

Light Emitting Capacitor (LEC) Exit Sign

1. Outline of Technology

With reference to Figure 1 below, the light emitting capacitor (LEC) panel has four main components, namely (i) front electrode layer, (ii) rear electrode layer, (iii) dielectric insulating layer and (iv) micro-encapsulated solid phosphors layer. When an alternating current is applied to the two electrodes of the LEC lamp, an electromagnetic field is created and excites the phosphors layer which produces luminous energy. This direct conversion of electric energy to light energy produces negligible heat and ultraviolet radiation. Electroluminescent or LEC technology has been used in the military application for more than 30 years. In recent years, LEC technology has been applied in commercial products, such as LEC exit signs and nightlights.

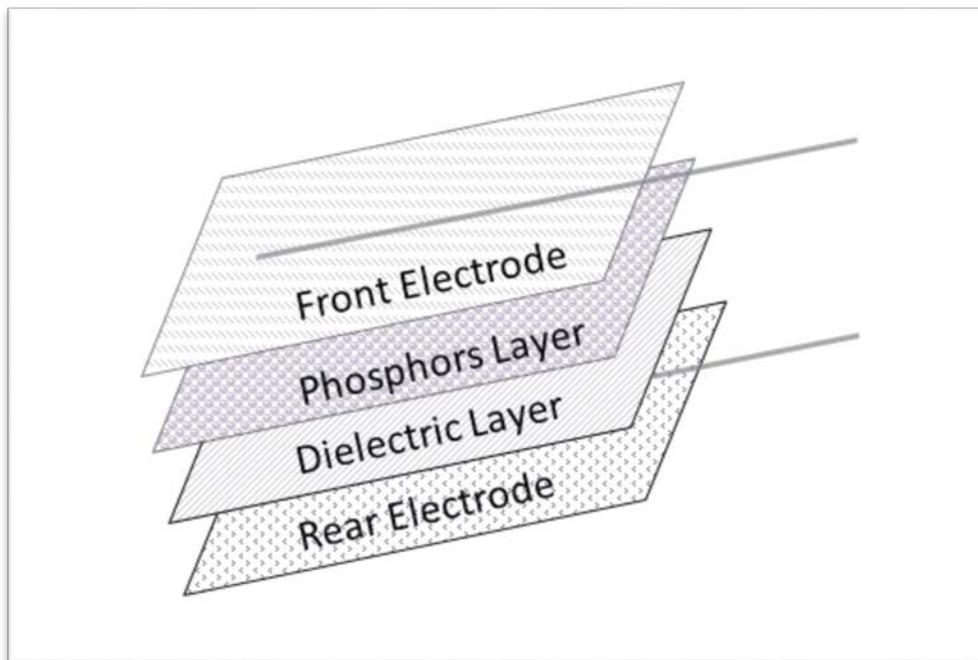


Figure 1 – Four main operating components in LEC panel

The Advanced Energy Design Guide (AEDG) of American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE) has established standards for several industries for design and building. The AEDG has selected LEC exit signs as the new guideline for healthcare, retail and commercial. ASHRAE 90.1-2013, Energy Standard for Buildings except Low-Rise Residential Buildings has described

that LED or LEC exit signs shall be used in building so as to meet the new standard of less than 5 watts per lighted face.

2. Product Characteristics

2.1 Characteristics and advantages of LEC exit sign:

- Paper thin in thickness
- Light weight and flexible
- More reliable as no filament connected and will not burn out suddenly
- Minimal heat emission
- Highly visible in darkness, smoke and fog
- No hazardous materials of LEC film
- Maintenance free of LEC film

2.2 Factors affect the performance of LEC exit sign:

- Type of phosphor used affects the life and brightness
- Quality of phosphor layer affects the uniformity of thickness and brightness
- Electrical driver affects the efficiency and power quality

3. Energy Performance of LEC Exit Sign

To study the energy saving potential, measurement on electricity consumption was conducted on a LEC exit sign and a LED exit sign. Both signs are single side type with battery backup. Based on test results shown below, LEC exit sign consumed 3.07 watts or about 8% less electrical power than LED exit sign.

Types of Exit Signs	Input Power (watt)
LEC exit sign	3.07
LED exit sign	3.35

Conventional exit sign using T5 fluorescent lamp consumes about 17 watts. It is noted that both LEC and LED exit signs have very good energy saving potential, i.e., saving about 80% energy in comparison with conventional exit sign.

The photo below shows the illumination performance of LEC and LED exit signs.



Figure 2 – Photo of tested LEC exit sign (left) and LED exit sign (right)

4. Summary

LEC panel operates when the micro-encapsulated solid phosphors are excited by an alternating current. LEC exit sign is one of the commercial applications on LEC technology with its high visibility in darkness and smoke. The energy saving potential of LEC exit sign is comparable with LED exit sign. In terms of energy saving potential, LEC exit sign would be another option, beside LED exit sign for new installation or replacement of exit sign using T8 or T5 fluorescent lamp. When choosing the LEC exit sign, please kindly take note on some factors affecting the performance of LEC exit sign as discussed in section 2.2 above.