

Lamp Technical Info

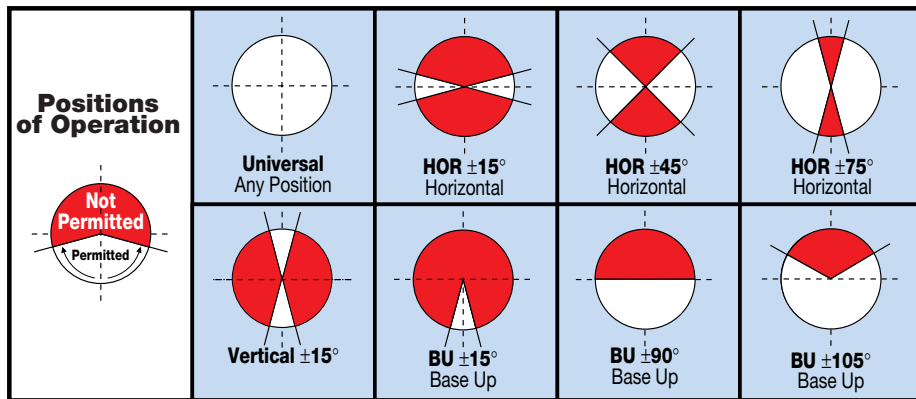
Proper Use of Metal Halide Lamps

Correct Operation and Warnings For High Intensity Discharge Lamps:

High intensity discharge (HID) lamps require auxiliary equipment (ballasts, capacitors, ignitors or power supplies) to provide the correct electrical values for starting and operating. This auxiliary equipment must meet all electrical specifications outlined by the American National Standards Institute (ANSI). Venture Lighting International will not be responsible for poor performance, personal injury, property damage, burns or fire from lamps operating on unapproved auxiliary equipment or from lamps being operated in a manner inconsistent with their design.

Power should always be turned off and preferably locked out in accordance with OSHA guidelines whenever installation, removal or maintenance is performed on lighting systems. Safety glasses and gloves should be used when installing or removing HID lamps. Lamps should be installed firmly into appropriate lamp sockets, without over tightening, to avoid loosening from vibration.

HID lamps and their arc tubes operate at extremely high temperatures and may shatter as a result of misapplication, system failure or other factors. Scratches on the outer bulb, direct contact with water or excessive installation pressure can also cause these lamps to break. Breakage may release extremely hot glass and lamp parts into the surrounding environment and raise the risk of fire, personal injury or property damage. Injury may also be caused by ultraviolet energy from an unjacketed HID lamp. If the outer jacket should break, immediately turn the power off. Do not remove a lamp until it has completely cooled; then replace it with a new Venture® lamp. In areas susceptible to contamination by flying glass, where flammable materials are present or where there is a possibility of personal injury, users should seek additional protective measures by using open fixture (O-rated) lamps and enclosed luminaires.



Luminaire Requirements and Operating Positions

It is imperative that users adhere to specified luminaire and lamp operating positions and requirements. The operation of lamps in positions other than those specified can result in severe reductions in lamp performance, including lamp life, light output and color. Incorrect operating positions can also create the possibility of an early failure.

Refer to each lamp's technical data specification sheet to determine correct operating position and luminaire requirements. Also, refer to the diagram in this section to determine allowable operating positions.

Federal Compliance - Metal Halide

Venture® lamps comply with USA Federal Standard 21 CFR 1040.30 and Canada Standard SOR/80-381.

“WARNING: This lamp can cause serious skin burn and eye inflammation from shortwave ultraviolet radiation if outer envelope of the lamp is broken or punctured and the arc tube continues to operate. Do not use where people will remain for more than a few minutes unless adequate shielding or other safety precautions are used. Lamps that will automatically extinguish when the outer envelope is broken or punctured are commercially available.”

Careful adherence to the precautions mentioned above may not eliminate all possible risks associated with the use of metal halide lamps, but will reduce the likelihood of personal injury or property damage.

End-of-Life and Reduction of Risk

At end-of-life, the vast majority of metal halide lamps will fail simply by not reigniting. On rare occasions, metal halide lamps may fail in a violent manner. The possibility of this failure is significantly reduced by group relamping at or before the rated end of life. (see Group Relamping) In any application where lamps are operated continuously (24 hrs/day, seven days/week), the lamps should always be turned off for a period of at least 15 minutes once a week, a precaution that can reduce the possibility of violent failures. This procedure is not required when Venture's open rated, shrouded lamps are used. These lamps are easily identified by the “MP” or “MPI” in the order code.

