



# 2012 Construction Conference

## LESS Session Alternative Lighting Sources

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# Current Source

- High Pressure Sodium (HPS)



# High Pressure Sodium

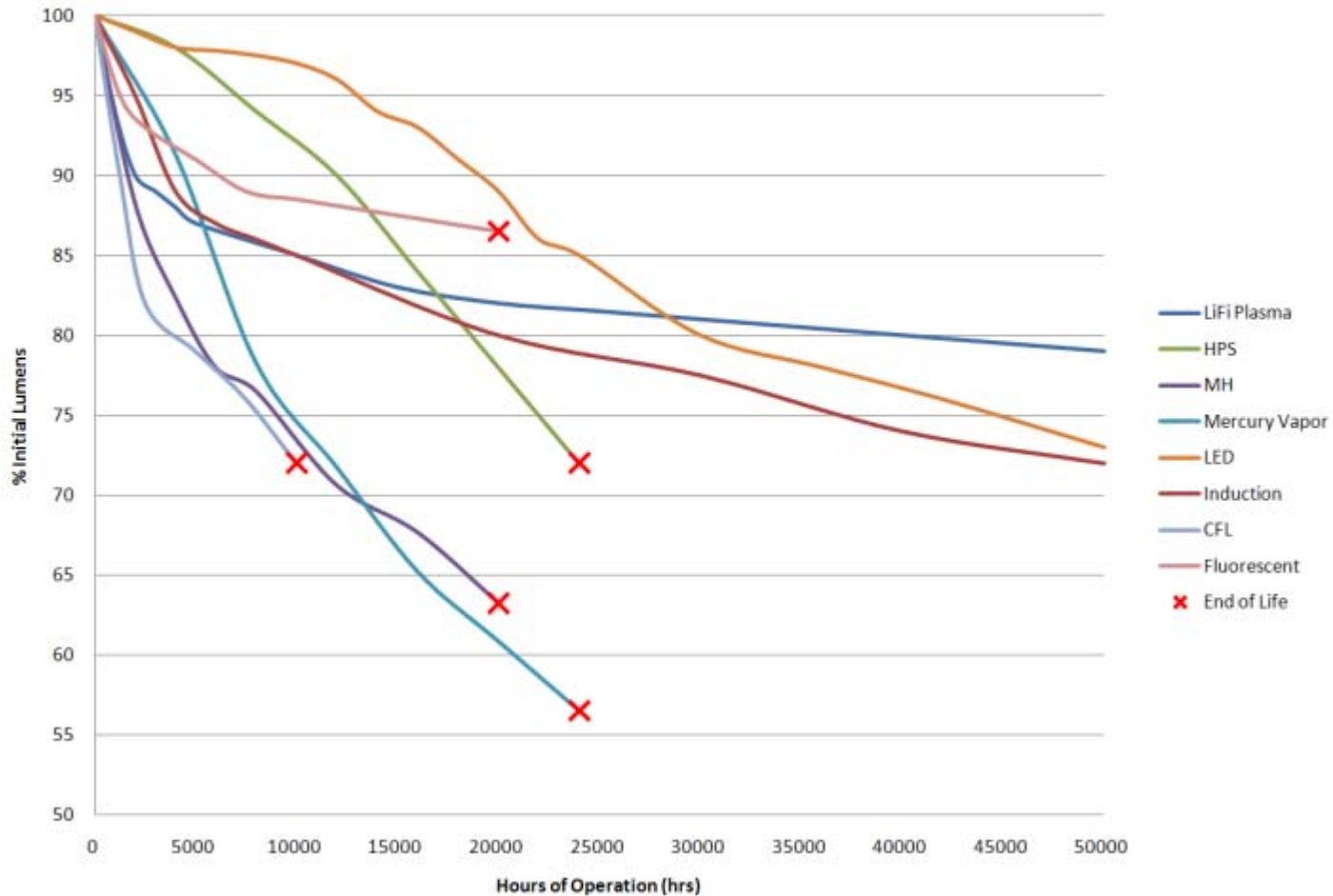
## Characteristics:

