



Product Benefits Information Sheet

BIRNS Corona: High-Pressure Sodium Vapor Light

General Information	The BIRNS Corona is the world's most advanced nuclear-grade high-intensity light. It is a longterm wet/dry high pressure sodium vapor area light, and can be operated for indefinite periods in air and immersed in cold water without damage. The BIRNS Corona is based on proven BIRNS nuclear lighting technology, in concert with the immense illuminance of HID high pressure sodium vapor lamps.
Applications	The rugged Corona is used for fuel pool lighting, turbine inspection, and illumination of the reactor cavity during fuel handling, but can be used in any applications where long-term use, extreme low levels of maintenance and high luminous efficacies are required.
Features/Benefits	The BIRNS Corona provides: <ul style="list-style-type: none">Brilliant illumination (140,000 initial lumens, 132,000 mean lumens!)Lowest operating costs of <i>any</i> lighting systemLamp life rated at 24,000+ hours¹60-second tool-free relampingCommercially-available lamps (price: less than \$100 each!)Rugged, Type 304 stainless-steel indexed connectorsRedundant o-ring seals, in stainless-steel grooves, based on proven technologySafe, reliable operation on GFCI's (Ground Fault Circuit Interrupters)Sturdy, rugged constructionLamp operating in dry, one-atmosphere chamber

BRILLIANT ILLUMINATION

The BIRNS Corona uses HID (High-Intensity Discharge) technology to produce 140,000 initial and 132,000 mean lumens light output. At an average efficacy of 132 lumens/watt, the BIRNS Corona has the *highest* efficacy of any lighting system. (Typical tungsten-halogen systems produce 16 lumens per watt².)

LOWEST OPERATING COSTS

Apart from the costs of power consumed, important costs are: labor to change burnt-out lamps (bulbs), and the replacement cost of replacement lamps
LABOR. The BIRNS Corona can be relamped, without tools, while wearing gloves, in 60 seconds.
LAMP COSTS. The current price for a replacement lamp for the BIRNS Corona is \$89.00.



LONG-LIFE LAMPS

These lamps are rated at a lifetime of over 24,000 hours!

FAST, TOOL-FREE RELAMPING

The BIRNS Corona needs no tools to change the lamp. It can be relamped in less than 60 seconds by an operator wearing bulky gloves .

COMMERCIALY-AVAILABLE LAMPS

(Note: this is a key point, because competing systems are based on a non-standard, custom-made lamp. That lamp is manufactured by a small, specialty lamp manufacturer; you can buy it only through our competitor.)

Replacement lamps for the BIRNS Corona are available from any good lamp distributor; while BIRNS stocks these lamps (and incorporates them into BIRNS' QA system), it is not necessary to procure replacement lamps from BIRNS. This means:

You have your choice of replacement lamp suppliers; you are not tied to a monopoly.

You are guaranteed future supplies of replacement lamps. (On the other hand, should our competitor -- or their specialty lamp supplier -- go out of business, or simply decide to discontinue making the lamp, their lighting fixtures will quickly become obsolete.)

Replacement lamp prices are competitive. This is reflected by the fact that competing replacement lamps cost more than ten times the price of BIRNS lamps.

Replacement lamps are available faster. If one supplier doesn't have them in stock, another will.

Replacement lamps for the BIRNS Corona are standard lamps, based on proven technology and manufactured under tightly controlled conditions by several large lamp manufacturers (e.g. Sylvania, General Electric, etc.) with the requisite ability and resources. Significant amounts of research and development time and expertise have been applied to the development of these lamps; they are designed and made to perform at peak output.³

RUGGED, INDEXED TYPE 304 STAINLESS-STEEL CONNECTORS

The BIRNS Corona uses heavy-duty stainless-steel connectors throughout. These connectors are indexed (i.e. they have a stainless steel keyway system that prevents mismatching) and provide complete mechanical protection for the electrical pins.

These connectors seal with redundant o-rings. (By contrast, competing systems seal on rubber-coated pins!)

