Psychometric calculation:

**GROUND FLOOR at 24°C initial condition;**

Qs = 33188.25347 W

QL = 7296.12016 W

QT = 40484.37363 W

SHF = 0.8197793493 ≈ 0.82

At outdoor condition: 34.5°CDB and 21.6°CWB

Where WO = 0.018136752

Solving for PS:

P­S = 2.870882826 kPa

For the computation of enthalpy;

ho = cpTo + Wohg

ho = 1.0062(34.5°C) + 0.01813675(2564.5)

ho = 81.2256005 KJ/kg

Solving for the specific volume;

vO = 0.8963812873 m3/kg

The mass flowrate from ventilation supply:

mo = 0.1784854709 kg/s

For the properties of return air condition;

Where wi = 0.009293235

wr = 0.009289440471 kg/kgm

For the computation of enthalpy;

hr = cpTr + wrhg

hr = 1.0062(24°C) + (0.009289440471 kg/kgm)(2545.5 KJ/kg)

hr = 47.79507072 KJ/kg

For the mass flowrate from sensible heat load;

me = ma

Solving for ma:

ma = 3.141309923 kg/s

Since is less than 10% then, use 10% as the value of

General equation

mowo + mrwr = mewe

.01me (0.018136752) + 0.9me (0.009289440471) = mewe

Solving for we;

we = 0.0101741716 kga/kgv

moho + mrhr = mehe

0.1me (81.2256005) + 0.9me (47.79507072) = me(he)

Solving for he;

he = 51.1381237 KJ/kg

moto + mrtr = mete

0.1me (34.5) + 0.9me (24) = me(te)

Solving for te;

Te = 25.06°C

From psychometric chart:

TL = 11.4°C

For capacity of cooling coil;

Capacity = me (he – hL)

Capacity = 3.141309923 kg/s (51.1381237 – 32.32978727 KJ/kg)

Capacity = 59.08281386 KW

**GROUND FLOOR AT 22°C initial condition**

Qs = 7016.44462 W

QL = 3529.72376W

QT = 10546.16838 W

SHF = 0.6653074716 ≈ 0.67

At outdoor condition: 34.5°CDB and 21.6°CWB

Where WO = 0.018136752

Solving for PS:

P­S = 2.870882826 kPa

For the computation of enthalpy;

ho = cpTo + Wohg

ho = 1.0062(34.5°C) + 0.01813675(2564.5)

ho = 81.2256005 KJ/kg

Solving for the specific volume;

vO = 0.8963812873 m3/kg

The mass flowrate from ventilation supply:

mo = 0.09482571893 kg/s

For the properties of return air condition;

Where wi = 0.00821976 kga/kgv

wi = wr

For the computation of enthalpy;

hr = cpTr + wrhg

hr = 1.0062(22°C) + (0.00821976 kg/kgm)(2541.8 KJ/kg)

hr = 43.02938597 KJ/kg

For the mass flowrate from sensible heat load;

me = ma

Solving for ma:

ma = 0.5578568571 kg/s

General equation

mowo + mrwr = mewe

0.1699821697me (0.018136752) + 0.8300178303me (0.00821976) = mewe

Solving for we;

we = 0.009944698262 kga/kgv

moho + mrhr = mehe

0.1699821697me (81.2256005) + 0.8300178303me (43.02938597) = me(he)

Solving for he;

he = 49.52206139 KJ/kg

moto + mrtr = mete

0.1699821697me (34.5) + 0.8300178303me (22) = me(te)

Solving for te;

Te = 24.12477712°C

From psychometric chart:

TL = 5.1°C

Solving for hL;

hL = 17.4701059 KJ/kg

For capacity of cooling coil;

Capacity = me (he – hL)

Capacity = 0.5578568571 kg/s (49.52206139 KJ/kg – 17.4701059 KJ/kg)

Capacity = 17.88040315 KW

**GROUND FLOOR AT 22.5°C initial condition**

Qs = 60346.52683 W

QL = 22546.97898W

QT = 82893.50581 W

SHF = 0.728006587 ≈ 0.73

At outdoor condition: 34.5°CDB and 21.6°CWB

Where WO = 0.018136752

Solving for PS:

P­S = 2.870882826 kPa

For the computation of enthalpy;

ho = cpTo + Wohg

ho = 1.0062(34.5°C) + 0.01813675(2564.5)

ho = 81.2256005 KJ/kg

Solving for the specific volume;

vO = 0.8963812873 m3/kg

The mass flowrate from ventilation supply:

mo = 0.4440074839 kg/s

For the properties of return air condition;

Where wi = 0.00848061 kga/kgv

wi = wr

For the computation of enthalpy;

hr = cpTr + wrhg

hr = 1.0062(22°C) + (0.00821976 kg/kgm)(2542.725 KJ/kg)

hr = 44.20335906 KJ/kg

For the mass flowrate from sensible heat load;

me = ma

Solving for ma:

ma = 4.997890316 kg/s

Since is less than 10%, then use 10% as the value of

General equation

mowo + mrwr = mewe

0.1me (0.018136752) + 0.9 me (0.00848061) = mewe

Solving for we;

we = 0.0094462242 kga/kgv

moho + mrhr = mehe

0.1me (81.2256005) + 0.9 me (44.20335906) = me(he)

Solving for he;

he = 47.9055832 KJ/kg

moto + mrtr = mete

0.1me (34.5) + 0.9 me (22.5) = me(te)

Solving for te;

Te = 23.7°C

From psychometric chart:

TL = 11.8°C

Solving for hL;

hL = 29.4145643 KJ/kg

For capacity of cooling coil;

Capacity = me (he – hL)

Capacity = 4.997890316 kg/s (47.9055832 KJ/kg – 29.4145643 KJ/kg)

Capacity = 92.41608429 KW