WILL YOU REMEMBER?

The average fluorescent tube loses approximately 50% of it's light output quality within one year. Changing your aquarium bulb regularly helps provide optimum living conditions for the fish and plant life.

Attached to every GLO bulb package, you'll find a convenient sticker which you can fill in with a date (anywhere from 8 to 12 months from the date of purchase) and place it in a prominent location to remind you of when it's time to change your bulb.

Or, if you prefer, sign up online at www.hagen.com/usa and we'll send you a reminder when it's time.

GLO

AQUARIUM LIGHTING

HAGEN
www.hagen.com

DO YOU KNOW THE FACTS OF LIGHT?

GLO

AQUARIUM LIGHTING

GUIDE

FRESHWATER & SALTWATER

HAGEN

www.hagen.com

THE FACTS OF LIGHT

1. A strong, vibrant light is essential to the growth and health of your aquarium.

2. For optimum maintenance of plants and fish, it is recommended to light the aquarium for at least twelve hours each day, without interference. Certain species may have specific lighting requirements which may alter aquarium lighting patterns and schedules.

3. Fluorescent bulbs lose approximately 50% of their lighting effectiveness within one year, resulting in a distorted spectrum, inefficient plant and coral growth and less intense fish colors.

4. Most bulbs will emit light for a span of 6,000 - 10,000 hours however, their effectiveness begins to wear off after approximately 5,000 hours of usage*.

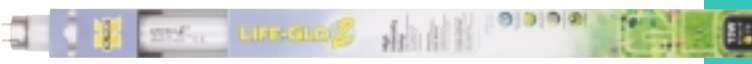
5. Replacing bulbs every 8-12 months is recommended depending on daily usage of bulbs*. Timely bulb replacement ensures there is no interference in the biorhythm of plants, and avoids unnecessary adaptation problems for plants.

6. Glo fluorescent bulbs provide real lighting for every aquarium need. Combinations of bulbs help to highlight and accentuate fish and plant colors, while simulating plant growth and providing a visually pleasing aquarium.

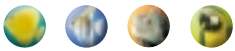
**Based on 12-16 hours of usage per day.*

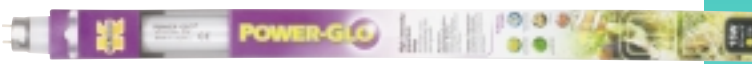
HAGEN®
www.hagen.com

FLUORESCENT AQUARIUM BULBS



LIFE-GLO 2 High-noon spectrum for aquariums, terrariums & vivariums





POWER-GLO Promotes coral, invertebrate and plant growth

AQUA-GLO Intensifies fish colors and promotes plant growth

FLORA-GLO Optimizes plant growth

MARINE-GLO Promotes marine reef life

SUN-GLO General purpose aquarium lighting

ICON KEY

PLANTED AQUARIUMS
INVERTEBRATES
CORALS
SALT WATER AQUARIUMS
TERRARIUMS
FRESHWATER AQUARIUMS
VIVARIUMS

LIGHTING FACTS

Lighting requirements:

Appropriate lighting for your aquarium is essential to create and maintain a healthy aquatic environment. Many factors influence the type and quantity of light required:

- **Size of aquarium**
- **Fish species and other inhabitants**
- **Plant life**
- **Filter media**
- **Aesthetics**

To achieve appropriate lighting, a general rule is to have a range of 1 to 3 watts of light per gallon of water in your aquarium, subtracting 10-15% of the tank volume to account for volume of materials inside the tank.

Adequate lighting range = (1 to 3 watts/gallon) – (10%-15% of tank volume)

Lighting Duration:

For optimum maintenance of plants and fish, it is recommended to light the aquarium for at least twelve hours each day, without interference. Certain species may have specific lighting requirements which may alter aquarium lighting patterns and schedules.

Glo fluorescent bulbs provide real lighting for every aquarium need. Combinations of bulbs will accentuate fish and plant colors, while stimulating plant growth, all the while providing a visually pleasing aquarium.

