Neptun Light, Inc

Induction Lighting Solutions

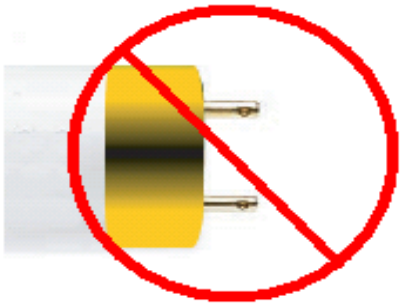
Introduction

- Induction lighting is a form of Fluorescent light that achieves higher wattages and longer life and utilizes **Electronic Ballasts**.

- Neptun Induction lights range from 30 watts to 500 watts, and can replace up to 1000 watt Metal Halide, and have a life span of 100,000 hours.

Life Span

- Induction lights last longer than standard fluorescent bulbs because they do not use electrodes to facilitate electrical current through the tube.
- Electrodes are what fail in a standard linear fluorescent thus determining the life of a T8 or T5, (typically 20,000 to 25,000 hours).



Life Span

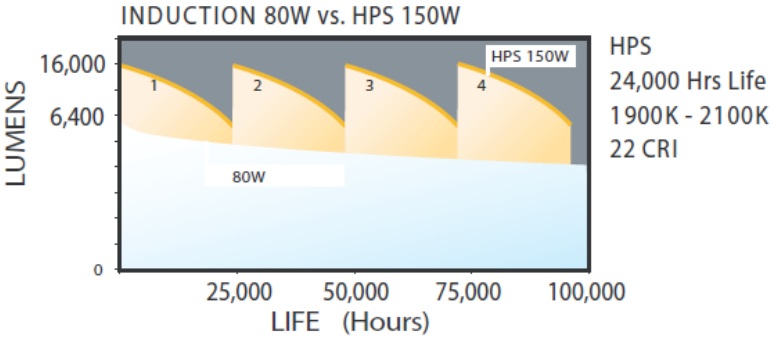
- Induction lights use magnets rather than electrodes to generate the current through the tube.
- The magnets essentially last forever, so the only thing that limits the life of induction lights is the slow degradation of the phosphors on the inside of the tube.
- Neptun Induction lights maintain 50% of initial lumens at 100,000 hours. (Lumen Maintenance)
- Most Municipal street lights use High Pressure Sodium or Metal Halide light sources.
- High Pressure Sodium bulbs have a life span of 22,000 hours and Metal Halide 10,000 hours.
- Again, Induction lights last 100,000 hours drastically reducing replacement maintenance costs.

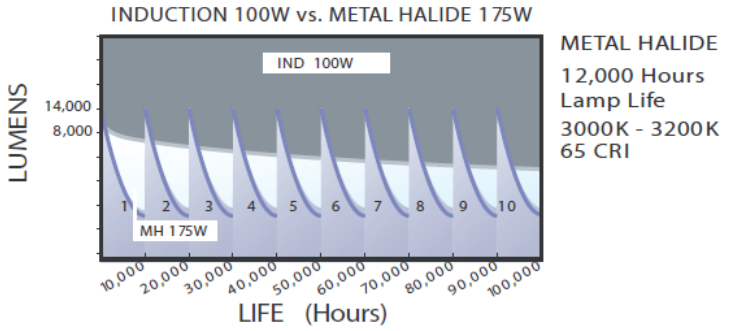
Lumen Depreciation

- All high wattage light sources including HPS Metal Halide, Mercury Vapor and even Induction are at their brightest when they are new.
- As they age the lumen output decreases, and some light sources depreciate even faster than others.
- For example, Metal Halide bulbs lose 40% of their initial lumen output in the first year.
- As mentioned, Induction Lights maintain 70% of their initial lumen output at 70,000 hours and 50% at 100,000 hours.
- See the Lumen depreciation charts on the following page it compares Induction to HPS and Metal Halide

Lumen Depreciation Comparison

- Induction vs. HPS
- Induction vs. Metal Halide





Savings Generated by Life Span

- As shown in the above figures, HPS bulbs need to be changed 4 times during the life of one induction bulb and…
- Metal Halide bulbs need to be changed as many as ten times during the induction life.
- Some cities estimate that changing a street light bulb can cost $200.00 to $500.00 in labor alone.
- For example, if a small city has 10,000 HPS street lights and they pay $250 in labor to change a bulb, their maintenance cost over 20 years is approximately 10 Million Dollars.
- If that same city installed Neptun Induction Lights there maintenance cost over that same period is Zero!

Efficiency

- Neptun Induction lights typically facilitate a 30% to 50% energy saving versus Metal Halide, High Pressure Sodium and Mercury Vapor light sources.
- However, this is not because Induction lights produce more light…
- Induction light sources, like linear fluorescent lamps, generate 80 lumens per watt which is actually 10% to 15% lower than the initial lumen output of High Pressure Sodium and Metal Halide.
- It is in the quality of light that allows Induction to reduce wattage while still increasing visibility

Efficiency – HPS vs. Induction

- The “Before” picture is a parking garage with 175W HPS – approximately 19,250 initial lumens.
- The “After” picture was taken when the HPS lights were replaced with 85W Induction fixtures – 6,800 lumens.

