LAMPIRAN II
PERHITUNGAN

Perhitungan Aktual pada *Solar Water Heater*

1. Jenis *Spiral Tube*

1.1 Laju Alir 0,5 L/min

Diketahui

I = 855 w/m²

T in = 32,6 ˚C

T out = 40 ˚C

Diameter Pipa (D) = 0,5 inch , r= 0,25 inch = 0,635 cm

Laju Alir (m) = 0,5 L/min

Luas Kolektor = 0,77 m²

Qin = ṁ x Cp x (To-Ti)

Mencari Massa Pipa

ṁ = ρ x m

= 0,997 Kg/liter x 0,5 Liter/M

= 0,50 Kg/m

= 0,0083 Kg/s

Mencari Cp

Dari nilai Tav didapatkan Cp air sebesar

Cp = 4,174 Kj/Kg.˚c

Qout = ṁ x Cp x (To-Ti)

= 0,0083 Kg/s x 4,174 Kj/Kg.C x 5 C

= 0,256 Kj/s

= 255,584 Watt

Qin = I x Ac

= 866 W/m^2 x 0,77 m^2

= 658,66 Watt

$$Eff = \frac{Qout}{Qin}$$

= 38,80 %

Qloss = Qin-Qout

403,08 Watt

1.2 Laju Alir 0,8 L/min

Diketahui

I = 857 w/m²

T in = 32 ˚C

T out = 36,6 ˚C

Diameter Pipa (D) = 0,5 inch , r= 0,25 inch = 0,635 cm

Laju Alir (m) = 0,8 L/min

Luas Kolektor = 0,77 m²

Qin = ṁ x Cp x (To-Ti)

Mencari Massa Pipa

ṁ = ρ x m

= 0,997 Kg/liter x 0,5 Liter/M

= 0,80 Kg/m

= 0,0133 Kg/s

Mencari Cp

Dari nilai Tav didapatkan Cp air sebesar

Cp = 4,174 Kj/Kg.˚c

Qout = ṁ x Cp x (To-Ti)

= 0,0133 Kg/s x 4,174 Kj/Kg.C x 3 C

= 0,253 Kj/s

= 253,018 Watt

Qin = I x Ac

= 679 W/m^2 x 0,77 m^2

= 659,63 Watt

$$Eff = \frac{Qout}{Qin}$$

= 38,36 %

Qloss= Qin-Qout

= 406,62 Watt

1.3 Laju Alir 1 L/min

Diketahui

I = 758 w/m²

T in = 33 ˚C

T out = 37 ˚C

Diameter Pipa (D) = 0,5 inch , r= 0,25 inch = 0,635 cm

Laju Alir (m) = 1,0 L/min

Luas Kolektor = 0,77 m²

Qin = ṁ x Cp x (To-Ti)

Mencari Massa Pipa

ṁ = ρ x m

= 0,997 Kg/liter x 0,5 Liter/M

= 1,00 Kg/m

= 0,0166 Kg/s

Mencari Cp

Dari nilai Tav didapatkan Cp air sebesar

Cp = 4,174 Kj/Kg.˚c

Qout = ṁ x Cp x (To-Ti)

= 0,0166 Kg/s x 4,174 Kj/Kg.C x 1 C

= 0,277 Kj/s

= 277,432 Watt

Qin = I x Ac

= 448 W/m^2 x 0,77 m^2

= 583,57 Watt

$$Eff = \frac{Qout}{Qin}$$

= 47,54 %

Qloss= Qin-qout

= 306,14 Watt

2. Jenis *Serpentine Tube*

2.1 Laju Alir 0,5 L/min
Diketahui
I = 823 w/m²
T in = 31 ˚C
T out = 38 ˚C
Diameter Pipa (D) = 0,5 inch , r= 0,25 inch = 0,635 cm
Laju Alir (m) = 0,5 L/min
Luas Kolektor = 0,77 m²

Qin = ṁ x Cp x (To-Ti)

Mencari Massa Pipa
ṁ = ρ x m
= 0,997 Kg/liter x 0,5 Liter/M
= 0,50 Kg/m
= 0,0083 Kg/s

Mencari Cp
Dari nilai Tav didapatkan Cp air sebesar
Cp = 4,174 Kj/Kg.˚c

Qout = ṁ x Cp x (To-Ti)
= 0,0083 Kg/s x 4,174 Kj/Kg.C x 7 C
= 0,236 Kj/s
= 236,331 Watt

Qin = I x Ac
= 709 W/m^2 x 0,77 m^2
= 633,88 Watt

$$Eff = \frac{Qout}{Qin}$$
= 37,28 %

Qloss= Qin-Qout
= 397,55 Watt

2.2 Laju Alir 0,8 L/min

Diketahui

I = 839 w/m²

T in = 32 ˚C

T out = 36 ˚C

Diameter Pipa (D) = 0,5 inch , r= 0,25 inch = 0,635 cm

Laju Alir (m) = 0,8 L/min

Luas Kolektor = 0,77 m²

Qin = ṁ x Cp x (To-Ti)

Mencari Massa Pipa

ṁ = ρ x m

= 0,997 Kg/liter x 0,5 Liter/M

= 0,80 Kg/m

= 0,0133 Kg/s

Mencari Cp

Dari nilai Tav didapatkan Cp air sebesar

Cp = 4,174 Kj/Kg.˚c

Qout = ṁ x Cp x (To-Ti)

= 0,0133 Kg/s x 4,174 Kj/Kg.C x 5 C

= 0,244 Kj/s

= 244,140 Watt

Qin = I x Ac

= 782 W/m^2 x 0,77 m^2

= 646,23 Watt

$$Eff = \frac{Qout}{Qin}$$

= 37,78 %

Qloss= Qin-Qout

= 402,09 Watt

2.3 Laju Alir 1 L/min

Diketahui

I = 833 w/m²

T in = 30 ˚C

T out = 35,2 ˚C

Diameter Pipa (D) = 0,5 inch , r= 0,25 inch = 0,635 cm

Laju Alir (m) = 1,0 L/min

Luas Kolektor = 0,77 m²

Qin = ṁ x Cp x (To-Ti)

Mencari Massa Pipa

ṁ = ρ x m

= 0,997 Kg/liter x 0,5 Liter/M

= 1,00 Kg/m

= 0,0166 Kg/s

Mencari Cp

Dari nilai Tav didapatkan Cp air sebesar

Cp = 4,174 Kj/Kg.˚c

Qout = ṁ x Cp x (To-Ti)

= 0,0166 Kg/s x 4,174 Kj/Kg.C x 4 C

= 0,361 Kj/s

= 360,661 Watt

Qin = I x Ac

= 757 W/m^2 x 0,77 m^2

= 641,21 Watt

$$Eff = \frac{Qout}{Qin}$$

= 56,25 %

Qloss= Qin - Qout

= 280,55 Watt