LIGHT READING™

The Newsletter of the Light Edge, Inc.

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TECHNICAL DATA ISSUE:

FIXTURE EFFICIENCY

Question: We've seen fixture efficiencies from less than 40% to greater than 100%. What is meant by fixture efficiency?

Answer: Fixture efficiency is simply the amount of light (lumens) leaving a given fixture compared to the amount of light generated by a given light source within the fixture. This figure is expressed in percent (%). If a given light source generates say, 5000 lumens and ultimately 3500 lumens leave the fixture then the fixture is considered to be 70% efficient. 5000 Lumens X 70% = 3500 Lumens. If a different fixture using the same light source is 100% efficient then 5000 lumens leave the fixture.

Question: Is it possible to have a light fixture that is 100% efficient?

Answer: Absolutely! In fact the very first light fixture ever invented was 100% efficient. Ask Thomas Edison.

Question: Really?!!

Answer: Really. The first light fixture was simply a bare socket with a bare lamp. 100% of the light produced by the lamp exited the fixture. The fixture was 100% efficient.

Question: We've seen some fixture manufacturers claiming to have fixture efficiencies in excess of 100%. Is this possible?

Answer: Not unless the laws of Physics have changed and not unless perpetual motion has been discovered. Any manufacturer claiming more than 100% efficiency is simply not telling the whole story. It is absolutely impossible to have more than 100% of anything, including light. Think about it. If a light source produces a given amount of light and is enclosed within a light fixture of any kind, then by the nature of any design, some of the light produced by the source will be reflected back into the lamps by the reflector media or trapped within the fixture body. Unless the lamps are in free air with no enclosure or reflectors of any kind, then the fixture MUST be less than 100% efficient. To this point, the very best reflector material available in the industry today reflects 95% of the light that hits it and some of this is always reflected back into the lamp and/or trapped within the fixture. Be wary of fixtures which claim very high efficiencies.

Question: So, which fixture puts more of the light produced by the source onto the task, a fixture which is 100% efficient or a fixture which is 70% efficient?

Answer: The fixture that is 100% efficient right? ABSOLUTELY NOT! WRONG! NEVER!

Question: That doesn't make sense. Why?

Answer: Remember the bare lamp in the bare socket. 100% of the light leaves the lamp but where does it go? It goes all over the place. 100% of the light does not reach to the task. Enclose the lamp with a reflector of some sort and the efficiency may drop to 60% but the light is now directed downward to the task. You'll never see bare HID or fluorescent lamps. All have a fixture and reflector of some sort to redirect the light to the task.

BOTTOM LINE: When comparing fixture efficiencies you must take into consideration things other than just the efficiency percentage. What is the task? Where does the light go? In what pattern is it dispersed? What is the mounting height? Is it a point source like HID, a linear source like T-12 and T8, or a 'pointalinear©' source like T-5/HO? All require an enclosed fixture and the design parameters for utilizing the available lumens from each unique source will be different. Comparing percentages of efficiencies will never be the correct way to determine which fixture to choose.