1. Efficacy - 50 to 140 lumens/watt
2. Expected Life - 24,000 hrs.
3. Color Rendition Index (CRI) – 25
4. Color Temperature – 2100K
5. Degradation Curve



# High Pressure Sodium

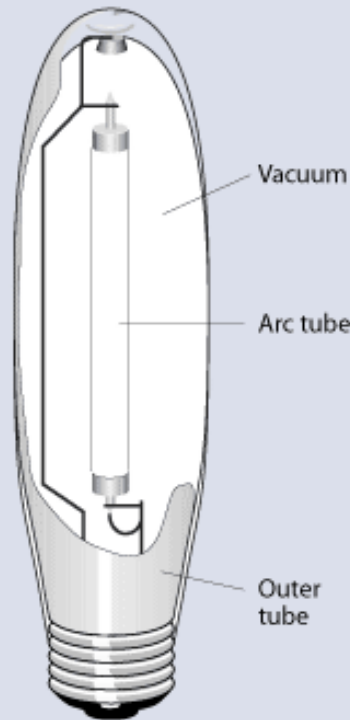
## Lumen Maintenance Comparison





# High Pressure Sodium

**High-Intensity Discharge (HID) Lamp**



In a high-intensity discharge lamp, electricity arcs between two electrodes, creating an intensely bright light. Mercury, sodium, or metal halide gases act as the conductor.

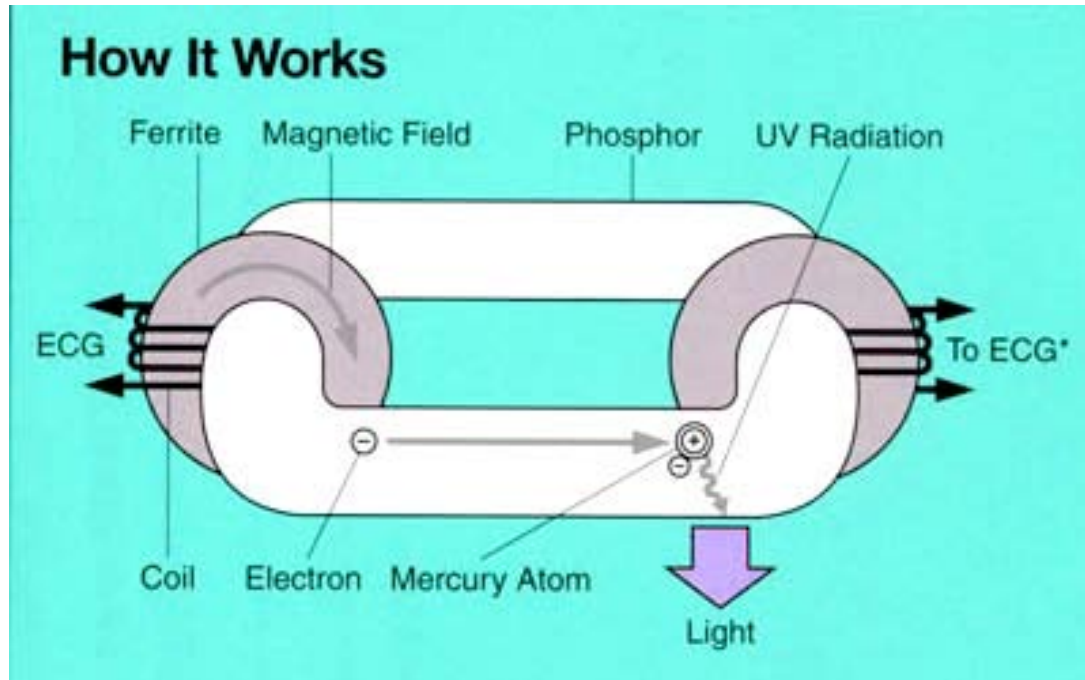


# New Sources

- Magnetic Induction
- Plasma Induction
- Light Emitting Diode (LED)



# Magnetic Induction



Sylvania Icetron electronic ballasts magnetically induce and electric field to create a current which circulates inside the lamp and excites the phosphorous to produce light in the same manner as standard fluorescent lamp.



