

## Advantages & unique features . . .

▶ Flexibility



Cold Cathode lamps can be factory bent and shaped to conform to almost any configuration.

▶ Continuity



These lamps when butted close to each other can ensure a perfectly continuous illumination without any dark spots - typically prominent in fluorescent fixtures.

▶ Long Life



The life expectancy is typically 35,000 to 50,000 hours or more. This eliminates frequent re-lamping particularly where lamps are in difficult to reach locations. Cold Cathode have no loss of lamp life each time its turned on - unlike fluorescent lamps.

▶ Consistency



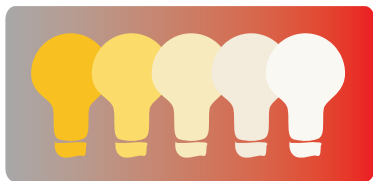
A single linear cold cathode lamp can be maximum 2.4 long, ensuring color consistency and reliability - unlike LED strip lights which has 20 to 40 light emitting diodes for every meter length.

▶ Colors



Over 20 colors choices plus a wide range tri-phosphorus coated white shades that are 25 % more brighter.

▶ Dimmability



Easily dimmed with inexpensive dimmers without resorting to sophisticated ballast or transformers.

▶ High Lumen output



Cold Cathode Luminaries offers several different systems for varying applications, with light output up to 1600 lumens per meter.

▶ Weatherproof

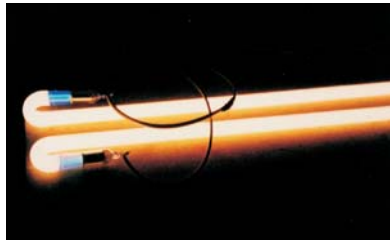


Unlike LEDs, Cold Cathode lamps are made of sturdy lead-free glass making it impact and water resistant, suitable for outdoor application.

## What is Cold Cathode Luminaries ?

Developed seventy years ago, cold cathode was first the first commercially available form of cold fluorescent lighting. Each cold cathode lamp is handmade can be sized and shaped to conform to virtually any design.

These lamps are manufactured so that they can be installed close to each other resulting a clean continuous flow of light eliminating any dark shadows which are typical in fluorescent fixtures. Unlike LEDs Cold Cathode lamps are weatherproof and impact resistant.



## Why use Cold Cathode Lighting ?

A cold cathode lighting system offers unique advantages not found in any other lighting fixtures. The illumination from cold cathode lights come from a single continuous lamp. Lamp ignition is instantaneous and flicker free. Cold cathode lamps are easily dimmed and are compatible with a wide variety of commercially available lighting control systems - an important feature to consider when specifying lighting fixtures. One of the big advantages of using a cold cathode system is that a single transformer can drive a long span of lamps connected in series, allowing virtually silent operation and low maintenance cost. Cold cathode lamps have been tested over a life span of more than one hundred and thirty thousand hours. The only aging element is found with powder coated tubes, where the UV emission causes a progressive aging of the luminous pigments.

Though initial cost may sometimes be higher, cold cathode lighting delivers substantial long term savings compared with other fixtures. It is energy efficient and will consume as little as 16 - 30 watts per meter, depending on the configuration of transformers. Lamps can last 50,000 hours and beyond, unlike fluorescent lamps, cold cathode lamp life is not affected by the number of times the system is switched on and off. A cold cathode system not only decreases energy cost, but drastically lowers lamp replacement and maintenance costs.

## How to plan and design a Cold Cathode layout ?

A cold cathode system is most often used in indirect lighting applications and is particularly effective for cove and ceiling coffers. The result of a high-quality, well-designed system is a rich, uniform light without any dark shadows or hot spots. Cold cathode can also be installed as direct illumination to 'light mark' any architectural detail.

Designers and electrical engineers should consider the unique characteristics of the various cold cathode lighting systems offered. Each configuration has its own set of guidelines with respect to installation method, application and light effect. Specification sheets, technical details and recommended ceiling coffer design are available on our website, additional information available on request.

## How energy efficient is Cold Cathode Lighting ?

Cold Cathode offers very good energy efficiency compared with other lighting fixtures. The lamp is filled with a mix of gases including mercury vapor. This mix generates a high density of invisible UV radiation, which is converted into visible light by an inner coating of fluorescent powders. This maximizes light efficiency, achieving results 10 times brighter than incandescent light bulbs.

