ABSTRAK

Salah satu teknologi yang sekarang ini banyak diminati di kalangan rumah tangga adalah *water heater*. Selain kebutuhan rumah tangga, *water heater* banyak digunakan untuk kebutuhan rumah sakit, hotel dan industri.

Penelitian ini bertujuan untuk (a) merancang dan membuat *water heater* tenaga gas LPG, (b) mendapatkan hubungan antara debit air dengan suhu air keluar *water heater*, (c) mendapatkan hubungan antara debit air dengan laju aliran kalor, (d) menghitung kalor yang diberikan gas LPG pada *water heater*, (e) menghitung kalor yang diterima air, (f) menghitung efisiensi *water heater*.

Penelitian ini dilaksanakan di Laboratorium Program Studi Teknik Mesin Sanata Dharma. *Water heater* yang dibuat memiliki dimensi tinggi 37 cm, diameter tabung paling luar 34 cm, diameter tabung tengah 26 cm, diameter tabung paling dalam 9 cm, 480 lubang udara pada tabung paling luar, panjang pipa 10 meter, diameter dalam pipa saluran air 1,27 cm, dan 8 buah sirip dari pipa tembaga dengan diameter dalam sirip 1,27 cm. Variasi dilakukan pada tinggi pembukaan tutup gas buang, yaitu sebesar 10 putaran (1 cm), 20 putaran (2 cm), dan 30 putaran (3 cm).

Hasil penelitian memberikan beberapa kesimpulan yaitu (a) *Water heater* yang sudah dibuat mampu menghasilkan debit sebesar 15,60 liter/menit pada suhu 38,7°C, (b) Hubungan antara debit air dengan suhu air keluar *water heater* terbaik dinyatakan dengan persamaan : $T_o = 97{,}61Q^{-0{,}328}$. (c) Hubungan antara debit air dengan laju aliran kalor yang diterima air terbaik dinyatakan dengan persamaan : $q_{air} = -9{,}3456Q^2 + 419{,}95Q + 8404{,}1$. (d) Laju aliran kalor yang diberikan gas LPG untuk tinggi pembukaan tutup gas buang 2 cm sebesar 21,312 kW, (e) Laju aliran kalor yang diterima air paling tinggi pada suhu 35,9°C untuk tinggi pembukaan tutup gas buang 2 cm sebesar 13,452 kW, (f) Hubungan antara debit air dengan efisiensi *water heater* terbaik dinyatakan dengan persamaan : $\eta = -0{,}0439Q^2 + 1{,}9705Q + 39{,}434$.

Kata kunci : *water heater, tankless water heater,* pemanas air tenaga gas, *gas water heater*, LPG.

ABSTRACT

One of the household favorite technology is water heater. In addition to the needs of household appliances water heater much used for the needs of hospitals hotel and industry.

This study aims to (a) designing and making LPG gas water heater (b) get the relation between a discharge of water with water temperature out water heater, (c) get relations between discharge to the rate of water flow kalor, (d) count kalor given by LPG gas into water heater, (e) count kalor that received by water (f) count the efficiency of water heater.

This research conducted in laboratories of mechanical engineering sanata darma. The dimensions of water heater as high as 37 cm , the outer of diameter of a tube is 34 cm, the diameter of a middle tube is 26 cm, the diameter of a central a tube is 9 cm, 480 air holes in a tube most outside, a length of pipe 10 meters, the diameter of in a pipe 1.27 cm, and 8 fins of a copper pipe with a diameter in the fins of 1.27 cm. The variation is on the opening of the exhaust gases, amounting to 10 rounds as high as 1 cm, 20 rounds as high as 2 cm, and 30 rounds as high as 3 cm.

Research results give some conclusions: (a) water heater already made capable of producing the discharge of 15,60 liter / minute at a temperature of 38,7^{o}C, (b) the relation between a discharge of water with the temperature of water out water heater best expressed with an equation: $T_o = 97{,}61Q^{-0{,}328}$. (c) a relation between a discharge of water at the rate of flow of heat engine received water best expressed with an equation: $q_{air} = -9{,}3456Q^2 + 419{,}95Q + 8404{,}1$. (d) the rate of flow of heat engine given gas cylinders as high as 2 cm of opening cover the exhaust gases as much as 21,312 kW (e) the rate of flow of heat engine received the most high water at a temperature high 35,9^{o}C for the opening cover the exhaust gases as high as 2 cm as much as 13,452 kW (f) the relation between a discharge of water efficiency of water heater best expressed with an equation: $\eta = -0{,}0439Q^2 + 1{,}9705Q + 39{,}434$.

Keywords : *water heater, tankless water heater,* pemanas air tenaga gas, *gas water heater*, LPG.