LAMPIRAN

Konsep Kinerja Visual

Perhitungan kebutuhan lampu pada ruang baca perpustakaan remaja dan dewasa

Ukuran ruang baca memiliki kisaran ukuran :

- Panjang : 16,2 m
- Lebar : 10 m
- Tinggi : 2,5 m
- Luas : 162 m^2
- volume : 405 m^3

- **Menghitung indeks ruang (K) untuk mencari UF (Utilization Factor)**

$$K = \frac{P \times L}{T(P+L)}$$

$$K = \frac{16,2 \times 10}{2,5(16,2+10)} = 2,4$$

cd/1000lm γ	0°	30°	60°	90°
0	270			
5	271			
10	281			
15	288			
20	284			
25	267			
30	242			
35	213			
40	179			
45	138			
50	84			
55	23			
60	9			
65	7			
70	5			
75	3			
80	2			
85	2			

room	70	50	30	0
index	50 30 10	50 30 10	30 10	0
k	30	30	10	0
0.60	0.33 0.30 0.27	0.32 0.29 0.27	0.28 0.27	0.26
0.80	0.38 0.34 0.32	0.37 0.34 0.32	0.33 0.31	0.30
1.00	0.42 0.39 0.36	0.41 0.38 0.36	0.36 0.35	0.34
1.25	0.46 0.42 0.40	0.44 0.41 0.39	0.39 0.38	0.37
1.50	0.48 0.45 0.43	0.47 0.44 0.42	0.41 0.40	0.39
2.00	0.52 0.50 0.47	0.50 0.48 0.46	0.44 0.43	0.42
2.50	0.55 0.52 0.50	0.52 0.50 0.49	0.46 0.45	0.44
3.00	0.56 0.54 0.52	0.53 0.52 0.50	0.48 0.47	0.46
4.00	0.58 0.56 0.55	0.55 0.54 0.52	0.49 0.48	0.47
5.00	0.59 0.58 0.56	0.56 0.55 0.54	0.49 0.49	0.48

UF

- **Menghitung DF (Design Factor)**

  DF = UF x MF (90%)

  DF = 0,44 x 0,9 = **0,396**

- Kebutuhan iluminasi untuk kegiatan-kegiatan tertentu:
  - **Penglihatan biasa** **= 100 lux**
  - Kerja kasar dengan detail besar = 200 lux
  - Kerja umum dengan detail wajar = 400 lux
  - Kerja cukup keras dengan detail kecil = 600 lux
  - Kerja keras, lama, detail kecil
    (merakit barang halus, menjahit dengan tangan) = 900 lux
  - Kerja sangat keras, lama, detail sangat kecil
    (memotongbatumulia, tisikhalus) = 1.300 – 2.000 lux
  - Kerja luar biasa keras, detail sangat kecil
    (merakit arloji, membuat instrumen) = 2.000 – 3.000 lux

Berdasarkan data yang terdapat di atas maka ruang baca membutuhkan sekitar 100 lux

E = Ø / A

100 lux = Ø / 160 m^2

Ø = 100 lux x 160 m^2

Ø = 16.000 lm

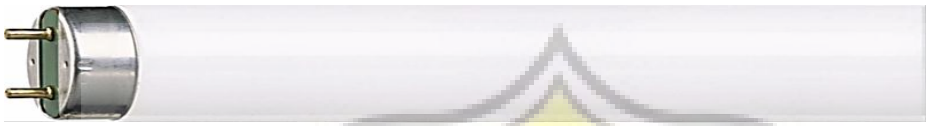
Dimana :

Ø = total arus cahaya (lm)

E = Iluminasi (lux)

A = Luas Area (m2)

Lampu yang digunakan Philips TL-D Standard colours Linear fluorescent tube 30 W, G13, Cool daylight (1825 lm)



Sumber : www.lightbulbmarket.com

Technical specifications

- Color rendering index (CRI): 75
- Dimmable: No
- Fitting/Cap: G13
- Lifetime: 13000 hour(s)
- Light effect: Cool daylight
- Light output: 1825 lumen
- Shape: Linear fluorescent tube
- Wattage: 30 W

Perhitungan Lampu = Ø / arus cahaya perlampu

= 16.000 / 1825 lm

= 8.76 titik lampu (pembulatan ke atas)

= 9 titik lampu

Jadi, titik lampu yang dibutuhkan untuk menerangi ruang baca adalah 9 lampu

Konsep Kinerja Termal.