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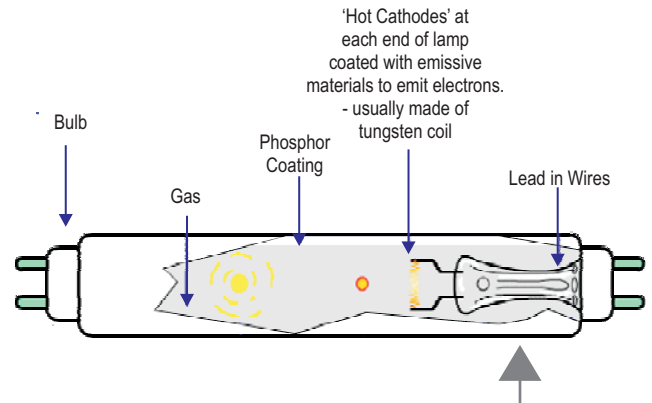
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## Cold Cathode vs Fluorescent

The technical name for a standard fluorescent lamp is hot cathode. The coated tungsten coil within the lamp produces electrons to support gas discharge in a process called thermionic emission. This means that in order to produce electrons the coated coil must be red hot (approximately 900°C). When the emissive material that coats the coil is consumed, the lamp ceases to operate. These lamps require special ballast if dimming is required. Conversely a cold cathode electrode is a rugged iron thimble that does not operate in a thermionic manner. At an operating temperature of approximately 200°C, the electrode is relatively cold, hence the term cold cathode is derived. The typical lamp life of a fluorescent lamp is 15,000 hours with 3 hours of lamp life lost each time they are switched on. During this process the filament coating sublimates which causes blacking of the tube ends and finally the end of the lamp life.



The interior of a standard fluorescent lamp. A tungsten coil is coated within emissive material. Lamp life is dramatically reduced by 3 hours each time its switched on.



Dark shadows are typical drawbacks of fluorescent lighting fixtures

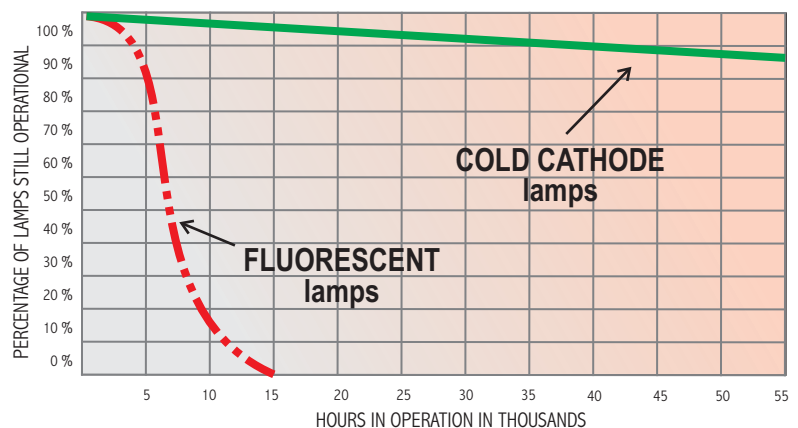
Fluorescent lighting although bright is provided in certain standard sizes and colors which may not lend itself to the size or shape of the cove or the specific color requirements of the architect or lighting designer. Being different from hot cathode tube, Cold cathode lamps needs neither a starter nor a current limiting device such as a ballast. Instead a high voltage, is provided by means of a transformer, commonly referred to as a converter. These transformers construction parameters are selected in such a way as to limit the operating current to a very low value, typically in the range from 25 to 100 mA.

The operating voltage of cold cathode lamp is chosen according to the length of lamps to be driven and the current according to the required lumen level, making cold cathode lighting versatile for wide applications.

Unlike fluorescent, Cold Cathode Lighting is the perfect choice for internal and external architectural lighting applications, they are weatherproof, flicker free and can be made to follow any contour to give a constant seamless light.

Cold cathode lighting is one of the most versatile lighting solutions available in the market.