REDUNDANT O-RING SEALS, IN STAINLESS-STEEL GROOVES, BASED ON PROVEN TECHNOLOGY

O-rings are a proven sealing technology; these same o-ring designs seal BIRNS deep-submergence lights in the marine environment to tens of thousands of feet depth, under extremes of thermal stress, mechanical abuse, and seawater corrosion, without difficulty.

O-rings and their grooves can be controlled C they are standard items, can be measured, and are accurate to +/- 0.001". There is no place in the BIRNS Corona for "potting" or other methodology which is impossible to control or to measure.

The BIRNS Corona features redundant seals throughout; all high-stress sealing points have a back-up seal.



SAFE, RELIABLE OPERATION ON GFCI's

The BIRNS Corona will operate safely and reliably on all commercial ground fault circuit interrupters (GFCI's), because its sealing methodology is reliable and prevents all electrical "leakage".

STURDY, RUGGED CONSTRUCTION

The BIRNS Corona (including connectors) is constructed entirely of heavy-gauge electropolished Type 304 Stainless steel.

Four 3/8-inch (10 mm) solid stainless steel bars are welded across the front of the Corona, which increases rigidity and protects against mechanical impact. (This is in contrast to competing units, which have no reinforcing bars of any type.)

A captivated heavy-gauge stainless-steel mesh screen provides further mechanical protection for the Corona. Its secure captivation notwithstanding, however, it can be removed for cleaning, without tools, in 60 seconds. (Competing units use a cylindrical screen which is designed to catch broken glass but which does not provide significant mechanical impact protection.)

LAMP OPERATES IN DRY, ONE-ATMOSPHERE CHAMBER

The BIRNS Corona provides a separate quartz envelope to enclose the lamp in a dry, one-atmosphere chamber. No water ever comes into contact with the lamp itself. This means that the lamp is not subjected to the pressure, thermal shock, corrosive effect etc. of the underwater environment.

In the unlikely event that a lamp should break, it is contained in the chamber, which is itself behind a stainless steel mesh screen and reinforcing bars. (Competing units' lamps are in direct contact with the water and are therefore under significant mechanical and thermal stress; should they break, there is no "barrier" between the mercury arc tube and the nuclear environment.)

As a luminaire manufacturer, BIRNS heeds the warnings and recommendations of the major lamp manufacturers, which advise against direct lamp contact with water:

Sylvania: "Warning: Although the outer bulb is made of heat resistance glass, external protection of the lamp is required to minimize the chance of bulb breakage due to direct contact with water during lamp operation."⁴

Osram: "Warning: Do not expose operating lamp to moisture."⁵

GE Lighting: "Outer bulbs of Lucalox [high pressure sodium] lamps are made of heat resistant glass, designed to have strength and thermal-shock-resistant characteristics for normal applications in typical luminaires. However, shielding of lamps must be provided to avoid bulb breakage that could result from direct contact with liquids (such as water) during operation."⁶



¹The lamp manufacturer rates this lamp at 24,000 "+" hours because the lamp typically does not fail, but begins to lose efficiency. However, please note that this rating is determined by the lamp manufacturer under laboratory conditions. Your own field results may vary.

²Based on a 120 volt/1,000 watt tungsten-halogen lamp in a PAR 64 bulb.

³The nature of the "specialty" lamp maker of competing systems is such that it does not have such resources, and its lamp is still quite young. Therefore, a "specialty" lamp's performance should be investigated if it is claimed to be equivalent to lamps made by established makers.

⁴GTE Sylvania Engineering Bulletin 0-348, "High Pressure Sodium Lamps", Page 11.

⁵Osram 1996 Product Catalog LLC96, Page 80: "Guide to High Pressure Sodium Lamps".

⁶GE Lighting Form 9200, 20th Edition, "Selection Guide for Quality Lighting", Page 68: 'High Pressure Sodium Operating Characteristics and Limitations'.