USHIO Applying Light to Life®



Aqualite™ Metal Halide

Metal Halide Lamps for Marine Aquariums and Reef Systems

Ushio Aqualite™ Metal Halide lamps feature the best combination of color balance, color rendering and photosynthetic light output for healthy marine aquarium and reef systems. Our Ushio BLV factory in Germany, collaborated with leading marine biologists to develop the first 10,000K Metal Halide lamps. We have successfully set the benchmark of quality for over ten years.

The Aqualite 10,000K lamps have a high color temperature from a single point source which simulates the appearance of sunlight near the equator in ocean depths of approximately 5 meters. Aqualite 14,000K and 20,000K+ lamps simulate water color at deeper depths and with differing wavelength spikes. Coral fluorescence will be excited in some species under the enhanced blue spectrum of the 14,000K and 20,000K+ lamps. The superior spectral balance of the Aqualite lamps are ideal for lighting and environmental conditions for reef systems. This includes fish, corals, invertebrates, marine fauna and flora.

At Ushio, we take the utmost care and inspection of our raw materials and maintain top standards in cleanliness during lamp production. Ushio Aqualite lamps utilize proprietary rare-earth mixtures to provide the most consistent lamp color over the entire lifetime of the lamp. Our arc tube forming process and coatings ensure that lumen depreciation levels are kept to a minimum. This is what sets Ushio apart from our competition.

MADE IN GERMANY

FEATURES & BENEFITS

- High Color Temperature - 10,000K, 14,000K, 20,000K+
- Excellent Color Rendering - Up to 90 CRI
- Superior Spectrum Balance
- High PAR Values
- High Color Stability
- High Intensity
- Made in Germany

APPLICATIONS

- Marine / Aquariums
- Salt Water Reefs / Corals
- Marine Fauna & Flora
- Fountains
- Waterscape

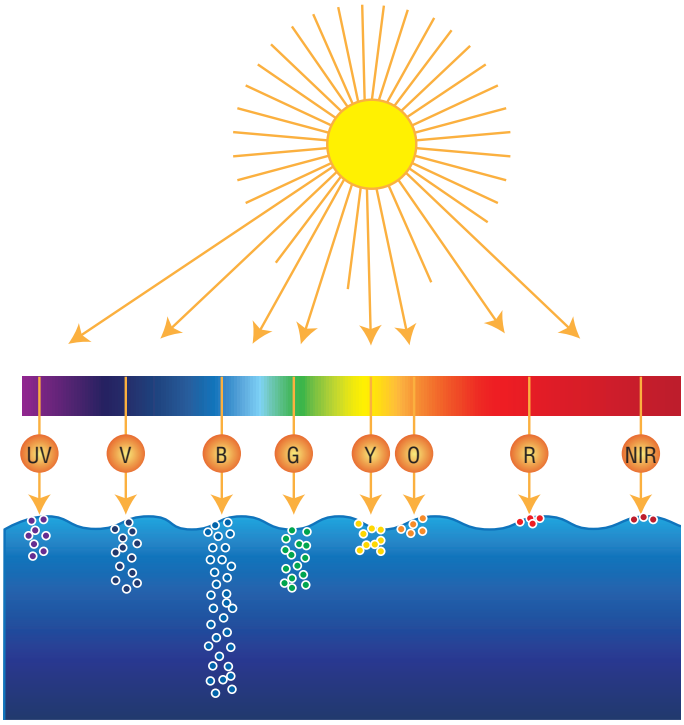
NATURAL LIGHT IN THE REEF

Different wavelengths of light are absorbed at different rates by water. The red and infrared (IR) energy which have the longest wavelength and therefore the least amount of energy in the visible spectrum do not penetrate the water very far and are quickly absorbed at the surface. A red fish swimming near the surface will appear red and vibrant but that same fish at lower depths will appear black since there is no red light to reflect off of it. Next is orange, yellow, green, and then the blue region around 450nm which reaches the furthest.

