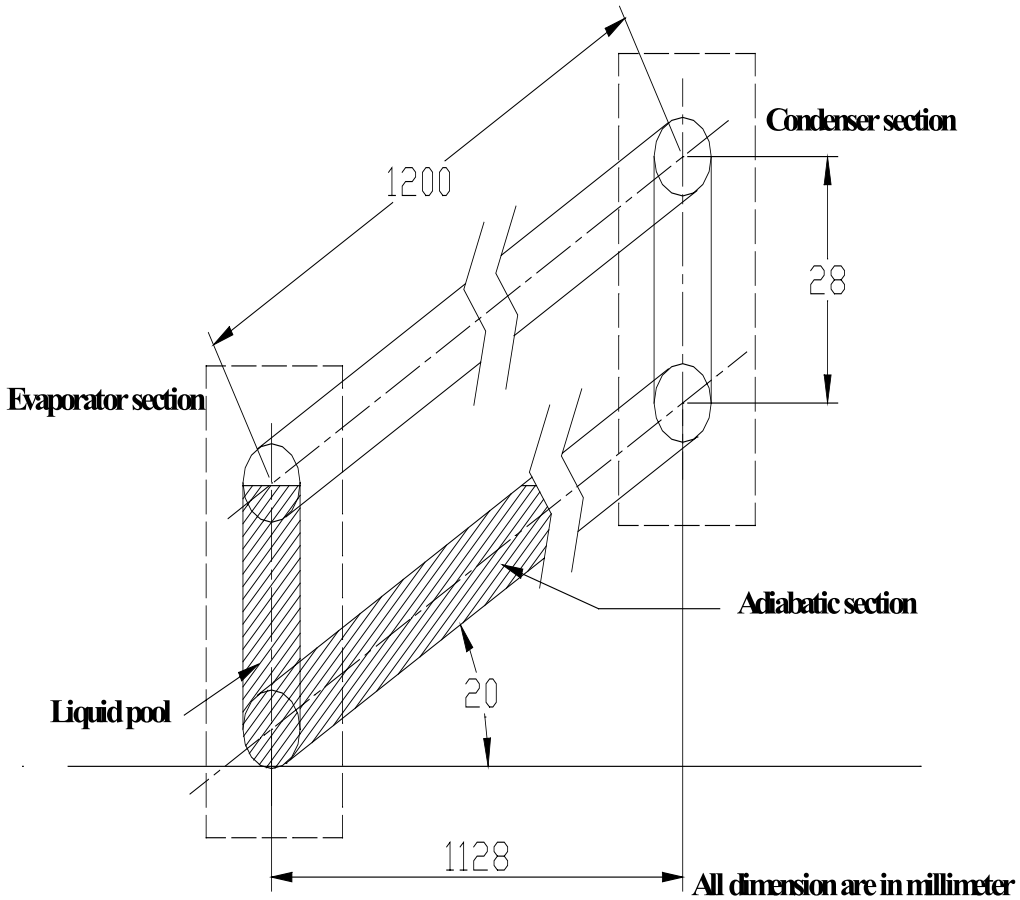

Figure 4.5. Description of the loop thermosyphon

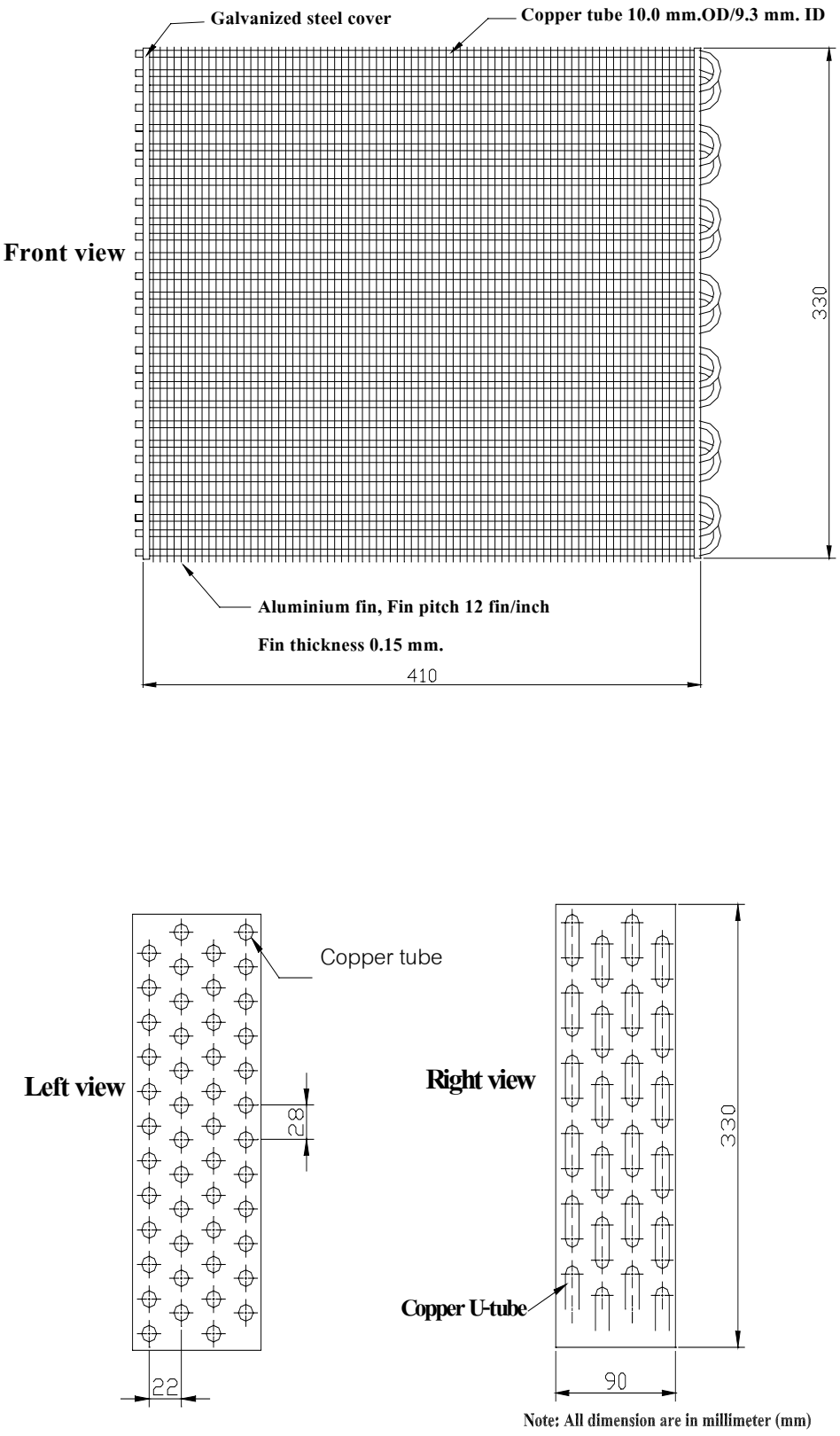

Figure 4.6 Drawing of the LTS