# Magnetic Induction

## Characteristics:

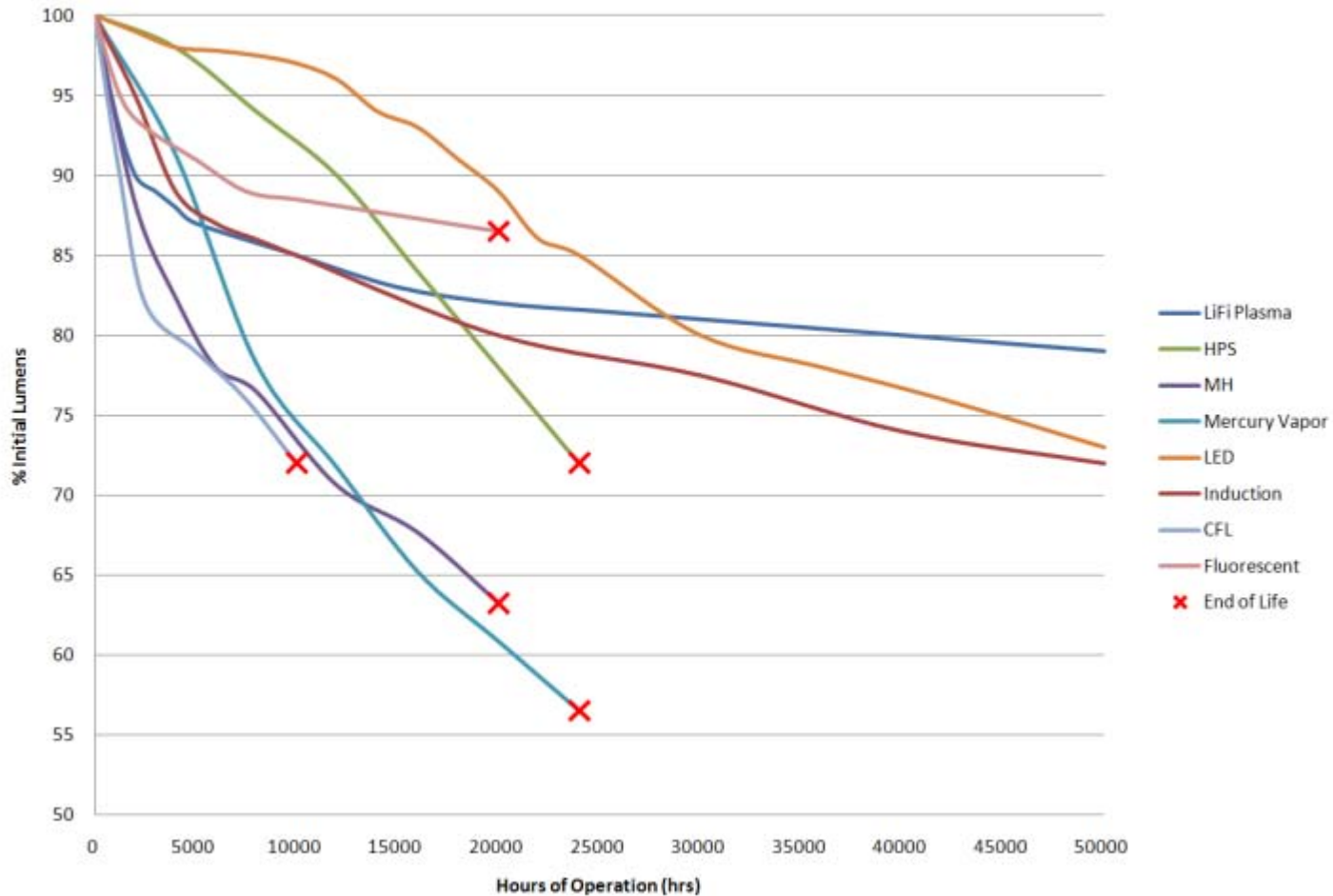
1. Efficacy - 60 to 90 lumens/watt
2. Expected Life - 75,000 hrs.
3. Color Rendition Index (CRI) – 80
4. Color Temperature – 4100
5. Degradation Curve





