

Characteristic Analysis on Steam Generation of Steam Heat Pump

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Extended Abstract

Steam is a useful heat transfer medium and is extensively being used in industries.[1] Conventionally steam generation is based on the central supply method but there is a substantial loss in the heat energy during the transport. Also, it is difficult to apply distributed control in industrial processes using the conventional technology.[2]

But, The steam heat pump: capable of utilizing low-temperature waste heat energy, which otherwise would have thrown away in the industry, as a heat source is an energy efficient and environmentally friendly technology. Distributed control can also be easily applied in the proposed technology.[3]

The steam generation of the steam heat pump is achieved by converting pressurized water to flash steam in a flash tank.

In this study, experiments were conducted according to change the pressurized water flow rate, and the steam discharge pressure.

In experiments with pressurized water flow rate, an experiment was conducted to change the flow rate of the pressurized water between 2.6 m³/h and 4.0 m³/h into the flash tank. Also, in experiments with the steam discharge pressure, temperature conditions of the pressurized water were set at 123°C (2.183 bar (a)), and the flow rate was fixed to 3.0 m³/h, and the experiment was conducted that the discharge pressure of the steam was gradually increased to atmospheric pressure from 120°C (1.987 bar (a)) to atmospheric pressure.

The results of the experiment showed that the steam generation increased as the pressurized water flow rate increased and as the difference between the pressurized water and the discharge pressure of the steam increases, the steam generation increases. In other words, it was confirmed that the generation of flash steam is determined by the enthalpy difference between pressurized water and discharged steam, and circulating mass flow rate.

In the future, tests will be carried out to improve the quality of flash steam in the flash tank. Also, it will be presented the optimum design of the flash tank in a steam heat pump.

References

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