Starting and Restarting Characteristics

Probe start metal halide lamps will start at an ambient temperature of -30°C (-22°F) or higher. Full light output does not occur immediately when power is applied to any metal halide lamp; there is a time delay of at least two to four minutes after starting before lamps reach full light output. After lamps have started, a power interruption of 1/4 cycle (1/240th of a second) or more may cause the lamps to extinguish. Several minutes are required before an arc can be re-established by the ballast and full light output achieved. The exact time is dependent on a number of factors including lamp wattage, ballast and ignitor characteristics, ambient temperature, fixture dimensions and supply voltage. The time needed to establish full light output can be as short as three minutes and as long as 15 to 20 minutes. In general, pulse start technology dramatically decreases the time for hot restart. Venture's exclusive *Uni-Form* pulse start formed body arc tube provides warm-up and hot restrike in up to 60% less time and allows better starting, even down to -40°C (-40°F).

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An Advanced Lighting Technologies Company

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Lamp Life

Lamp life is an important consideration when purchasing a new, retrofit or replacement lamp. Two very different and distinct terms describe life: "rated life" and "economic life."

Rated Life

Rated, or average (median), life for metal halide lamps is a value of lamp life expectancy based on laboratory and field tests of representative lamps, operating on approved ballasts, with a burn cycle of at least 10 hours per start. The average life is determined when 50% of traditional metal halide lamps initially installed are still operating. For 300-875 watt *Uni-Form* pulse start lamps, life is determined when 70% of the initial lamps installed are still operating.

Various operating conditions affect lamp life. One key factor is operating position. Position-oriented lamps (designed to operate in one specific position) are tested and rated based on that designated position. Operating these lamps in any other positions can dramatically shorten life, reduce lumen output and cause color shift. Lamps designated universal can be operated in any position. However, life expectancy and lumen output are sacrificed in certain positions. Published "rated life" for universal lamps is based on operation in the vertical position. "Rated life" for universal lamps operated horizontally is 75% of the published rating.

Shorter operating cycles reduce life. At operating cycles shorter than 10 hours per start, life will shorten as follows:

- 5 hrs/start: Life is 75% of rating
- 2.5 hrs/start: Life is 55% of rating
- 1.25 hrs/start: Life is 40% of rating

Other factors, alone or in combination, that can also reduce lamp life include:

- High or low line voltages
- Marginally-operating control devices (ballasts, capacitors, ignitors, dimming systems, etc.)
- Extremely high operating temperatures

Economic Life

Economic life refers to the hours of operation during which a lamp is designed to provide optimum light output and color quality as well as lowest replacement cost. Economic life describes actual lamp life better than rated life because rated life does not account for the lumen depreciation and color shift that occur as lamps age. The economic life of lamps is generally 60% to 75% of the lamp rated life. Though economic life is important when considering a lighting system, lamp data tables show rated life because they provide a comparison with other lamp manufacturers' ratings.

Group Relamping Is Effective Lighting Management

Group relamping offers significant savings in time and labor costs over spot replacing failed lamps. Regularly scheduled maintenance based on projected lamp life and lumen depreciation keeps a lighting system functioning at its maximum by replacing all lamps at their economic life. This provides:

- Optimum light output
- Superior aesthetic quality
- Optimum energy efficiency
- Lower labor costs

1) Optimum Light Output:

Light levels are at their peak when your lighting installation is new. Most traditional metal halide lamps decrease in light output to 40% of initial light output by the end of rated life. A number of factors may accelerate this reduction in efficacy (lumens per watt). Group relamping at economic life keeps the light levels from dropping significantly. It also provides an opportunity to remove dirt accumulation in the luminaires. Cleaning during group relamping saves time and helps maintain optimum light levels. A cleaner, well-lit environment increases safety and security, can contribute to higher worker productivity and creates a better impression on visitors.

2) Aesthetic Quality:

The quality of light changes over economic life, shifting 200K to 300K in color. In the last 25% of rated life it may accelerate, shifting 500K to 600K. This causes old lamps to appear blue or pink especially when compared to new lamps. All the lamps in an area will generally change color together; so the color shift of the lamps will be most noticeable during spot relamping.

