



*GE Lighting*



**Lucalox™ XO**  
**X-tra Output**

High Pressure Sodium Lamps

**THE SOLUTION TO RELIABILITY**

# GE Lucalox™

## High Pressure Sodium Lamps



Late 1950's  
Lucalox™  
Ceramic  
invented by GE

1962  
First HPS lamp  
invented by GE

1965  
Lucalox™ lamp  
announcement

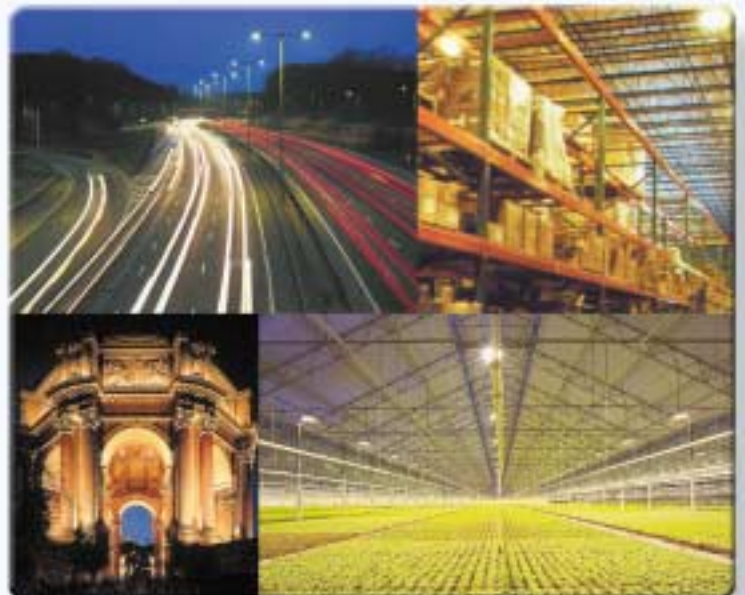
1970-1980  
Advancements,  
patents in sealing  
materials  
and electrodes

1981-2000  
Expansion of the  
product range -  
Standby,  
Improved colour,  
High Output,  
Internal Ignitor

2001  
Lucalox™ XO -  
Quantum leap in  
reliability

The heart of a high pressure sodium lamp is the arc-tube, manufactured from transLUCent ALuminum OXide (LUCALOX) which was invented by GE in 1962. From the launch of the original Lucalox™ range - the world's first high pressure sodium lamp - GE Lighting has led the way in this technology, offering specifiers and users every option to achieve long useful life, low operating costs and energy efficient performance.

In recent years, utilities, industries, commerce, agriculture and municipalities have seen an explosion in maintenance costs all across Europe. Consequently they have started to demand much higher quality lighting products that require significantly less maintenance than before. GE has responded by increasing the performance and the quality of its HID lamps dramatically, and completed a major program to redesign its Lucalox™ HPS lamp.



# GE Lucalox™ X-tra Output

## High Pressure Sodium Lamps

It was understood that a reliable distribution of light is critical to almost every customer application. This is especially true in streetlighting and security lighting, to ensure personal safety.

Spot replacement of early lamp failures can not provide the consistency demanded by today's customers. Group relamping will provide a consistent distribution of light, and in addition, reduce life-cycle costs... if early lamp failures are substantially reduced. That is precisely the aim of the new range of GE X-tra Output lamps, which delivers a new level of reliability through improvements in these areas:

- **Revolutionary new arc-tube design (monolithic)**
- **Simpler, more robust construction**
- **New arc tube sealing process**
- **New getter material**
- **New starting aid GRS (GE Reliable Starting) Technology**
- **Direct replacement for standard Lucalox™ and Lucalox™ HO**