Although it has the shortest wavelength and highest energy, ultraviolet light is also quickly absorbed from water. The smaller wavelengths of light are easily scattered by particles in the water.

The difference between natural light at a few meters below the surface and artificial light can be quite dramatic. Professional dive photographers use xenon strobe lamps at 6,000K daylight color temperature to best show off the colors of coral and marine life as we would prefer to see it. You can see how quickly the color of the corals and fish enhanced by a xenon strobe fall off and everything turns blue in the background of professional underwater photographs. Colors of the reef and fish that are enhanced under the artificial light would normally have a monotone cast to it under natural light at that depth. This is why artificial light in reef aquariums can be very subjective when it comes to color rendering. The choice of lamp color temperature is tied to the individual aquarist's eye when other factors such as PAR ratings and coral growth are ruled out.







Wavelength theory provides a graphical representation of radiant energy and the electromagnetic spectrum. The preferred unit of wavelength for the visible and ultraviolet (UV) regions of the spectrum is the nanometer (nm).

PAR (Photosynthetically Active/Available Radiation)

The first 200 meters of the ocean depth is termed the photic zone which is penetrated by sufficient sunlight for photosynthesis to occur and plants thrive.

PAR is a measurement used to help determine the photosynthetic amount of light needed by corals and plant life. Photosynthesis in corals utilizes energy between the blue 400nm wavelengths and red 700nm wavelengths.

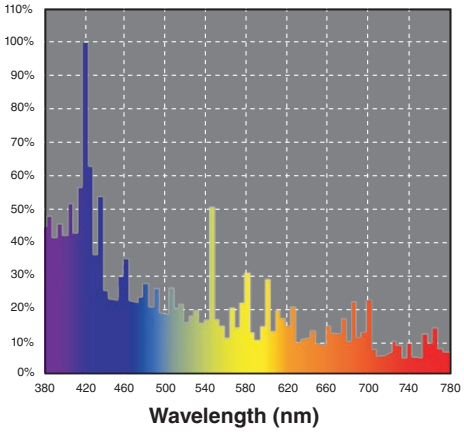
What About the UV?

UVC and UVB in excessive amounts can be detrimental to fish and corals; However, UV light does occur naturally in sunlight which in balanced amounts is not necessarily harmful. Studies have found that the majority of coral reef fish produce mucus that absorbs harmful UVB rays. Corals also have developed a natural pigmentation as a protection from UV. Metal Halide lamps produce UV light which can be significantly filtered by fixture glass and water depth. Ushio's Aqualite Metal Halide lamps are balanced to reduce excessive amounts of UV light for your reef system. (See section on use of safety fixture glass on back cover).

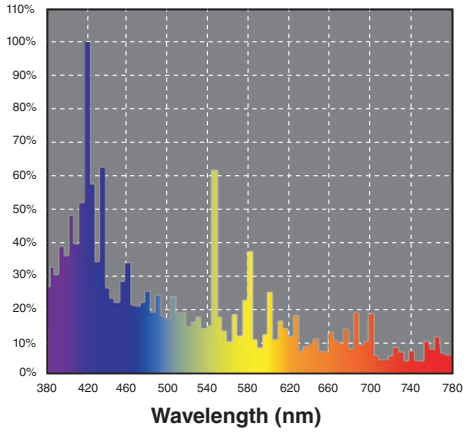
Aqualite 10,000K lamps produce the ideal balance of blue, white and red light in the spectrum to simulate daylight in the water. Our Aqualite lamps are designed to provide the reef environment with healthy levels of PAR and visible light values.

