LIGHT READING™

The Newsletter of the Light Edge, Inc.

VOLUME 3 ISSUE 3 – MARCH 2004

19150 SW 119th Avenue, Tualatin, OR 97062
503.968.9968 phone 503.968.9747 fax

TECHNICAL DATA ISSUE:

Power Factor

What is Power Factor? "Power Factor is the ratio of WATTS to VOLT-AMPS (roughly, watts divided by volt-amps). To be exact however, a professional engineer friend clarifies it technically; *"… it is the cosine of the phase angle between current and voltage. Watts are calculated by multiplying apparent power, volt-amps, by the cosine of the angle between current and voltage."*

In a perfect system Power Factor is at unity or put another way the Power Factor is one (1.0). The Power Company delivers power to the end user. Power is defined as volt-amps, the amount of amps being delivered times the voltage. 1 amp delivered at 100V is 100 volt-amps. Are you with us so far?

Watts are calculated by taking the amount of volt-amps and multiplying them by the power factor. For example, 100 volt-amps at a power factor of .50 = 50 watts. The energy delivered by the utility is not metered in volt-amps but instead metered in watts. So the power bill shows only the amount of watts being metered. If the power factor is only .50 then in theory the utility is being paid for only half of what they deliver. They don't like this, so after determining the PF of the system they add things like "Power Factor Correction Charges" to ensure they are being paid for the TOTAL AMOUNT OF POWER being delivered. If the Power Factor is 1.0 then the watts are equal to the volt-amps and the power company is happy because they are being paid for the entire amount of the energy being delivered without the necessity of adding power factor correction charges.

All linear devices; resistive loads (non switching loads) such as electric heaters and incandescent lamps have a power factor of 1.0 BUT anytime the power delivered is switched on and off at the delivered frequency (transformer, motor magnetic ballast) or greater (electronic device solid-state motor drive, electronic ballasts etc.), then the power factor will always be less than 1.0.

For perspective let's compare a typical 400 watt HID fixture with a 4 lamp T5/HO fixture, like our RAPTOR™ series, which incidentally are powered by high-performance electronic ballasts. Assuming a power factor of .70 (most are) for the HID the 400 watt HID fixture meters 465 Watts but consumes 664 volt amps (465 divided by .70) per fixture. Most HID ballasts have a power factor of between .70 and .90 with very few above .90 and many as low as .50. Our 4 lamp products consume 220 Watts at a power factor of .98 so our systems consume a maximum of 224 volt amps (66% less REAL Power). If the power factor were the same for both systems then we could easily calculate the energy savings and the payback but, they are never the same so REMEMBER when calculating the real savings you need to know the power factor of the existing system. THIS CAN BE A VERY BIG DEAL BECAUSE THE UTILITY WILL GET PAID FOR WHAT THEY DELIVER ONE WAY OR ANOTHER.

Greater than .90Pf is considered High power factor, between .70Pf and .90Pf is considered Normal power factor and less than .70Pf is considered Low power factor. Almost all HID ballasts are marked HPF, NPF or LPF.

Hope this has been of some help, if you have any questions let us know.