TYPICAL EXPECTED LAMP LIFE : COLD CATHODE VS. FLUORESCENT



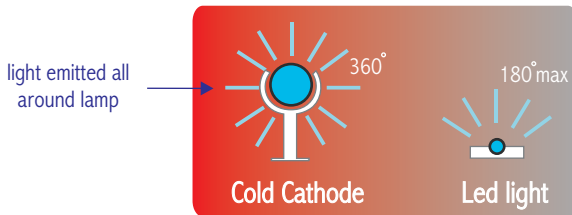
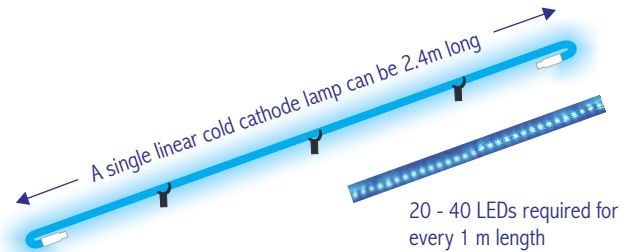
The chart at right illustrates the typical lamp life of a cold Cathode lamp versus a fluorescent lamp based on testing a testing on large batch of each type of lamp. Notice that 50 % of the fluorescent lamps have already failed prior to reaching their rated life-span.

# Introduction to Cold Cathode Luminaries 4

Fiber Optic Luminaire  
Masonlite Cold cathode

## Cold Cathode vs LED lights

LEDs, Fluorescent and incandescent lighting are typically available in pre-determined sizes, lengths and colors, while Cold cathode lighting (which has been in existence for decades) are custom bent 'light tubes' they can be crafted to conform to any shape or size, straight or curved. Even as advances are made in LED technology the lamps require regular replacement which may not be practical in difficult access areas. Incandescent lighting although warm in color is limited in its color palette and requires regular bulb changes along with higher energy consumption. LEDs which are relatively new have limited light output with limited color palette and can become quite expensive for this application.



Unlike LEDs, cold cathode lighting are tubular in cross section, light emanates in all directions along the length of the lamp even at the electrode ends thus avoiding hot spots. Many options are available for light output or intensity ranging from 30 milliamp power supplies for accent lighting to 200 milliamp power supplies for larger diameter cold cathode lighting used for room lighting.

LED lights are typically designed to exceed rated light output (candela) for a particular light specification. This is because within the first 500 hours of operation a percentage of LED light reduces. Although the LED does not fail, over a period of time the light output continues to dim below design specifications. Long before their 100,000 hour claimed life expectancy occurs, the light fixture falls below specified light requirements. This is quite evident in LED illuminated signs where dotted LED lights becomes visible over time. The 100,000 hours of claimed operational life of the LED light fixtures is not consistent with written specifications. Note: 100,000 hours = 10 hours of operation per day for 27 years. LED lights have only been on the market for about 5 years. These claims cannot be substantiated. While the LED light continues to operate it can give a false landing cue for pilots, causing significant safety concerns, including Night Vision Device (NVD) incompatibility and leaves an after-image in the eye contributing to the induction of spatial disorientation.

Unlike LEDs, Cold Cathode Lighting is the perfect choice for internal and external architectural lighting applications, they are weatherproof and can be made to follow any contour specification. The operating principal for this lighting relies on cold ignition which creates an extremely long life span. Some lamps we have removed from cathedrals for re-working were still operative after 30 years. This life span becomes very favorable when lighting has to be installed in areas which have difficult access after initial installation. LED lights color can sometimes be inconsistent and are still a very directional light source.

## Cold Cathode Transformers

Wire wound transformers have been used for almost fifty years. They are simple in design and construction, have high electrical losses (which is reflected as heat), dependable, reasonably priced, but very heavy and bulky suitable outdoor or high rise areas. This type of technology is used on the vast majority of cases where dimming is not required, or weight and heat are not an issue.

Newer advanced solid state electronic converters have also made cold cathode lighting very efficient. They are light weight, dimmable which incorporate the facilities to dim, flash and chase, multi coloured systems using analog dimmers, 0 - 10 volt output units or the entertainment industry standard DMX512 protocol. Though they are more expensive than the wire wound transformers, offer a far superior performance, compact, light weight and offer a high degree of electrical protection. Since their internal electronic circuits adjust the output voltage to maintain the rated current, they do not need to be matched to the tubes such as wire wound transformers. In addition the more advanced units isolate the outputs in the event of short or open circuit on the high voltage cables. This feature is helpful in avoiding damage to the transformer itself, in the case of a short circuit, and to prevent dangerous situations arising in cases of open circuits due to disconnected HT wires or electrodes that are exposed following the breaking or tampering of the glass lamps.

It is important to note, light should be measured in lumens (a measure of light intensity) per watt of power consumed.

When a light source is said to require low wattage, care must be taken to evaluate how much light is being generated "per watt".

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