UVC = 100–280nm: Most harmful and used in sterilization to kill biological organisms. (Germicidal Lamp = 254nm peak)
UVB = 280–315nm: Harmful and causes sunburn, skin cancer, and eye damage.
UVA = 315–400nm: Longer wavelength and less energy than other UV. It is the least harmful but is still damaging to DNA and the human eye.
Black Light Blue Lamps = 368-371nm
Actinic Lamps = 420nm Peak: (Although actinic lamps peak at 420nm they do produce wavelengths in the UVA range so UV protective safety rules apply.)
Visible Light = 380–780nm
Photosynthetic Light = 400-700nm: (The more peaks across this broad spectrum will give you the best photosynthetic performance.)

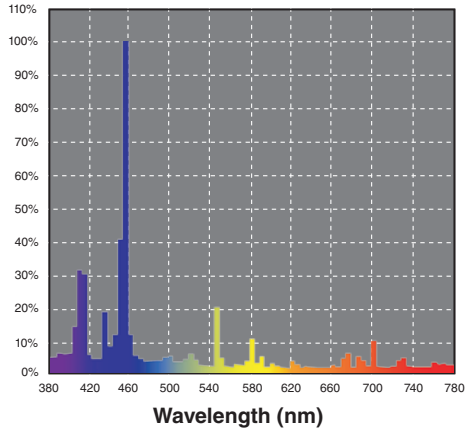
150W 10,000K



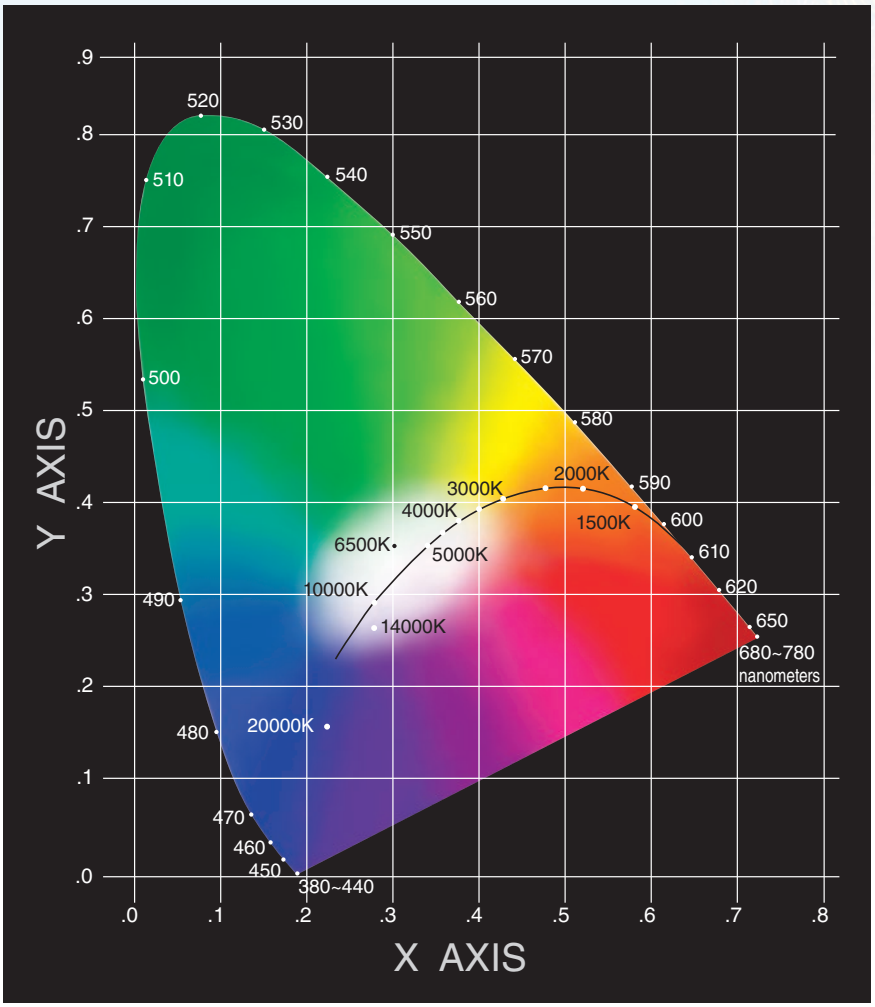
150W 14,000K



150W 20,000K+



COLOR CHROMATICITY CHART



AQUALITE™ Chromaticity Coordinates			
Double-Ended			
75W	10,000K	X=0.285	Y=0.275
75W	14,000K	X=0.287	Y=0.260
75W	20,000K+	X=0.200	Y=0.180
150W	10,000K	X=0.285	Y=0.275
150W	14,000K	X=0.287	Y=0.260
150W	20,000K+	X=0.220	Y=0.160
250W	10,000K	X=0.285	Y=0.275
250W	14,000K	X=0.287	Y=0.260
250W	20,000K+	X=0.220	Y=0.160
E39 Base			
175W	6,500K	X=0.304	Y=0.360
175W	10,000K	X=0.285	Y=0.275
175W	14,000K	X=0.287	Y=0.260
175W	20,000K+	X=0.220	Y=0.160
250W	10,000K	X=0.285	Y=0.275
250W	20,000K+	X=0.200	Y=0.140
400W	10,000K	X=0.285	Y=0.275
400W	14,000K	X=0.270	Y=0.250
400W	20,000K+	X=0.200	Y=0.140
400W	10,000K	X=0.285	Y=0.275
400W	14,000K	X=0.270	Y=0.270