3) Optimum Energy Efficiency:

While the light output of traditional metal halide lamps decreases over life, they still consume the same (or sometimes more) electricity. Since energy is the largest cost of lighting, group relamping prevents almost half of the energy from being wasted by under-performing lamps. For example, a 400 watt traditional metal halide lamp may consume \$800 of electricity over rated life. After 60% of rated life, about \$320 is wasted on lamps providing less than mean lumens. Spot relamping wastes energy dollars. The cost of a new lamp and the labor to install it as part of group relamping is generally less than 5% of the total energy cost.

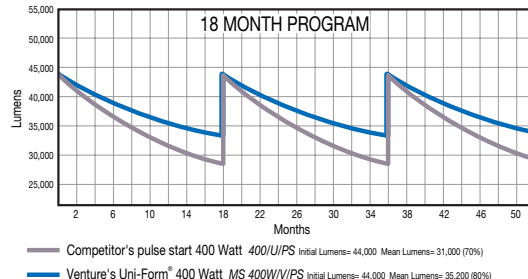
4) Cost Effective Replacement:

Group relamping, as a planned maintenance program, reduces downtime and labor costs. Spot relamping often takes an employee away

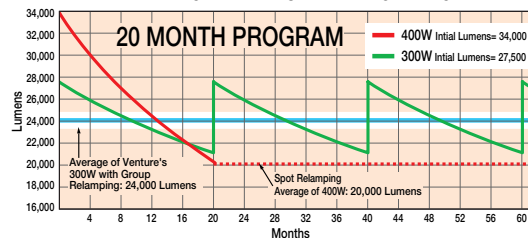
from regular duties just to replace a burned out lamp. This inconvenience grows as lamp failures increase towards the end of rated life. Group relamping not only eliminates wasted labor and workday disruptions, it allows for scheduling during normal shutdown periods.

Group relamping at economic life is a practical way to reduce energy and maintenance costs, as well as sustain workers' visual acuity with a bright workplace environment. It also offers the opportunity to replace older lighting with Venture's energy saving Energy Master® retrofit products or new, more efficient *Uni-Form* pulse start systems.

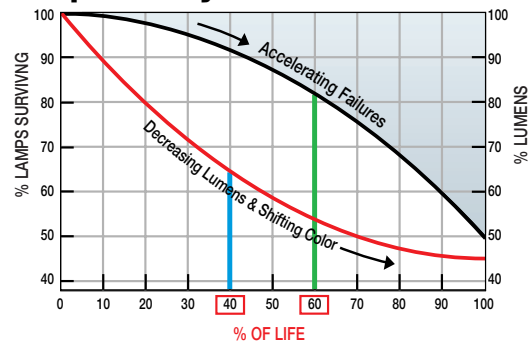
MAINTENANCE PROGRAM TYPICAL LAMP LUMEN PERFORMANCE



MAINTENANCE PROGRAM TYPICAL LAMP LUMEN PERFORMANCE



Lamp Mortality & Maintenance Curves



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It's An Open Story: Open Rated Lamps

Open fixture rated metal halide lamps offer significant advantages for users. They broaden luminaire options by:

1. Eliminating the need for cover lenses, which reduce light output
2. Removing a source of dirt accumulation that further reduces light output
3. Making lamp replacement easier

There are now two types of lamps for use in open luminaires. One type is designated with the American National Standards Institute (ANSI) "S" rating; the other is given an "O" rating. There are significant differences between these two ratings. To reduce the risk of liability, lighting specifiers need to be aware of what the criteria are for a true open rating and what the "S" or "O" ratings indicate about lamp construction.

The Open Fixture Rating

The best-selling 400 and 1000 watt universal metal halide (probe start) lamps, produced to the ANSI



M59 and M47 lamp standards, are rated by the major lamp manufacturers for operation in open luminaires. These lamps have been assigned the ANSI letter/designation "S," indicating "suitable" for use in open luminaires, if positioned within $\pm 15^\circ$ of vertical. With a continuous operating



cycle, "S" rated lamps must be shut down at least once a week for a minimum of 15 minutes and relamped before reaching rated lamp life.

However, it has not been proven that these restrictions eliminate violent end-of-life failures.

In fact, an insurance industry report published in March, 1998, warned against the use of lamps with an "S" designation because they pose a risk of fire and injury¹. Lamps with the "S" designation do not have containment shrouds.

"O" rated lamps, on the other hand have been designed with a quartz shroud around the arc tube to help with containment and only receive the "O" rating if they pass a rigorous ANSI test.