GENERAL FRESHWATER COMMUNITY AQUARIUMS

Lighting requirements:

- **To highlight fish color**
- **Light containing a plant growth spectrum**

General freshwater community aquariums are a common introduction to the aquatic hobby. Fish are usually the main focus, with emphasis on color and hardiness. Aquatic plants often play a secondary role.

It is recommended to select fish and plants that thrive in similar pH and water hardness values. For example, a livebearer community tank containing guppies, swordtails and platies will do well with plants such as Vallisneria Spiralis and Hygrophila Difformis. These fish and plant species enjoy well lit, slightly hard, alkaline conditions.

2 Watts of light per gallon of water is required for proper fish presentation and good plant growth.

LIGHTING EFFECT

AQUA-GLO®
Ideal for single bulb canopy. Accentuates fish colors and promotes plant growth.

SUN-GLO®
AQUA-GLO®
Promotes tall growth of background plants while intensifying red, yellow and orange pigments.

SUN-GLO®
POWER-GLO®
Provides bright light and high output.

AQUA-GLO®
POWER-GLO®
Efficient photosynthesis while intensifying blue and violet pigments.

SUN-GLO®
FLORA-GLO®
Promotes tall growth of background plants while intensifying red, yellow and orange pigments.

GOLDFISH AQUARIUMS

Lighting requirements:

- **Warmer color tones to highlight red and orange pigments**
- **Cooler color tones to accentuate white, blue and bronze colors**
- **Light combinations to highlight plastic plants**

Goldfish are present in many aquariums. They are difficult to combine with live plants because they tend to uproot and consume them. Plastic plants are a common decorative choice, available in many bright colors. Goldfish are available in a wide variety of colors and body shapes. Lighting requirements can be quite varied and aesthetic considerations play the determining role in bulb selection.

Light quantity can vary from 1 to 2 Watts per gallon.

LIGHTING EFFECT

AQUA-GLO®
Ideal for single bulb canopy. Provides overall color enhancement.

AQUA-GLO®
POWER-GLO®
Excellent choice to highlight both red and blue colors.

POWER-GLO®
MARINE-GLO®
Creates dramatic effects with certain plastic plants and cooler pigments.

NATURAL BIOTOPE AQUARIUMS

Lighting requirements:

- **Bright, neutral light to simulate natural light conditions**
- **High light output to promote plant growth**
- **High color temperature with plant growth promoting wavelengths**

Natural biotope aquariums attempt to recreate a natural aquatic ecosystem by combining a limited number of fish and plant species, with structure found within that specific environment. A high color temperature light is suggested for this type of aquarium, along with CO_2 injection and attention to water chemistry.

The quantity of light required for these aquariums is from 1 to 3 Watts per gallon.

LIGHTING EFFECT

LIFE-GLO 2®
Ideal for a single-bulb canopy. Accentuates natural presentation while stimulating rigorous plant growth.

LIFE-GLO 2® AQUA-GLO®
Reddish-white light that promotes plant growth.

LIFE-GLO 2® POWER-GLO®
High light output with a high color temperature that produces cool, white light. Flora-Glo can be combined to enhance background growth.

CICHLID AQUARIUMS

Lighting requirements:

- **Light containing a plant growth spectrum**
- **Warm to light-blue light for South American cichlids**
- **Bright, cool light for African cichlids**

Beautifully planted aquariums are common with cichlids such as Angelfish, Discus, and Apistogramma. Plants such as various species of Echinodorus, Hygrophila, Vallisneria and Cryptocoryne tolerate the soft, warm, acidic water conditions that these cichlids require.

African cichlids from Lakes Malawi and Tanganyika are kept in a hard water environment, which limits the selection of plants that will tolerate such conditions. Beautifully planted aquariums are possible by combining varieties of Vallisneria, Anubias, and Microsorium, with species of Cyprochromis, Julidochromis and Lamprologus. Malawi cichlids, with their striking colors, are stunning when lit with Power-Glo or Marine-Glo.

The quantity of light for cichlid aquariums may vary between 1 to 3 Watts per gallon, depending on plant and cichlid species.

LIGHTING EFFECT

POWER-GLO®
Beautiful color presentation combined with spectral output that supports plant growth.

LIFE-GLO 2®
MARINE-GLO®
Accentuates bluish tones, creating a cool overall appearance.