400W	20,000K+	X=0.200	Y=0.140
1000W	10,000K	X=0.285	Y=0.275

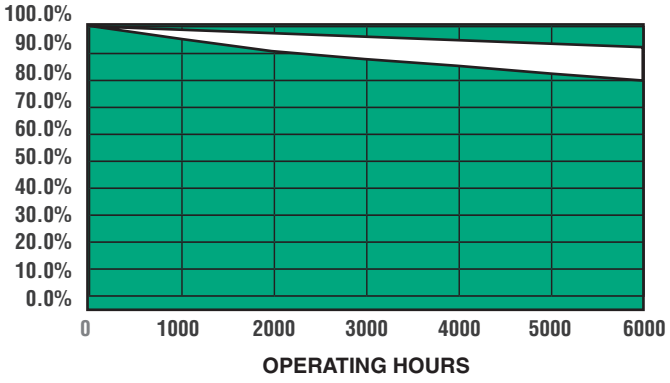
Correlated Color Temperature: Measured in degrees of kelvin (K), color temperature is the absolute temperature of a blackbody radiator resembling that of the light source. This black body curve can be seen on the Color Chromaticity Chart. Color temperature can be used as a general rule of thumb to measure the appearance of "warmth" or "coolness" of a light source. It does have its limitations, since lamps with the same color temperature rating will not often look the same between manufacturers. This is due to the different gas/metal mixtures in Metal Halide lamps and different phosphors used in fluorescent lamps. Other measurements such as CRI, PAR values, spectral distribution and lumen depreciation should also be considered when choosing a light source for your reef system.

Outdoor daylight is approximately 5,600-6,000K. Aqualite 10,000K lamps approximate equatorial daylight at 5 meters of ocean depth. Aqualite 14,000K lamps have a bluer tone to enhance blue corals but maintain higher color rendering for white rock and sand. Aqualite 20,000K+ lamps are blue in appearance, simulating deeper water environments. Blue lamps are typically not given a color temperature just as we would not assign a color temperature for magenta or green lamps. For simplifying lamp choice selection, Ushio uses 20,000K+ as a marketing term for our blue lamp.

