

Specification for a two-phase flow setup

(Ref # MEE/2014/SSG/Two-Phase)

Quotations are invited for the design and development of a customized setup for the evaluation of two phase flow instabilities in horizontal evaporator tubes. The present study is intended to analyze the actual boiling process occurring in a solar steam generation plant that is currently under operation. The setup should consist of long stainless steel tubes. The tube should be heated by elements that can emulate the non-uniform heating process occurring in a solar receiver tube. The total power input to the heater should be around 20 kW, and the pipe sizing should facilitate the observation of laminar, intermittent, slug, annular and mist flow regimes. The setup should consist of at least two windows provided at suitable locations for observing the local two-phase flow regime in the tube. Provisions for measuring the tube surface temperatures and fluid temperatures at different locations should be available.

Flow control must be included for obtaining different flow rates of water in the tube. Various devices such as pressure and flow monitors/transmitters have to be provided at inlet and outlet of the tube. All these devices have to be properly interfaced with a computer for data collection. The exit of the tube has to be fitted with a motorized pressure control valve.

The price quoted should also include the cost for design, installation and commissioning of the above setup. The technical details of important components are given below:

- The heated fluid should be capable of attaining a temperature of at least 400°C and the heater should be controlled by thyristors. The total electrical heater set up should be properly insulated and interfaced with a manual control panel.
- Eighteen tube-surface temperature measurements and six fluid temperature measurements to be carried out at different positions over the tube length.
- One flow transmitter and indicator to be installed at the inlet of the SS tube
- One pressure transmitter and one pressure gauge at inlet and also at outlet.
- Water storage tank -1 no (500 litre capacity)
- Camera for flow monitoring interfaced with PC

- PLC automation system for control and data acquisition.
- Cable interconnection of sensors to PLC. Data logging facility is to be provided.

Sealed quotations, in two parts (with separate technical and financial details) have to be sent to:

Prof. T. Sundararajan
Dept. of Mechanical Engineering,
IIT Madras, Chennai-600036,
Tamil Nadu, India.

=====