# Magnetic Induction

## Lumen Maintenance Comparison



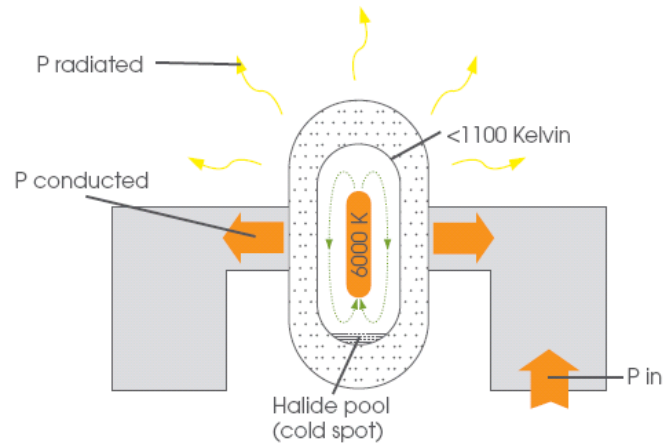


# Magnetic Induction





# Plasma Induction



At steady state, the gases (Ar, Hg, metal halides) are in local thermodynamic equilibrium.

A radio frequency (RF) circuit is established by connecting an RF power amplifier to a ceramic resonator cavity. In the center of the cavity is a sealed quartz bulb that contains materials consistent with metal-halide lamps.

The power amplifier drives the resonator, creating a standing wave confined within its walls. The electric field is strongest in the center which ionizes the gases inside the bulb.

The ionized gas in turn heats up and evaporates the metal halide materials which forms a bright plasma column within the bulb.



# Plasma Induction System Components



**Emitter**



**RF Driver**



**AC-DC Power Supply**



# Plasma Induction

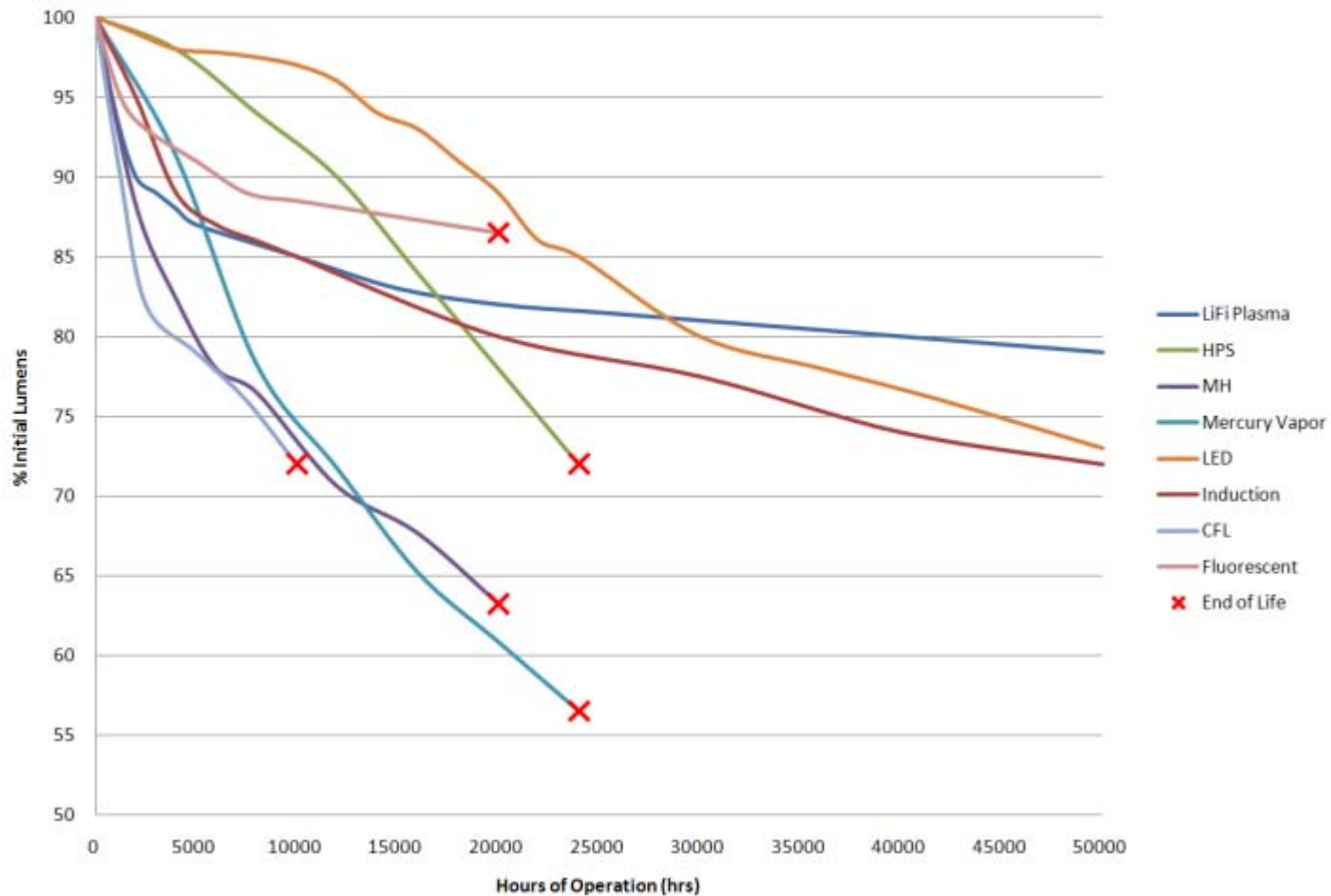
## Characteristics:

1. Efficacy - 60 to 90 lumens/watt
2. Expected Life - 75,000 hrs.
3. Color Rendition Index (CRI) – 80 & 95
4. Color Temperature – 5500K & 6500K
5. Degradation Curve



# Plasma Induction

## Lumen Maintenance Comparison



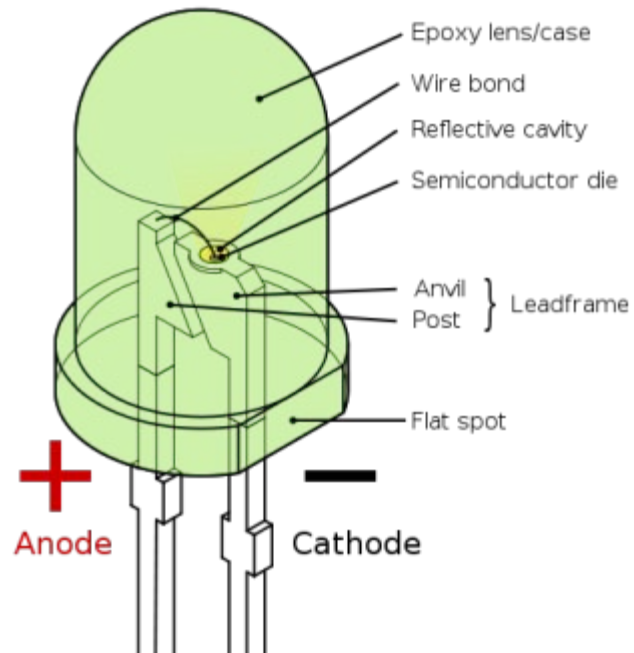


# Plasma Induction





# Light Emitting Diode (LED)



LED lights





# LED

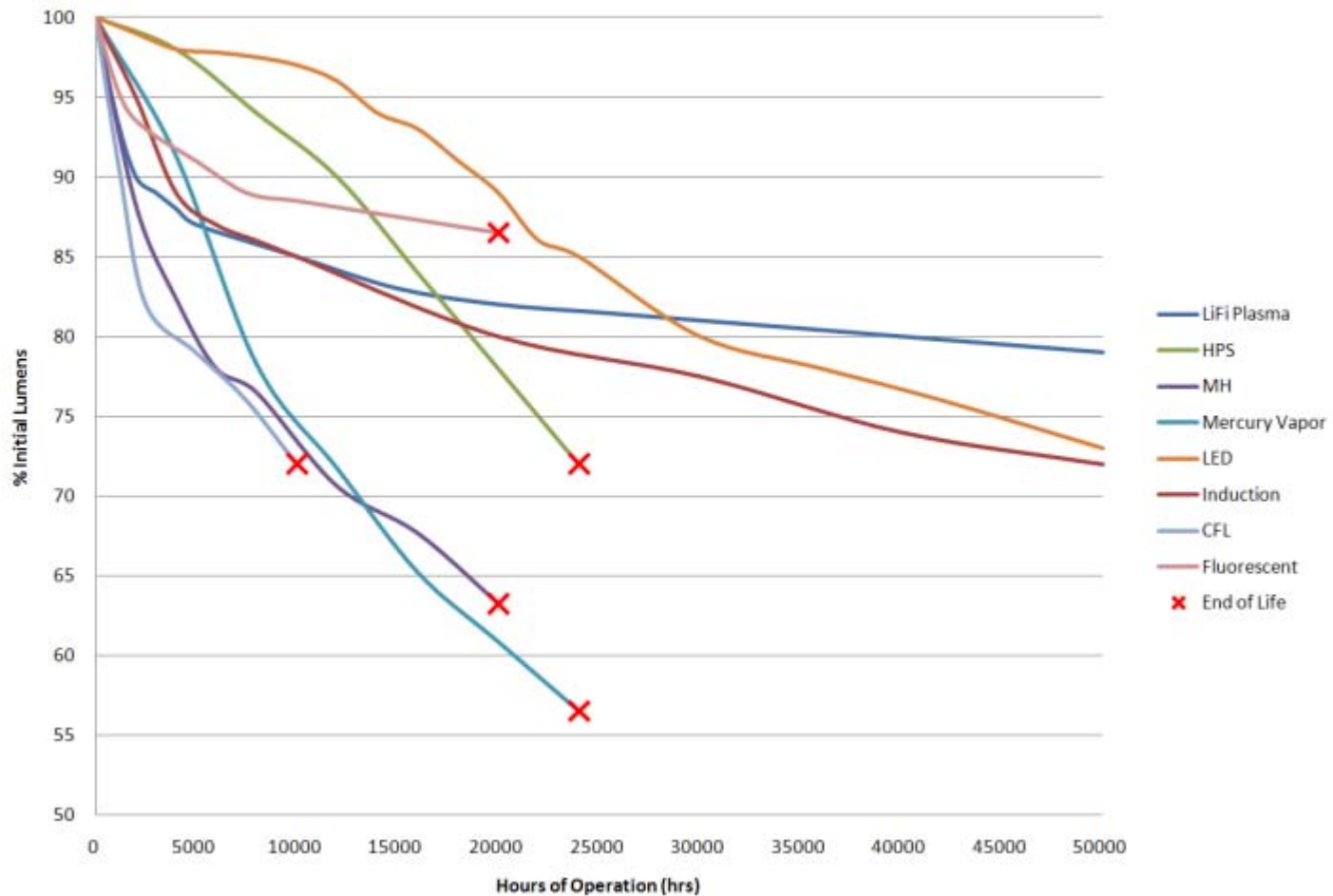
## Characteristics:

1. Efficacy - 65 to 75 lumens/watt
2. Expected Life - 50,000 hrs.+
3. Color Rendition Index (CRI) – 75
4. Color Temperature – 4000K – 6000K
5. Degradation Curve



# LED

## Lumen Maintenance Comparison





# LED





# LED





# LED





# Proposed LED Criteria

- IP 65 Rating
- Minimum Lamp Efficiency (70% Lumen Output) – 60,000 Hrs.
- LM 80 (Independent 3<sup>rd</sup> Party Testing)
- Power Factor  $\geq 95\%$  at Full Load
- Total Harmonic Distortion  $\leq 15\%$  at Full Load
- CCT 4500K ( $\pm 500$ K)
- Efficacy – 70 lumens/watt
- 5 Yr. Non-prorated Warranty



# Questions

If you have any questions, please feel free to contact us.