- Luas seluruh bangunan perpustakaan ini adalah :

  8.075,67 m2

- Luas ruang yang tidak di beri AC

  Ruang loading dock, gudang, genset, toilet, ruang AHU dan Ruang ME, ruang baca outdoor, ruang kontrol

  27,5 m^2 + 22 m^2 +27,5 m^2 + 165 m^2 + 55 m^2 + 22 m^2 + 195 m^2 + 11 m^2 = 525 m^2

- Luas bangunan yang di beri AC :

  8.075,67 m^2 – 525 m^2= 7.550,67 m^2

Perhitungan beban AC :

Luas area x cooling load x 10/6 x 1,14

8.075,67 m^2 x 202 x 10/6 x 1,14

3.099.442,15 W → **3.099,44 Kw**

Perhitungan airflow

16 L/s x Luas area

16 L/s x 8.075,67 m^2

129.210,72 L/s m^2

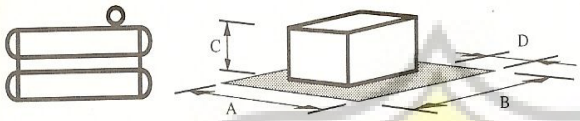
Berdasarkan perhitungan cooling load maka didapatkan system pendingin berupa :

1. Chiller Water Set (CWS) water cooled

➔ Total beban AC: **3.099,44 Kw**

CWS (water cooled)

This unit is normally installed within a plant room. The areas shown are based on duplex units.



Cooling kW(R)	A	B	C	D	area m^2	weight kg
		metres				
100 to 250	6.7	4.5	2.8	2.4	30	2000
250 to 500	7.3	4.8	3.0	2.8	35	4000
500 to 750	7.7	5.2	3.2	3.2	40	5000
750 to 1000	8.2	5.5	3.2	3.6	45	7000
1000 to 1250	8.6	5.7	3.4	4.4	49	8000
1250 to 1500	8.8	5.9	3.6	4.4	52	9500
1500 to 1750	9.2	6.1	3.6	4.4	56	11000
1750 to 2000	9.4	6.3	3.8	4.4	59	13000
2000 to 3000	9.5	6.3	4.0	4.4	60	19000

For > 3000 kW(R) pro rata based on 3000 kW unit

3.099,44 Kw / 1000 kw = 3,09 jadi membutuhkan 3 unit CWS

2. Cooling Tower

➔ Total beban AC : **3.099,44 Kw**

5.5 Cooling tower

Cooling towers of the 'induced draft' and 'forced draft' type are fully weather-proofed and best located in the open, but may be mounted behind an 'open mesh' site screen, which provides no restriction to the unit's air supply and discharge.

The 'forced draft' type may be located inside the building, provided that it has an unrestricted air supply and an exhaust duct of 1 m^2 cross-section per 200 kW(R), discharging to outdoors.

Cooling kW(R)	A	B	C	D	area m^2	weight kg
	metres					
100 to 200	4.3	2.8	1.8	0.9	12	840
200 to 400	5.4	3.7	1.9	1.0	20	1750
400 to 600	6.5	4.3	1.9	1.0	28	2700
600 to 800	7.3	4.9	2.0	1.0	36	3600
800 to 1000	8.0	5.4	2.2	1.1	43	4400
1000 to 1200	8.6	5.8	2.5	1.3	50	5400
1200 to 1400	9.2	6.1	2.6	1.3	56	6200
1400 to 1600	9.7	6.4	2.8	1.4	62	7200
1600 to 1800	10.1	6.7	3.0	1.5	68	8000
1800 to 2000	10.6	7.0	3.0	1.5	74	8800
2000 to 2200	11.0	7.3	3.0	1.5	80	9800
2200 to 2400	11.3	7.6	3.1	1.6	86	10800
2400 to 2600	11.7	7.8	3.3	1.7	91	11800
2600 to 2800	11.9	8.0	3.3	1.7	95	12400
2800 to 3000	12.2	8.1	3.3	1.7	99	13200

3.099,44 Kw / 1000 kw = 3,09 jadi membutuhkan 3 unit cooling tower

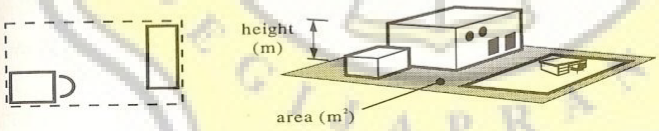
3. Auxiliaries (with all AHUs localized)

➔ Total beban AC: **3.099,44 Kw**

5.9 Auxiliaries

Auxiliaries cover all those minor items necessary for the effective operation of a central plant system. The plant room space shown includes return air fans, shafts, ductwork silencers, pipework and cabling, control centre, maintenance walkways, switchboards, panels, hatches, compressors, tanks, monitors, and pumps as appropriate.

(A) represents a central A/C system with all AHUs centralised.
(B) represents a central A/C system with all AHUs localised.
(C) represents any central heating system.



Cooling load kW(R)	(A) Auxiliaries area (m^2)	(A) Auxiliaries height (m)	(B) Auxiliaries area (m^2)	(B) Auxiliaries height (m)
150 to 200	48	4.7	16	2.7
201 to 250	52	4.8	17	2.8
251 to 300	55	4.9	18	2.9
300 to 350	60	5.0	20	3.0
351 to 400	65	5.0	22	3.0
401 to 450	70	5.2	23	3.2
451 to 500	74	5.2	25	3.2
501 to 600	84	5.4	28	3.4
601 to 700	92	5.4	31	3.4
701 to 800	102	5.6	34	3.6
801 to 900	110	5.6	37	3.6
901 to 1000	120	5.8	40	3.8
1001 to 1100	128	5.8	43	3.8
1101 to 1200	138	6.0	46	4.0
1201 to 1300	148	6.0	49	4.0
1301 to 1400	156	6.0	52	4.0
1401 to 1500	165	6.0	55	4.0
1501 to 1700	184	6.0	61	4.0
1701 to 1900	202	6.0	67	4.0
1901 to 2100	220	6.0	73	4.0
2101 to 2300	238	6.0	79	4.0
2301 to 2500	256	6.0	85	4.0