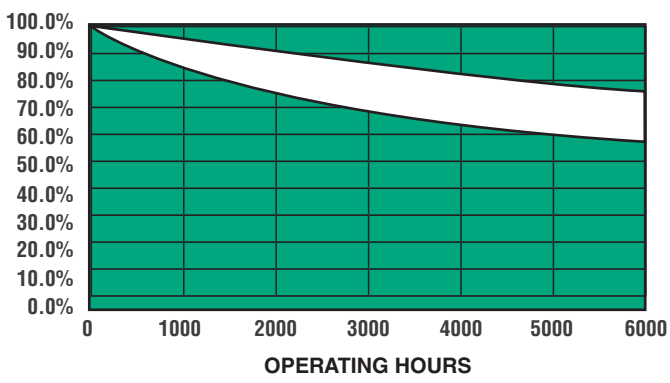
Luminous Flux: Measured in lumens is an industry standard for measuring the visible light output from the lamp. Luminous flux measure the photopic vision of the human eye from approximately 300-700nm. Lumens come into play in a marine aquarium, since a dim tank does not show off the marine life as expected. It will make a difference on what is seen at the bottom of the tank and how the tank is illuminated in comparison to the ambient light of the surrounding room. However, lumens alone cannot be a measurement of perceived brightness because other factors including color temperature and color rendering come into play. All Metal Halide lamps depreciate in lumen value over time. Because the Metal Halides used in the 10,000K lamp are more stable, the 10,000K lamps hold their luminous flux values over a much longer period than the 14,000K and 20,000K+ lamps and thus require less lamp changes over time. Out of the box, the 10,000K and 14,000K lamps have over twice the luminous flux values as a 20,000K+ lamp and thus you would have to double your wattage of a 20,000K+ lamp to get the same visible light output of a 10,000K or 14,000K lamp.

LUMEN DEPRECIATION

USHIO 150W 10,000K
TYPICAL LUMEN DROP OVER LIFETIME



USHIO 150W 14,000K
TYPICAL LUMEN DROP OVER LIFETIME

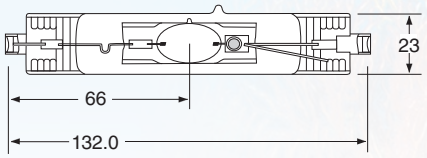


SAMPLE LUMEN DEPRECIATION & KELVIN PERFORMANCE OVER TIME

UHI-150AQ/10K — 7000 LUMENS 90CRI					
Operating Hours	0-100	1000	2000	4000	6000
Loss of Lumens	0% to 0%	1% to 4%	3% to 9%	4% to 15%	7% to 21%
Kelvin Performance	11100/111%	10300/103%	9500/95%	9250/93%	9000/90%
UHI-150AQ/14K — 6800 LUMENS 70CRI					
Operating Hours	0-100	1000	2000	4000	6000
Loss of Lumens	0% to 0%	6% to 16%	11% to 24%	17% to 34%	23% to 42%
Kelvin Performance	14100/101%	12000/86%	11000/79%	10550/75%	10100/72%

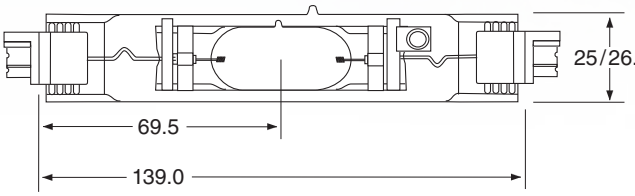
Color Shift: Usho Aqualite lamps use a proprietary mixture of salts and metals to ensure that color is stable from lamp to lamp out of the box. Metal Halides break down over the life of the lamp and thus all metal halide lamps will experience a color and Kelvin shift near the end of life.