LIFE-GLO 2®
MARINE-GLO®
POWER-GLO®
Powerful full spectrum lighting, highlighting fish colors and stimulating rapid plant growth.

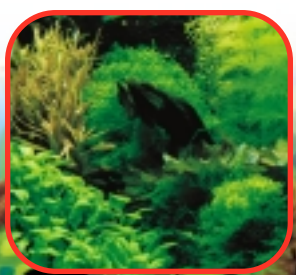
PLANTED AQUARIUMS

Lighting requirements:

- **Simulated natural daylight**
- **High light output**
- **Light containing a plant growth spectrum**

Planted aquariums are growing in popularity due to the increasing trend of captivating lush aquatic gardens. They are easily achieved with the vast varieties of aquatic plants and support equipment available. Combinations of Glo fluorescent bulbs will produce a complete spectral output that efficiently stimulates plant growth. Although fish are not the main emphasis, planted aquariums serve to highlight their beauty and natural behavior.

The quantity of light for faster-growing plant species should approach a minimum of 3 Watts per gallon. As wattage is increased, more attention to fertilization and CO_2 levels is recommended.



LIGHTING EFFECT

LIFE-GLO 2®
Ideal for single bulb canopy. Accentuates green coloration in plants with a high output aiding rapid growing species.

POWER-GLO®
For dense plant growth, providing cool lighting.

SUN-GLO®
AQUA-GLO®
Promotes plant growth, providing a broad spectrum.

POWER-GLO®
FLORA-GLO®
Efficient combination to stimulate desired growth in foreground and background plants.

SUN-GLO®
POWER-GLO®
LIFE-GLO 2®
Ideal combination providing high output and balanced spectrum.

AQUA-GLO®
FLORA-GLO®
Intensify fish colors while stimulating plant density and vertical growth.

LIGHTING FACTS

How to evaluate and select lighting needs

Marine aquariums, which are intended for the keeping of photosynthetic corals and invertebrates, require serious consideration and understanding when the issue of lighting is addressed. Quality, intense, full-spectrum lighting is essential. This can be achieved by combining multiple Fluorescent GLO Bulbs.

The chlorophyll found in various algae, invertebrates and corals require exposure to specific wavelengths of light for proper function. These chlorophyll are essential for the basic survival and growth of many species of coral, invertebrates and algae commonly kept in marine aquariums. In general, it is the blue spectrum that is important for various chlorophyll to function.

Light wavelength absorption by water is another critical factor for marine aquarium lighting. Blue light, which represents the dominant wavelength in the aquatic environment, penetrates to depths of hundreds of feet. Red light is almost totally absorbed by water within the first 16 feet. Sunlight present over tropical reefs is extremely intense (high lux values). In comparison to calm waters, waves and turbulent conditions can reduce light penetration due to reflection.

How much light does my aquarium require?

The quantity of light required for marine aquariums will vary depending on the life forms kept. In fish-only setups, 2 Watts per gallon is sufficient. Reef-type systems containing primarily soft corals should have a ratio of 2 to 4 Watts per gallon. A deduction of 15% to 20% of the rated tank volume is permissible to account for water displacement due to live rock formations.

Reef systems containing species of hard corals need a minimum of 4 Watts of light per gallon. It is often impossible to determine the origin (which ocean, the depth and surroundings) of a coral or an invertebrate. Even hard corals, requiring more intense lighting, have been found in lower light conditions. Knowing a coral or invertebrate's origin would allow simulating lighting requirements more accurately, however, only general guidelines can be followed. If a coral is not responding in its present location, it is recommended to place it in a different area of the aquarium where the lighting conditions and water movement may be more suitable.

MARINE FISH AQUARIUMS

Lighting requirements:

- **Bright cool light**
- **Higher blue spectrum**
- **Red spectrum for certain fish (red, yellow, orange)**
- **High color temperature**

Not all marine aquariums contain corals and can include a mixture of invertebrates and fish. In the case of fish only, the aesthetics of lighting should include a mixture of 2 bulbs to accentuate a variety of pigments found in many commonly kept marine fish.

