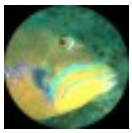
Aquarium Professionals Group

2533 Hartrey Avenue

Evanston, IL 60201

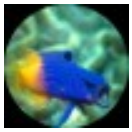
Author: David Hauser

Aquarium Lamp Types Explained



Incandescent

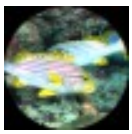
These are the same bulbs you use in your home. There are some incandescent bulbs used in inexpensive aquarium light fixtures for small freshwater aquariums. Incandescent bulbs use a tungsten filament which glows hot as voltage passes through it. Incandescent bulbs produce a lot of heat per watt of output, are inefficient and tend to burn out rapidly. Although there are some vivarium and terrarium applications for incandescent lighting, we do not recommend incandescent lighting for normal aquaria use. Ever!



Fluorescent

The standard for aquarium lighting, fluorescent lamps are used in the majority of aquaria. Available in many sizes and color spectra, fluorescent lamps are ideal for fish-only aquariums and some freshwater live-plant applications. They are made from glass tubes, coated inside with rare-earth phosphors which are combined in various mixtures to produce different colors of light. A ballast (transformer) is used to reduce the voltage that is used to power the bulbs. The ends of the lamp are electrodes or filaments through which electricity passes from each end of the lamp. The electrical current excites the rare-earth phosphors inside the lamp which then "fluoresce" or glow.

Fluorescent lighting is very efficient compared to incandescent lighting. It produces more light per watt and far less heat and so is ideal for general aquarium use. We use and recommend regular fluorescent lighting in fish-only aquariums, in either single or multiple bulb configurations, depending on the height of the aquarium and application. Regular fluorescent bulbs should be changed every 8 to 12 months to maintain the same output and color spectra that benefit aquatic life.

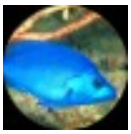


VHO Fluorescent

VHO is short for "very high output." These bulbs operate in the same way as regular fluorescent bulbs, except that the ballasts that power these lamps apply more electrical current to the lamp, and some brands of VHO lamps employ more phosphors in their operation. Typically, a VHO bulb produces twice the output in lumens as a regular fluorescent bulb. They also tend to burn twice as hot as regular fluorescents, although some new VHO electronic ballasts allow the lamp to operate at cooler temperatures.

What we mean by this is that we have measured a faster reduction in intensity over time for VHO lamps compared to when the lamp was new than what we've measured for normal fluorescent lamps. We base our opinions on our observations. What we have observed is that in VHO-lit reef aquariums, some hard corals begin to close slightly and algae growth is retarded after about four months. We change the bulbs, and the animals and algae spring back to life! That simply doesn't happen as often in the reef aquariums we maintain which use metal halide and/or Power Compact lamps. Therefore, for reef aquariums that employ VHO lamps, **we** recommend changing these bulbs two to three times a year in order to maintain the overall health of the environment.

The other problem we have encountered with VHO lighting is that for some reason (we don't know why), VHO lighting ballasts seem to fail more often than any other lighting ballast we've used, and we've used hundreds! This seems to be especially true of the newer, electronic ballasts that are being sold these days. We consider VHO lighting systems to be expensive in terms of bulb-replacement, and in our experience, subject to ballast failure. We do know that IceCap®, a major manufacturer of VHO ballasts, has made great strides in developing electronic ballast technology that promises to considerably extend bulb life, so we haven't given up completely on VHO. VHO still holds one advantage over their competitor, Power Compact lamps, in that the lamps distribute light better over a greater area.



Power Compact Fluorescent

In our opinion, Power Compact bulbs are one of the most valuable innovations in the aquarium hobby in recent years. Power Compact bulbs consist of U-shaped fluorescent tubes that are almost half the diameter of a regular fluorescent bulb. They work the same way as a fluorescent tube but the surface area of the tube has been increased slightly and more phosphors added. They require more electricity than regular fluorescents but the payoff is huge! They produce nearly four times the light-output per watt than regular fluorescents and in our experience, degrade slower and last longer. They come close to the output of metal halide bulbs with relatively-precise color temperature production, though metal halide bulbs produce a far broader spectrum range. They also produce much less heat than metal halide lamps.

There is no question that metal halide lighting is still (and probably always will be) the mainstay of marine reef aquarium lighting. However, we have rarely seen a reef aquarium lit by metal halide bulbs that did not require a chiller for success, unless the aquarium was located in a cool room or was equipped with some form of major ventilation system. PowerCompact bulbs allow many photo-receptive species to be kept without the intense heat produced by halides. Research has shown that many stony corals, clams, and other sessile species that depend on photosynthesis of zooanthellic algae not only thrive but also propagate when maintained under PowerCompact lighting alone.

This is our choice for many of our reef and all of our live-plant aquaria, especially when a chiller cannot be used. If a chiller can be used, however, we recommend metal halide lighting in combination with 7100K Power Compacts to help improve the color rendering. PowerCompact lamps should be changed every 12 to 18 months, depending on how many hours they are on each day.

Metal Halide

In our opinion, metal halide lighting still represents the ultimate choice for marine reef aquariums, especially for sensitive hard corals. Metal halide bulbs look like incandescent bulbs but differ considerably in operation. Metal halide bulbs employ two tungsten filaments embedded in a quartz inner arc tube, spaced apart so when electricity passes through them, it forms an arc between the two. The electrical discharge excites metallic halogen gases in the arc tube which glow quite brightly.

Metal halide lamps produce an incredible amount of light. So much so that, like the sun, they should never be viewed directly. As previously mentioned, however, they have two major drawbacks. They (and the ballasts that power them) produce a lot of heat and use a lot of electricity. They also distribute light over a relatively limited area, so that several bulbs may be required for longer tanks. Unless an aquarium equipped with metal halide lighting is kept in a cool room and adequate ventilation is used above the water's surface, an aquarium chiller will be required to maintain a safe temperature for live-reef and live-plant tanks. Metal halide bulbs come in various color spectra, from 5500K to the new 10,000K and 20,000K lamps.

We favor the 6500K lamps, in combination with 7100K PowerCompact lamps. Although some would disagree with us and recommend the higher color-temperature lamps, we feel that the results do not justify the much greater cost of these lamps. We've tried all of them, and while the 10,000K and 20,000K lamps do produce a warmer appearance without the use of actinic lamps, we've seen no appreciable difference in the growth of corals in the reef aquariums in which we tested them (admittedly by using a simple "before and after" approach without any scientific method or controls). Metal halide bulbs should be replaced every 8 to 12 months.