Heating load kW	(C) Auxiliaries area (m^2)	(C) Auxiliaries height (m)
150 to 750	15	3.0
751 to 1500	25	3.5
1501 to 3000	35	4.0

3.099,44 Kw / 1500 kw = 2,06 untuk cooling load membutuhkan 2 unit

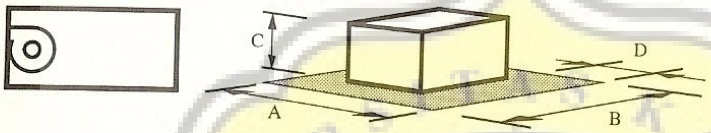
3.099,44 Kw / 1500 kw = 2,06 untuk heating load membutuhkan 2 unit

4. Floor Mounted AHU

- Air flow : **129.210,72 L/s m2**

Floor mounted AHU

The dimensions shown include an access corridor on three sides. Locate the fourth side adjacent to an outside air intake.



Airflow L/s	A	B	C	D	area	weight
		metres			m^2	kg
900 to 1200	3.1	2.8	2.6	0.7	9	750
1200 to 1800	3.4	2.8	2.6	0.7	10	1200
1800 to 2500	3.6	3.4	2.6	0.9	12	1500
2500 to 3200	3.7	4.0	2.6	1.0	15	1800
3200 to 4000	3.9	4.8	2.6	1.2	19	2100
4000 to 5000	4.2	5.0	2.6	1.3	21	2500
5000 to 6400	4.5	6.2	2.6	1.6	28	2900
6400 to 8200	4.8	6.2	2.6	1.6	30	3350
8200 to 9900	5.4	6.2	2.8	1.6	34	3700
9900 to 11600	5.6	6.2	3.1	1.6	35	4000
11600 to 14000	6.0	6.2	3.6	1.6	38	4400

For > 14000 L/s - pro rata based on 14000 L/s unit values

129.210,72 / 14000 = 9,22

Cara menentukan PK dalam ruangan

- Volume ruang baca remaja dan dewasa = 16,2 m x 10 m x 2,5 m = 405 m^3
- Volume/3 x 500 = 405 /3 x 500 = 67.500 BTU/h

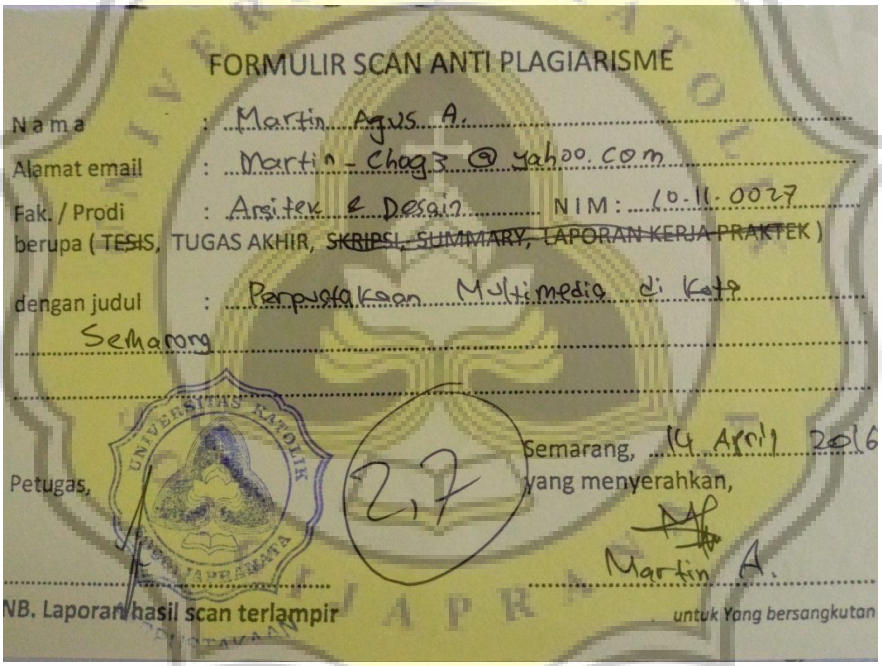
Macam macam AC:

- AC ½ PK = ± 5.000 BTU/h

- AC ¾ PK = ± 7.000 BTU/h
- AC 1 PK = ± 9.000 BTU/h
- AC 1½ PK = ± 12.000 BTU/h
- AC 2 PK = ± 18.000 BTU/h

Diambil menggunakan AC 1 PK maka 67.500 : 18.000 = 3,75 dibulatkan menjadi 4 sehingga menggunakan 4 buah AC dengan ukuran 2 PK.

Lampiran Hasil Cek Plagiasi



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dengan judul : Perpustakaan Multimedia di Kota Semarang

Semarang, 14 April 2016

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