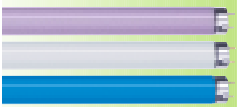
2 Watts per gallon is adequate for this type of aquarium.

LIGHTING EFFECT

POWER-GLO®
Provides correct spectral qualities required by fish and invertebrates.

AQUA-GLO®
POWER-GLO®
Effective combination for accentuating a wide variety of colors.

AQUA-GLO®
POWER-GLO®
MARINE-GLO®
Highlights a variety of fish colors and supports invertebrates.



POWER-GLO®
LIFE-GLO 2®
MARINE-GLO®
Excellent combination for supporting macro algae, invertebrates and fish.

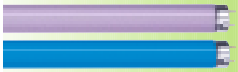
MARINE REEF AQUARIUMS

Lighting requirements:

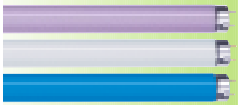
- **High light intensity**
- **Higher blue spectrum**
- **Higher color temperature**

Reef systems can vary in content. Aquariums containing predominantly soft corals and invertebrates can function effectively with lower light levels than systems including stony corals. Mushroom corals frequently open effectively in lower light conditions. Placing them at the bottom of reef structures is generally recommended. Certain species of green marine algae are desirable in marine aquariums. They contain pigments very similar to other plants and are very attractively displayed with Life-Glo 2 bulbs. Systems containing varieties of hard corals require intense lighting with much emphasis on higher color temperatures. A minimum of 4 Watts per gallon is recommended for this type of aquarium.

LIGHTING EFFECT



POWER-GLO®
MARINE-GLO®
Cool lighting effect. Effective combination for reef aquariums.



POWER-GLO®
LIFE-GLO 2®
MARINE-GLO®
Intense output with cool temperature. Full spectral output.

MAXIMIZING THE EFFICIENCY OF FLUORESCENT BULBS

1. Keep any glass between bulb and water surface free of algae and mineral deposits.
2. Clean the bulb surface weekly (with damp soft sponge) if directly exposed to water surface.
3. If bulbs or lenses accumulate mineral deposits, clean with a mild acid.
4. In situations requiring higher light intensities, it is recommended to line fluorescent fixtures with a proper light reflector.
5. Replace fluorescent tubes annually, for maximum efficiency.
6. Make note of installation date of fluorescent bulbs.
7. Combine different tubes for certain specialty applications, to maximize spectral representation.
8. Use electronic ballast(s) when possible, for the following reasons:
   - *Higher frequency operation, resulting in superior bulb performance and visual presentation*
   - *Higher power factor, greater or equal to 0.96*
   - *Longer ballast life*
   - *Increases bulb life*
   - *Greater flexibility, triggers all bulb diameters T-8, T-10, & T-12*
   - *Greater energy efficiency*
   - *Less heat production will not affect aquarium temperature*
9. Avoid turning lights on and off unnecessarily.

LIGHTING TIPS

1. Most plants require approximately 12 hours per day of light from a fluorescent fixture.
2. Sudden changes in light may stress fish. When turning canopy lights on or off it is beneficial to have room lights on for at least 30 minutes.
3. Fish fed during the day should be allowed 30 minutes of light before and after feeding.
4. Use timers when possible. Plants and fish will respond better to consistent lighting periods.
5. Plants and fish will adapt to gradual light changes. When changing bulbs in a multiple bulb installation, stagger them 1 to 2 weeks apart.
6. A remote ballast should be mounted in an area where there is adequate ventilation to efficiently dissipate heat.
7. Electrical wiring leading to the ballast should always incorporate a drip loop.
8. Consider a GFI (Ground Fault Interrupter) outlet as an inexpensive insurance to avoid unpleasant circumstances surrounding any potential electrical mishaps.

LIGHTING ACCESSORIES

GLOMAT 1

Fluorescent Lighting Control Unit

GLOMAT 2

Electronic Double Fluorescent Lighting Control Unit

- **Complete electrical control of lights**
- **Excellent for aquariums and other lighting requirements**
- **Easily concealed**
- **Both models available for 20W, 30W and 40W**
- **For use with T8 (1"/25.5mm), T10 (11/4" / 32.5mm) and T12 (11/2" / 38mm) diameter tubes**