



Benha University

Dr : Mohamed Ahmed Ebrahim



Undergraduate Course

Electric Installation Design

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Lecture (10)



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Lighting, Energy and greenhouse

- Artificial lighting uses a lot of energy in our homes and work places.
- In a typically home, lighting will account for about 10% of electricity use.
- In an office, it can be 30%. In a lighting intensive retail environment it could be more than 50%.
- Inefficient lighting also gives off a lot of heat, increasing the energy needed for air conditioning.

Reduce the need for artificial lighting

1. **Use Daylight:**

- The best way to reduce the energy used for lighting is to use free natural daylight.
- However, too much daylight, specially direct sun, can create glare problems and excessive heat.

2. **Only use lights when they are required.**

3. **Installation of LED panel indicator lamps in place of filament lamps.**

4. **Installation of energy-efficient fluorescent lamps in place of “conventional” fluorescent lamps.**

5. Use the right amount of light and recommended illuminance.

Type of Lamp	Lumens / Watt		Color Rendering Index	Typical Application	Typical Life (hours)
	Range	Avg.			
Incandescent	8–18	14	Excellent	Homes, restaurants, general lighting, emergency lighting	1000
Fluorescent Lamps	46–60	50	Good w.r.t. coating	Offices, shops, hospitals, homes	5000
Compact fluorescent lamps (CFL)	40–70	60	Very good	Hotels, shops, homes, offices	8000–10000
High pressure mercury (HPMV)	44–57	50	Fair	General lighting in factories, garages, car parking, flood lighting	5000
Halogen lamps	18–24	20	Excellent	Display, flood lighting, stadium exhibition grounds, construction areas	2000–4000
High pressure sodium (HPSV) SON	67–121	90	Fair	General lighting in factories, ware houses, street lighting	6000–12000
Low pressure sodium (LPSV) SOX	101–175	150	Poor	Roadways, tunnels, canals, street lighting	6000–12000

6. Installation of compact fluorescent lamps (cfls) in place of incandescent lamps.

Incandescent Bulb (Watts)	Typical Lumens (Measure of Light Output)
40	> 450
60	>800
75	>1100
100	>1600
150	>2600

7. Replace all exit signs with light emitting diode (led) exit signs.

	Incandescent	Fluorescent	LED
Input Power (watts)	40	11	2
Yearly energy (kWh)	350	96	18
Lamp life (years)	0.25-0.5	1-2	10+
Estimated energy cost/ year (\$0.06/kWh)	\$21.00	\$5.75	\$1.10

Human eye sensitivity and photometric quantities

- The luminous intensity, which is a photometric quantity, represents the light intensity of an optical source, as perceived by the human eye.
- The luminous intensity is measured in units of candela, which is a base unit of the International System of Units.

Other Benefits for reducing the artificial lighting

1. Improved Color Rendition/Visibility in Space.
2. Longer Lamp Life.
3. Less Maintenance (Normally a result of longer lamp life).
4. Adjust to target light levels.
5. Improved Controls.
6. HVAC Savings – Typically (1% to 2%) above lighting savings for cooled spaces.
7. Incentive from Utility Rebates.