### Monolithic construction

*More robust*

### GE Reliable Starting Technology

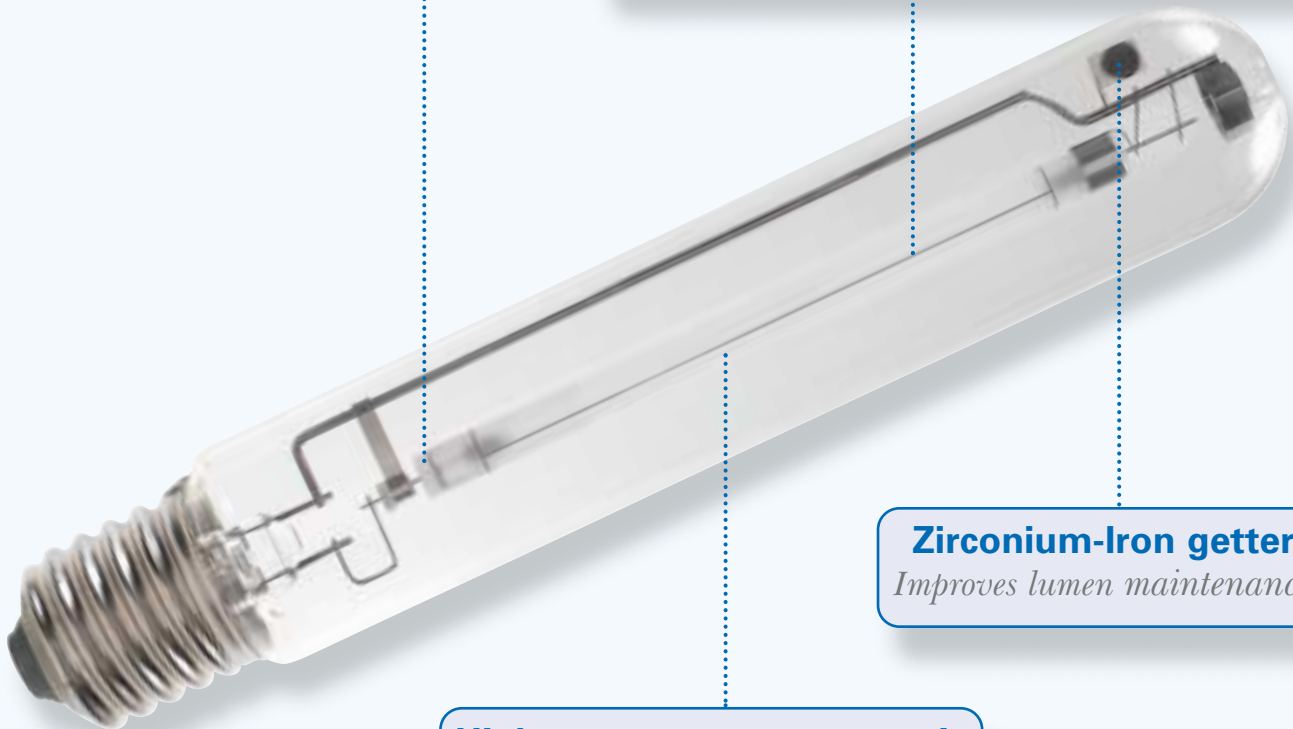
*More reliable*

### Zirconium-Iron getter

*Improves lumen maintenance*

### Higher transparency ceramic

*More light output*



## Improved reliability



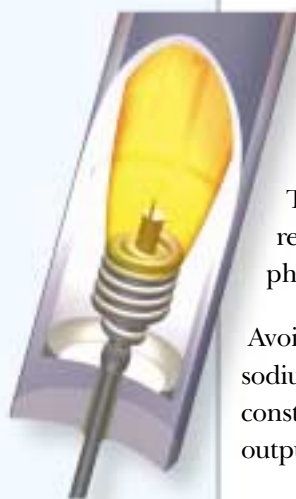
### *The simplicity of the design*

Lucalox™ XO lamps incorporate very robust and reliable construction, which fulfills the most demanding requirements. There are fewer parts, and only 5 critical welds. Simplicity and robustness deliver higher reliability, even in vibration-prone roadway applications.

The ceramic tube is more transparent, and the gas pressure is increased, for higher efficiency and light output. The new ceramic is also more resistant to chemical attack by the sodium dose. Lucalox™ XO lamps create the most efficient and reliable HPS systems to date.

The production processes are highly automated to ensure consistency from lamp to lamp. During assembly, items critical to quality are measured and controlled.

## More robust



### *Monolithic construction*

The life of a high pressure sodium lamp depends upon the rate of voltage rise. The new sodium-resistant ceramic used in GE Lucalox™ X-tra Output high pressure sodium lamps slows sodium loss, and therefore slows voltage rise.

The electrical feed throughs at each arc-tube end are *wires* – for a more reproducible construction than designs with metal tubes, with greater physical separation between the amalgam and the sealing material.

Avoidance of amalgam-seal reactions promotes longer life, by slowing sodium loss and voltage rise. The simpler and more reproducible construction provides exceptional consistency in lamp voltage and light output.

