QUESTIONS & ANSWERS

What you should know when selecting marine lighting.

Q. I'm not sure what type of lights to use (halogen, LED, incandescent or fluorescent). Why should I use one type over another?

A. For task, accent, and art lighting, halogens are a good choice due to their excellent CRI (color rendering index) value. For general lighting, we recommend halogen or compact fluorescents (neutral color temperature) with a CRI of 80 or more.

If efficiency is a major concern, LEDs are an excellent choice for task lighting, courtesy lighting and specialty applications such as livewell lights and compartment lights. In engine rooms, fluorescent lamps with a cool-white color temperature throw a lot of light and are very efficient.

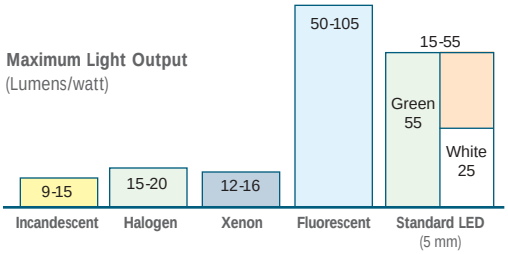
Incandescent lamps have good color rendering, are relatively inexpensive and readily available. However, they are inefficient and are adversely affected by voltage fluctuations, so they are not the best choice for many marine applications.

Q. LEDs are big news. Why don't all fixtures use them?

A. Although LEDs are attractive to boat owners for their low energy use, their luminous flux is low compared to other light sources. Several LEDs must be clustered together at different angles to approximate the light output of one standard incandescent bulb.

The angle of illumination can vary (depending on the application). To achieve enough light (in foot-candles) to illuminate objects, the LED must have a viewing angle of between 15-20 degrees. Therefore, bulkhead-mounted reading lights or chart lights are well suited for this type of illumination.

For courtesy lights, LEDs with a wider viewing angle (lower foot-candles) are a good choice. Up to now, this inverse ratio between viewing angle and foot-candles has limited LED usage to specific applications. However, advances in LED technology is quickly overcoming these trade-ofs and we believe LEDs will soon be a practical alternative for general illumination.



Q. How does bulb wattage vary with each type of light to get the same light output?

A. As the chart above illustrates, light output (measured in Lumens/watt) varies according to bulb type. Therefore, on average, 1 watt of fluorescent is equivalent to almost 6 watts of incandescent (or 4 watts of halogen).

LEDs are available in narrow beam, medium beam, and wide beam; the wider the beam angle, the lower the intensity of light output. Generally it takes between 7-9 LEDs for adequate reading and task lighting. It can take 20+ LEDs to equal the light output of a 10W halogen spot (however, it is believed that we could see a 2-fold increase in the intensity of LEDs over the next two years.)

Q. There seem to be many different terms used to describe light intensity or light output. What are the differences between these terms and how are they measured?

A. Luminous Flux is the total amount of lamp light in all directions and is measured in *Lumens*.

Luminous Intensity is the concentration of light in a particular direction and is measured in *Candelas*.

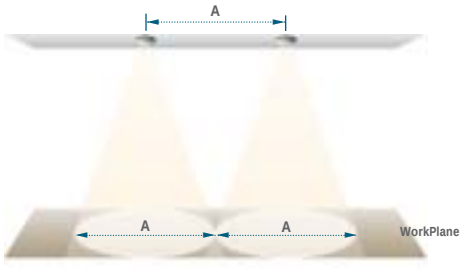
Illuminance is the density of light on a surface and is measured in *Lux units*.

Luminance is the concentration of light directed toward the eye and is measured in *Candela/square meter*.

FAQ's about marine lighting

Q. How do I calculate the correct spacing between my spot lights?

A. Spacing should be at least equal to the beam diameter at the WorkPlane in order to evenly maintain foot-candle level throughout an area."WorkPlane" is defined as the height at which an activity takes place in a particular room. At this height, imagine a plane cutting across the entire room *(see diagram below)*. The WorkPlane is the point at which foot-candles are measured.



To maintain even lighting, the distance (A) between spot fixtures should equal the beam diameter (A) at the WorkPlane in the room.

Q. Some fixtures have a F symbol in their descriptions. What does this mean and why is it important?

A. The F symbol indicates the fixture has been approved for zero clearance. This means the fixture's back side may be in contact with "normally inflammable" surfaces without heat-related problems occuring. Some fixtures are available in higher wattage versions which may not be F rated. In these cases, the fixture will actually have a F symbol printed on its housing, and a block of space 25mm above and 70mm all around the back pan must be allowed.

Q. How do I choose the right dimmer?

A. First, decide if you need an AC, DC, or low voltage AC dimmer. Then decide if you prefer rotary (rheostat) control or momentary push-button control. Once you have narrowed your choice of dimmer category, you must match the power (Amp rating) of the dimmer with the total wattage demand of the circuit. Most dimmers have a 10-20% built-in overcapacity, so you don't have to overkill on amp size.

A useful formula to remember is:

W (watts) = V (volts) x A (amps)

Finally, there are different features that may be important to you: multiple-switch capability, memory features, soft-start, nighttime LED locator, or compatibility with your favorite decorative face plates (like Gewiss or Vimar).

Q. How do I dim a circuit that is low voltage AC (powered by a transformer)?

A. There are two ways to do this. You may dim from the output side of the transformer using a low voltage AC dimmer, or you may use a standard AC dimmer on the supply side of the transformer. If you decide to use a standard AC dimmer, be sure it is rated for "Inductive" loads. If you prefer to use a low voltage AC dimmer, the transformer must be compatible (many compact electronic transformers will not work with low voltage AC dimmers due to their high output frequency).

Q. Am I limited to the type of fixtures I can use if my low voltage is powered by transformers?

A. Many larger vessels use transformers to take their 120VAC or 220VAC down to low voltage 12VAC or 24VAC. This allows the use of smaller fixtures which use miniature low voltage bulbs. All our low voltage incandescent, halogen, Xenon bulbs and LEDs will work with low voltage AC or DC. However, our DC fluorescent fixtures will only work with straight DC current.

Q. Why would I use a Xenon bulb instead of a standard halogen bulb?

A. Xenon G4 bulbs are direct replacements for standard G4s. Xenon lowers the rate of evaporation of the filament, therefore extending lamp life. Xenon bulbs can last up to five times longer than standard halogen bulbs and run about 20% cooler on average. These bulbs are especially useful in 24V systems because the filaments in 24V bulbs are finer and more damage-prone. For the ultimate in longevity, choose the 28V version.

The primary drawback to the Xenon is a 15-20% reduction in light output; they are also more expensive than standard G4 halogens.

Q. What accessories can I use to extend bulb life?

A. We offer two items, a voltage stabilizer and a bulb saver, which can help extend the life of your bulbs *(both shown on page 39)*. **The Cantalupi Voltage Stabilizer** is available in 12V and 24V versions. It is a sugar cube-sized module that is wired directly to one or two low voltage fixtures (capacity 25W). It will stabilize the output voltage (to the bulb filament) within a range best suited for long bulb life. **The IML Bulb Saver** is a physically larger and more powerful unit (15 Amps) that can handle several fixtures at once. One model will operate between 10-40VDC. However, it simply drops the output voltage nominally by 1.5V regardless of the input voltage.

For more questions and answers on marine lighting and other topics, please visit the knowledge base at **www.imtra.com**.