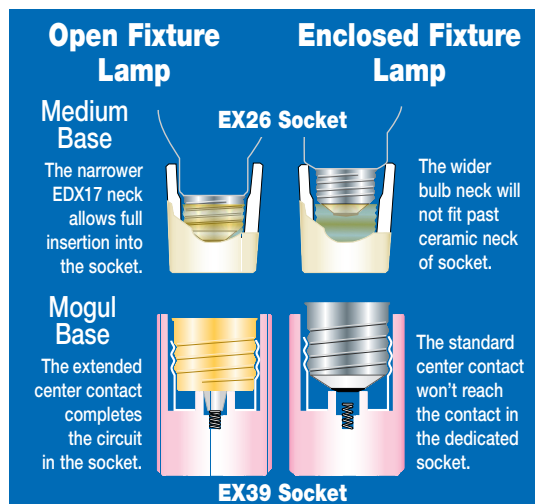
The insurance industry now recommends that all metal halide lamps manufactured for open luminaires incorporate shrouded arc tubes to contain shattered particles. One major insurer also recommends using "O" rated lamps in enclosed luminaires with plastic lenses². The industry urges metal halide lighting manufacturers to adopt "O" rated lamps and abandon the use of the "S" rated lamps. With the growing use of metal halide lighting spurred by the advances of pulse start technology, proper selection of "O" rated lamps for open luminaires becomes even more important.

ANSI Lamp Designations

E - Lamp must be used in enclosed luminaires which meet the requirements of UL1598.

S - Lamps are considered "suitable" for open luminaire operation, only if operated in the vertical $\pm 15^\circ$ position. Lamps do not meet ANSI criteria for containment and must be turned off at least once per week for a minimum of 15 minutes if operated continuously. In addition these lamps must be replaced when reaching rated lamp life.

O - Lamps can be operated in open or enclosed luminaires within the manufacturer's specified operating position limits. These types meet the ANSI criteria for containment rated operation and do not need to be shut off weekly. Special exclusionary sockets are available for these lamps to ensure that the wrong lamp type is not used.

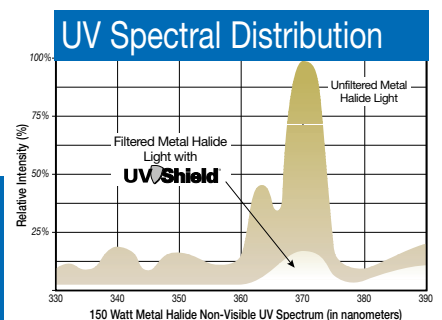
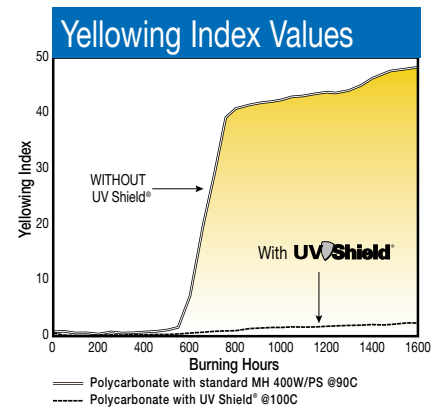
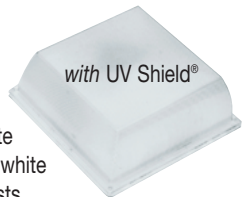
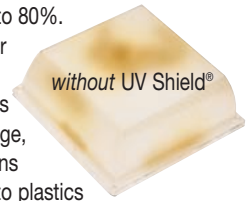


UV Shield® Protection

All O-rated Uni-Form pulse start lamps also include UV Shield® protection. The quartz shroud in these lamps is specially-treated to reduce ultra-violet light output, up to 80%.

That's 50% more than other UV-reducing lamps on the market. This protects assets like merchandise and signage, because ultraviolet emissions cause fading and damage to plastics and fabrics.

UV Shield lamps can also be used in enclosed luminaires. This reduces "yellowing" of polycarbonate lenses, ensuring maximum white light output. Laboratory tests demonstrate that UV Shield extends polycarbonate lens life by a factor of six to ten times.



UV Shield®

Footnotes:

1. IRInformation, IM.5.11.2, Industrial Risk Insurers, March 2, 1998.
2. FMGlobal Property Loss Prevention Data Sheets, 5-21, Rev. May 2001.

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