GE “XO” lamps retain the amalgam within a unique internal amalgam reservoir inside the arc tube, *but only at one end*. This feature reduces undesirable chemical reactions and end blackening, which otherwise can cause starting problems later in life.

Many high pressure sodium lamps are operated in applications with vibration, such as on a bridge or in high winds. The unique construction of the XO reservoir prevents the amalgam from splashing onto the electrodes which can cause the lamp to extinguish, and it better stabilises the light output against supply voltage variations.

## More reliable



### GRS - GE Reliable Starting Technology

A starting aid reduces the voltage requirement for electrical ignition. In earlier designs, the starting aid was a relatively complex assembly mounted against the arc tube. Parts could shift during life, or weld points fail, to contribute to early mortality.

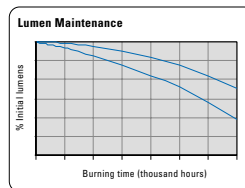
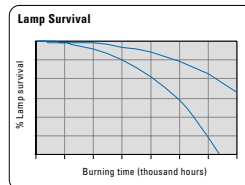
The new GE Reliable Starting Technology totally eliminates these possibilities for failure by permanently bonding a pattern of heat-resistant electrically conductive ceramic to the arc tube surface.

Because there is no bimetallic strip, there are no moving parts leading directly to three significant improvements: starting is more consistent, lumen maintenance is improved and early lamp mortality reduced.

Average lamp life & lumen maintenance is based on laboratory tests of a large number of representative lamps under controlled conditions, including operation at 10 hours per start on ballasts having specified electrical characteristics.

The following conditions can reduce average lamp life and lumen maintenance:

- frequent on/off switching
- high line voltage
- excessive vibration
- high ambient temperature within the fixture
- ballast and ignitor characteristics.



## Improved lumen maintenance



### Zirconium -Iron getter

Maintenance of high vacuum within the outer bulb is critical to quality. In earlier designs, barium getters were located toward the lamp cap, near the metal-glass seals of the electrical in-leads. Rapid induction heating produced a dark barium mirror on the bulb walls with good gettering capability, but the process also stressed the seals, with potential for bulb leakage. Introduction of a new Zirconium-Iron getter at the opposite end of the lamp eliminates this risk for bulb leakage.

Traditional barium getters absorbed light and contributed to sodium loss from the arc tube. The new Zr-Fe getter does not have these disadvantages. The bulb remains clear. Appearance and lumen maintenance are improved.

Should arc-tube leakage occur at end of life, the new Zr-Fe getter considerably reduces the risk of rectification.

# The solution to reliability

Watts	Product Code	Product Description	Length mm	LCL mm	Cap	Rated Avg Life hrs	Initial Lumens	CCT K	Operating Position	Pack Qty.
<b>Lucalox™ XO - (High Output), Tubular Clear</b>										
50	93373*	LU50/85/XO/T/27	156	97	E27	28500	4400	2100	Universal	25
70	93375*	LU70/90/XO/T/27	156	97	E27	28500	6600	2100	Universal	25
100	93376*	LU100/100/XO/T/40	211	133	E40	28500	10500	2100	Universal	12
150	93377*	LU150/150/XO/T/40	211	133	E40	28500	17500	2100	Universal	12
250	93378*	LU250/XO/T/40	260	158	E40	28500	33000	2100	Universal	12
400	93269	LU400/XO/T/40	283	175	E40	28500	56500	2100	Universal	12
600	93270	LU600/XO/T/40	283	168	E40	28500	90000	2100	Universal	12



<b>Lucalox™ XO - (High Output), Elliptical Diffuse</b>										
100	93379*	LU100/100/XO/D/40	186		E40	28500	10000	2100	Universal	12
150	93380*	LU150/100/XO/D/40	227		E40	28500	16900	2100	Universal	12
250	93381*	LU250/XO/D/40	227		E40	28500	31200	2100	Universal	12
400	93296	LU400/XO/D/40	282		E40	28500	54000	2100	Universal	12



\*available in 2002

GE Lighting is constantly engaged in the global quality process. A statistical quality system designated SIX SIGMA is applied across the board in all areas of the company from manufacturing through to sales. Moreover, the company's Environmental Management System certification to ISO 14001 guarantees application of the highest possible standards throughout the process of manufacturing light sources.



For more technical information please check our technical data sheet on Lucalox™ XO lamps on our web-site



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[www.GELighting.com](http://www.GELighting.com)

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Lucalox™ XO - Eng - Aug 2001