SPECIFICATIONS



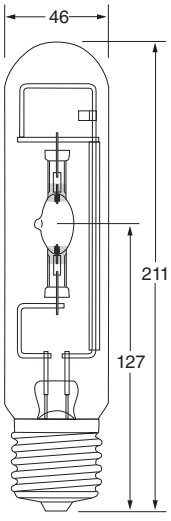
RX7s-24

UHI-150AQ
150W

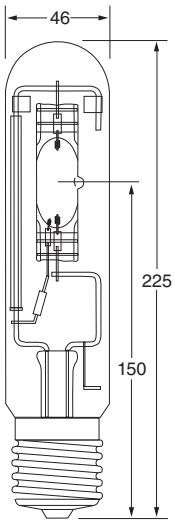


Fc2/18

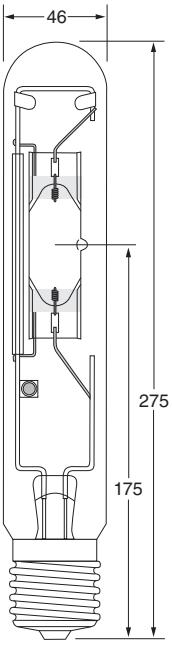
UHI-250AQ
250W



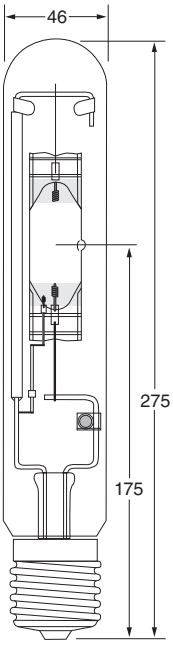
UHI-S175AQ
175W



UHI-S250AQ/CWA
250W



UHI-S400AQ
400W



UHI-S400AQ/CWA
400W

All dimensions are in millimeters.

Watts (W)	Ordering Code	Lamp Description	Lamp Current (A)	Color Temp (K)	CRI	PAR Value/ Watt	Luminous Flux (lm)	Recommended Life (h)	Ballast	Case Qty
		Double-Ended - RX7s								
150	5001587	UHI-150AQ/14	1.8	14000	70	35	6000	6000	M81**	10
150	5001588	UHI-150AQ/20+	1.8	20000+	N/A	16	3000	6000	M81**	10
		Double-Ended - Fc2/18 Base								
250	5001589	UHI-250AQ/14	3.0	14000	70	56	10600	6000	M80**	10
		Single-Ended - E39 Base								
175	5000761	UHI-S175AQ/10	1.5	10000	90	47	7500	6000	M137*/M152	12
175	5001591	UHI-S175AQ/14	1.5	14000	70	47	7500	6000	M137*/M152	12
175	5001592	UHI-S175AQ/20+	1.5	20000+	N/A	22	4300	6000	M137*/M152	12
250	5001070	UHI-S250AQ/10/CWA	3.0	10000	90	54	11000	8000	M58	12
250	5002093	UHI-S250AQ/20/CWA	3.0	20000+	N/A	38	5000	8000	M58	12
400	5001492	UHI-S400AQ/10/CWA	3.6	10000	90	95	18500	8000	M59	12
400	5001608	UHI-S400AQ/14	3.2	14000	70	95	18500	6000	M135*/M155	12

Discontinued - For Reference Only

Burn Position: Double-Ended: Horizontal ± 45°
Single-Ended: Universal 360°
(1000W): Horizontal ± 60°

Recommended Ignition Voltage: 4kV
*Pulse start ballast with ignitor **Need ignitor with 4kV
Lamp should be switched off for at least 15 minutes/week

Enclosed fixture rated:
Use only in fixtures installed with tempered safety glass!

⚠ **CALIFORNIA PROPOSITION 65 WARNING:** These products can expose you to Mercury, which is known to the State of California to cause cancer, birth defects, and other reproductive harm. For more information, please go to: www.p65warnings.ca.gov.

R - Non Self-Extinguishing Lamp
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. Do not use where people will remain for more than a few minutes unless adequate shielding or other safety precautions are used.

Hg contains mercury
contient du mercure
Manage in Accord with Disposal Laws
www.lamprecycle.org 1-800-895-8842

Aqualite™ Metal Halide lamps are manufactured under ISO 9001 guidelines ensuring quality and security for the purchaser.

