ABSTRAK

Tujuan penelitian *water heater* yang menggunakan bahan bakar gas LPG ini adalah : (a) Merancang *water heater* berbahan bakar gas LPG, (b) mendapatkan hubungan antara debit air dengan laju aliran kalor tanpa penutup atas dan dengan penutup atas, (c) mendapatkan kalor yang diterima air dari *water heater* tanpa penutup atas dan dengan penutup atas, (d) mendapatkan kalor yang diberikan dari gas LPG, (e) mendapatkan efisiensi *water heater* tanpa penutup atas dan dengan penutup atas, (f) mendapatkan besarnya debit dan efisiensi dari *water heater* yang menghasilkan suhu keluar untuk keperluan mandi.

Penelitian *water heater* ini dilakukan sebanyak dua kali yaitu pertama penelitian tanpa penutup atas *water heater*, kedua, penelitian *water heater* menggunakan penutup atas *water heater* dan pelaksanaan di laboratorium Teknik Mesin Universitas Sanata Dharma Yogyakarta. *Water heater* dibuat dengan memiliki ketinggian 300 mm, berdiameter luar *water heater* 300 mm, panjang pipa 8 meter dibuat dengan 2 lintasan. *Water heater* memiliki 3 tabung diantaranya 2 tabung memiliki lubang udara. Tabung dalam berdiameter 100 mm dengan 40 lubang udara dengan diameter lubang 5 mm. Tabung tengah berdiameter 250 mm dengan 55 lubang udara dan berdiameter lubang 8 mm. Tabung bagian luar memiliki diameter 300 mm tanpa lubang udara. Variasi penelitian terhadap gas LPG dimulai dari posisi regulator gas LPG maksimum (3 kali putaran regulator), posisi regulator gas LPG medium(2 kali putaran regulator gas), posisi regulator gas LPG low (1 kali putaran regulator gas).

Hasil penelitian didapatkan (a) *water heater* tanpa menggunakan penutup atas mampu menghasilkan air panas dengan suhu air keluar 39,8^{o}C dengan debit yang diperoleh 11,48 liter/menit. (b) laju aliran kalor yang diterima air pada kondisi regulator gas maksimum 9,369 kW. (c) nilai efisiensi yang dihasilkan *water heater* 39,45 %. (d) laju aliran kalor yang diberikan gas LPG sebesar 23,747kW. (e) *water heater* menggunakan penutup atas mampu menghasilkan air panas dengan suhu air keluar 40,3^{o}C dengan debit yang diperoleh 13,56 liter/menit. (f) laju aliran kalor yang diterima air pada kondisi regulator gas maksimum 11,617 kW. (g) nilai efisiensi yang dihasilkan *water heater* 48,92 %. (h) laju aliran kalor yang diberikan gas LPG sebesar 23,747 kW.

Kata kunci :*water heater*, debit air, suhu air, efisiensi

ABSTRACT

The purposes of studying water heater that uses LPG gas fuel are such as : (a) design water heater which uses fuel based on LPG; (b) obtain the relationship between water discharge rate and heat flow without the top cover and the top cover; (c) gain heat which is received from water from the water heater without the top cover and the top cover; (d) get heat supplied from LPG gas; (e) gain efficiency of water heater without the top cover and the top cover; (f) get the amount of discharge and the efficiency of the water heater that generate exit temperature for bathing purposes.

The study of water heater was conducted twice. On the first study the researcher used water heater which does not have the top cover. However, on the second study, the researcher used water heater which has the top cover. The research was conducted in mechanical engineering laboratory of Sanata Dharma University in Yogyakarta. Water heater is made with a height of 300 mm with outer diameter is that 300 mm. The pipe used is 8 feet long made with 2 trajectories. Then, the water heater has three tubes where two of them have air holes. Hence, the inner tube which is 100 mm in diameter has 40 air holes with 5 mm in diameter for each hole. Central tube which is 250 mm in diameter has 55 air holes with 8 mm in diameter for each hole. Outer tube which is 300 mm in diameter has not got air holes. Variation research on LPG gas starts from the maximum position of LPG gas regulator (three rotation of the regulator), the position of LPG gas regulator medium (two rotation of the regulator), and the position of the low LPG gas regulator (one rotation of the regulator).

The results of the research are such as: (a) use water heater with the top cover is capable of producing hot water which temperature is 39,8^{o}C and obtained discharge is 11.48 liters/min; (b) the rate of heat flow of water received in the condition of maximum gas regulator is 9.369 kW; (c) the efficiency value which was resulted from water heater is 39.45%; (d) the rate of heat flow given by LPG gas is 23,747kW; (e) water heater with the top cover is capable of producing hot water which temperature is 40,3^{o}C and obtained discharge is 13.56 liters/min; (f) the rate of heat flow of water received in the condition of maximum gas regulator is 11,617 kW gas regulator; (g) the efficiency value which was resulted from water heater is 48.92%; and (h) the rate of heat flow given by LPG gas is 23,747 kW.

Keywords: *water heater, water flow, water temperature, efficiency*