Understanding High-Performance T8 Systems

BY JEFFREY SCHWARTZ

Once upon a time there were very few options when selecting 32-W T8 lamps. We could either select 700 series (CRI of 70-plus) or 800 series lamps (CRI of 80-plus). The 800 series provided higher initial and mean lumens making them the "premium" choice for many applications.

Today a typical lamp catalog will list over 30 choices for 4-ft 32-W T8 lamps. When combined with ballast options (one manufacturer lists over 25 options for electronic T8, 120V, two-lamp T8 systems), the choices are endless. While designers often crave this much flexibility, the decision process is complicated and time-consuming. To add to the confusion, lamp and ballast manufacturers have used various trade names for the next generation of advanced 32-W T8 products.

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The specifier's job is now a little easier because the Consortium for Energy Efficiency (CEE) publishes a list of high-performance T8 (HPT8) lamps and ballasts that meet certain criteria for energy efficiency and performance. Many lamp and ballast manufacturers have qualified products on the HPT8 list. The CEE and the National Electrical Manufacturers Association (NEMA) Ballast Section cooperated in establishing the metrics for the CEE high-performance ballasts when used with 32-W 3,100 lumen T8 lamps, and expect to make a public announcement in the near future.

The term "HPT8 system" refers to a complete luminaire using both HPT8-qualified lamps and ballasts. The benefits of HPT8 systems are that they provide energy savings, higher maintained lumens over the life of the lamp, reduced maintenance and disposal costs and high color rendering.

Many utilities and regional energy-efficiency program sponsors are offering incentives for these products in both retrofit and new fixture programs. The Northeast Energy Efficiency Partnerships (NEEP) is currently promoting an HPT8 systems initiative using outreach and education to encourage distributors to stock and promote lighting systems with HPT8 lamps and ballasts.

HPT8 LAMP SPECIFICATIONS

To qualify for listing as a high-performance T8 lamp, the lamp must meet specific performance criteria, be tested with the appropriate IESNA and ANSI reference standards and meet OSHA/NRTL and UL guidelines. The lamps must have:

- Color Rendering Index (CRI) ≥ 81
- Minimal initial lumens ≥ 3,100 lumens
- Lamp life ≥ 24,000 hours at three hours per start
- Lumen maintenance of ≥ 94 percent or minimum mean lumens ≥ 2,900.

High-lumen HPT8 lamps (3,100 initial lumens vs. 2,800 to 2,950 for standard lamps) provide more lumens per watt, making them an energy-efficient choice. The average rated life is at least 4,000 hours longer than standard 20,000-hour lamps. The combination of higher maintained lumens and longer life result in fewer lamp changes. HPT8 lamps are available from many manufacturers. An additional requirement for the lamps is to meet a Mean System Efficacy (MSE) of ≥ 90 mean lumens per watt for instant-start ballasts and ≥ 88 mean lumens per watt for rapid-start ballasts.

HPT8 BALLAST SPECIFICATIONS

Criteria aren't limited just to the lamp. To create HPT8 systems, the ballast must also meet HPT8 criteria.

Performance Characteristics for Ballasts			
Instant-Start Ballast (BEF)			
Number of Lamps	**Low BF≤0.85**	**Normal 0.85<BF≤1.0**	**High BF≥1.01**
1	≥ 3.08	≥ 3.11	≥ 3.11
2	≥ 1.60	≥ 1.58	≥ 1.55
3	≥ 1.04	≥ 1.05	≥ 1.04
4	≥ 0.79	≥ 0.80	≥ 0.77
Programmed Rapid-Start Ballast (BEF)			
1	≥ 2.84	≥ 2.84	n/a
2	≥ 1.48	≥ 1.47	≥ 1.51
3	≥ 0.97	≥ 1.00	≥ 1.00
4	≥ 0.76	≥ 0.75	≥ 0.75

FIGURE 1

HPT8 ballasts use less energy to power the lamp. The ballast must have:

- Ballast frequency of 20 to 33 kHz or ≥ 40kHz
- Power factor ≥ 0.90
- Total harmonic distortion ≤ 20 percent
- Meet Ballast Efficiency Factors (BEFs) set for instant-start and programmed rapid-start ballasts.

BEF is equal to the ballast factor times 100 divided by the ballast input watts: [BEF= (BF x 100) / ballast input watts]. The minimum BEF criterion depends on the number of lamps as well as the ballast factor. **Figure 1** shows the required BEF.

HOW DO HPT8 SYSTEMS SAVE ENERGY?

In one-for-one replacement applications, HPT8 systems using 32-W high-lumen lamps combined with low-ballast factor ballasts (≤ 0.85) use less energy than old T12 or standard T8 systems. As an example, a three-light HPT8 System provides about the same light at 73 watts as a standard T8 system does at 88 watts, saving 15 watts per fixture. Compared to old T12 systems, the savings can be as high as 40 percent.

In new design application, using normal ballast factor ballasts (0.85 to 1.0BF) or high ballast factor ballasts (≥1.01BF) with the high-lumen lamps allows the designer to achieve light levels equal to standard T8 systems using less fixtures, or fewer lamps per fixture.

In either scenario, one-for-one or new design, quality lighting can be delivered using less energy which translates into energy-cost savings for the client. And for those of us involved in meeting energy codes (isn't that all of us?), HPT8 Systems can significantly reduce the watts per sq ft.

SUMMARY

Most fixture manufacturers now offer HPT8 ballasts as an option on standard and custom fixtures. Specifiers can design with HPT8 systems and specify the appropriate HPT8 lamp. Project costs can be reduced when specifying HPT8 systems by using fewer lamps per fixture, or fewer fixtures (be sure to verify spacing criteria when using fewer fixtures). At the same time, operating costs can be reduced by lower energy costs, longer lamp life (fewer lamp replacements and lower disposal costs) and increased lumen maintenance (fewer lamp replacements due to lumen depreciation).

For more information about HPT8 systems visit *www.designlights.org*, *www.CEE1.org* or e-mail HPT8@icfi.com.

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