GLOSSARY OF TERMS

Lamp Life: The median life of metal halide lamps is statistically determined under controlled conditions on a 11 hours on, 1 hour off, cycle. Environmental factors including the lamp ballast, lamp housing, reflector and thermal properties will affect lamp life considerably. All Metal Halide lamps degrade in light output and may shift in color over time. Inferior lamps are easy to spot since they significantly shift in color and drop off rapidly in output. The lamp life rating between different manufacturers may be the same on paper but performance over the life of the lamp will tell you your true cost of ownership. Ushio Aqualite Metal Halide lamps utilize proprietary rare-earth mixtures to provide the most consistent lamp color over the entire lifetime of that lamp. Our arc tube forming process and coatings ensure that light degradation levels are kept to a minimum. For the best health of your aquarium and reef system, it is recommended that you schedule regular lamp changes depending upon your timing cycles and rated lamp life. It is normal for Metal Halide lamps to stabilize in color and output within 100 hours of "burn in" operation.

Brand new lamps will always produce more light than lamps near their end of life (up to 40% difference). Your corals and fish will need time to adjust to the higher light levels. It is recommended that when a lamp is first replaced, that you first raise the light fixture and then lower it as the lamp ages.

CRI or Color Rendering Index: CRI is an internationally accepted system to measure the capability of a light source to render color naturally. The closer the number is to 100 the closer that light source is rendering color like natural daylight. Fish, coral and plant life will appear much more true to life under higher CRI light sources. The CRI of the Aqualite 10,000K metal halide is higher than the 14,000K and the 20,000K+. We do not measure the CRI of the 20,000K+ lamp because it is blue. Although blue lamps like the 20,000K+ would have a poor CRI and low luminous flux rating, they are appealing to some in the marine aquarium hobby. That is why when it comes to marine aquarium use, all measurements of lighting must be taken into consideration, color temperature, color rendering, luminous flux, and most importantly, spectral distribution and PAR.

Operating/Burn Position: The operating position of the lamp is specified to provide the proper light output and color. Changing the lamp operating position can change the thermal properties of the arc tube during operation causing some metals or salts to drop out of the arc stream and thus changing the color of the lamp.

Timing Cycles: For the health of your fish and reef system the lighting system should be turned on at least 6-12 hours per day. Check with marine biology sources to determine the proper amount of daylight hours needed for your specific species.

Ballasts and Power Supplies: Ushio always recommends ballasts that are UL recognized for safety and adhere to ANSI standards. It is extremely critical to match the proper ANSI coded lamp to the ANSI coded ballast. Failure to do so will cause improper lamp ignition, poor color and spectral performance, and short life. Check that the operating current of the ballast and ignition voltage matches the lamp. This information should be readily available from any reputable ballast manufacturer. Some ballasts intentionally overdrive the current to the lamp in order to push up luminous flux values on initial tests. The drawback to this intentional "overdriving" is a faster lumen depreciation and color shift.

For example: Ushio's 175W Aqualite is a pulse start lamp. Pulse start type lamps may ignite and work just fine on a probe start ballast for a few months; however, as the lamp ages, the electrodes erode and higher voltage is needed to start the lamp. The open circuit voltage provided by probe start ballasts is not sufficient to ignite a pulse start lamp. Pulse start lamps like our 175W Aqualite always require an ignitor to keep the lamp starting throughout its life cycle.

Use Safety Fixture Glass! Double Ended Metal Halide lamps are made of quartz which allows the transmission of UV wavelengths from the arc tube. It is mandatory that tempered safety glass be used with double ended Metal Halide type lamps. UV protective glass is required for any architectural use of Aqualite Metal Halide lamps where people are directly exposed to the light. Single ended Metal Halide lamps use a hard outer glass jacket which reduces UV. Ushio mandates the use of tempered safety glass on any fixtures using our Aqualite Metal Halide lamps. The safety glass not only reduces UV, but also extends the life of your lamps and sockets by protecting them from salt water corrosion. If the outer glass jacket of the single ended lamp is cracked or damaged in any way this will permit UV light exposure and the lamp should be replaced immediately.

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