Perception – HPS vs. Induction

- Again, the previous photos showed 19,250 lumens of HPS light in the “Before” photo and 6,800 lumens of Induction light in the “After” photo, yet the “After” photos obviously appear brighter and whiter.
- The perceived brightness of the Induction lights is the result of two things, **CRI** and **Color Temperature**.

Perception – CRI
HPS vs. Induction

- CRI stands for Color Rendering Index which is a scale that measures the combined wavelengths of different colors in light.
- Higher CRI equals increased visibility.
- Sunlight and incandescent light are 100 CRI
- HPS lights, shown in the “Before” photo have a CRI rating of only 21.
- Induction light has a CRI of 84, just like the linear fluorescent tubes used in office lighting.

Perception – Color Temperature
HPS vs. Induction

- In addition to the inherent CRI advantage of induction light over HPS light, induction also has a color temperature advantage.
- HPS has a color temperature of 2100° degrees Kelvin which is why it appears yellow/orange.
- Induction light sources can be manufactured in many different color temperatures.
- Neptun Induction lights are manufactured using a 5000°K phosphor for superior visibility and color.

Efficiency – MH vs. Induction

- This “Before” picture is a manufacturing plant with 400W MH – approximately 40,000 initial lumens.
- The “After” picture was taken when the MH lights were replaced with 200W Induction fixtures – 16,000 initial lumens.

Perception – MH vs. Induction

- The previous photos showed 40,000 lumens of MH light in the “Before” photo and 16,000 lumens of Induction light in the “After” photo, yet the “After” photos obviously appear brighter and whiter.
- The perceived brightness of the Induction lights is the result of two things, **CRI** and **Color Temperature**.
- The MH CRI in this picture was 61, while the Induction was at 84.
- The MH Color Temperature was at 3,500K, while the Neptun Induction was at 5,000K.

Perception – “Pupil Lumens”

- An independent study was done at the Lawrence Berkeley Laboratory that studied the quality of light emitted by all standard light sources.
- Some light sources like HPS actually produce lumens in Ultraviolet and Infrared wavelengths that are invisible to the human eye.
- This study only counted the lumens that are visible to the human eye, thus the term “Pupil Lumen” was coined.
- Pupil Lumens is the measurement of how well the human eye sees in different types of light.
- So instead of having a lumen per watt measurement we now have Pupil Lumens per watt.
- See the following Pupil Lumen Chart…

Perception – “Pupil Lumens”

PUPIL LUMEN CHART			
Light source	**Conventional lumens per watt**	**Correction factor**	**Pupil lumens per watt**
Low-pressure sodium	140	0.38	53
5,000-K fluorescent (induction)	104	1.83	190
4,100-K fluorescent	90	1.62	145
Clear metal halide	85	1.49	126
3,500-K triphosphor fluorescent	69	1.24	85
50-watt high-pressure sodium	65	0.76	49
2,900-K warm white fluorescent	65	0.98	64
Daylight fluorescent	55	1.72	95
High-pressure sodium	55	0.57	31
Vitalite fluorescent	46	1.71	79
Deluxe mercury vapor	40	0.86	34
Standard incandescent	15	1.26	19
Tungsten halogen	22	1.32	29

Perception – “Pupil Lumens”

- As shown, 5000°K fluorescent lighting has 190 Pupil Lumens per watt while HPS has only 31.
- This advantage is what allows lower wattage induction lights to replace HPS lights up to twice the power.

Total Savings

- Going back to the city that has 10,000 street lights that already saved 10 million dollars in maintenance…
- If all the street lights in that city were 150W HPS and they replaced them with 85W Induction lights, at 12 hours a day and at $0.10 a kWh…
- Their electrical savings over the life span of the induction lights would be an additional 5.7 million dollars
- Together the labor savings and the electrical savings equal $15,700,000.00 in 20 years for a city with just 10,000 street lights.

Total Savings

- A large city like Chicago, has 300,000 street lights, their savings would be approximately 464 million over 20 years.
- In addition to the monetary savings, replacing 10,000 HPS street lights with Induction would be the equivalent of…
- 70,435 cars removed from the road, or
- 111,033 acres of forest planted, or
- 81,424,200 lbs of Carbon dioxide removed from the atmosphere.

Induction Products

- Neptun currently manufactures over 300 different induction fixtures for all types of indoor and outdoor applications
- The following slides are a few of the Neptun Induction Product Categories we offer today.

Street Lighting

- Neptun Induction Cobra heads start at 40W and go all the way up to 250W, replaces HPS and Metal Halide Lights from 100W to over 400W’s.

Acorns & Retrofits

- Neptun's Induction Retrofit Kits are a perfect replacement for the HPS, Metal Halide and Mercury Vapor bulbs used in today's decorative walk-way fixtures. Neptun also offers a variety of new decorative Acorn fixtures.

Parking Lots and Garages

- Neptun can replace all Parking Lot and Parking Garage fixtures will these, and other fixtures models.

Security Light

- Neptun Security Lights with photo sensor.
- Neptun Hazardous Location Lights.

Outdoor Lighting

- Neptun Wall Pack Lights
- Neptun Bulk Head Lights

Indoor High Bays

Pictures show our 200W, 300W, and 400W, Neptun high bays range from 80W up to 500W replacing up to 1000W metal halide.