LED T8 Update: What Does the 8 Ball Say?

by Eric Strandberg, LC

The flood of LED T8\* products on the market is steadily increasing, as has the number of changes, and opportunities for confusion about the products. The following article will address some current issues about this product type.

UL status - signs point to yes

The majority of these LED T8s require disconnecting the ballast and rewiring the sockets. This has led to concern about UL listing of the luminaire after a retrofit. UL has a helpful publication on this topic at www.ul.com (Publications-The Code Authority). Basically it says that a sticker is required (by UL) stating that the fixture is now “UL Classified” as a conversion retrofit. So once the sockets are rewired, someone maintaining the fixture can see that the fixture has been modified.

Wiring consistency - it is uncertain

However, not all brands of LED T8s are wired the same way; some wanting power to both ends, some wanting power across the pins, etc. To compound the confusion, many of the wiring diagrams for the LED T8s come from areas of the world where even the symbols used are different than what is conventional in this country. This can make it difficult to have consistent wiring from product to product. Future installations of other products may require the fixture to be again modified for different wiring. Note also, that the wiring for the sockets (“tombstones”), may require that they be converted from shunted to unshunted (or vice versa).

Product performance - outlook good

There is good news though. The best of the LED T8 “Kits”** do perform well in terms of quality of light and energy savings. Even though they produce less overall light, as shown in a test that we conducted here, two national brands that I have looked at are almost indistinguishable from the 8oo series fluorescents they replace, while consuming less energy. This could be due in part, to the directionality of the lamps, which tend to push the light out of an open type of fixture. Be aware however, this could cause problems in some types of luminaires that are designed for a more omni-directional light source. Lastly, at about $65 each, or more, whether it is a cost effective measure, remains uncertain.

The following chart shows the results of an informal test we did comparing a 2 lamp strip fixture with a instant start ballast (.88BF) with standard, and low wattage fluorescent T8s to 3 different LED T8 products (A and B are the national brands). We are using a 2 lamp T8 striplight as a baseline and it represents the 100% value. Note that the % of energy savings is generally increasing faster than the % of light loss, which is another promising trend.

<table>
<thead>
<tr>
<th>Description</th>
<th>2 lamp wattage</th>
<th>% energy savings</th>
<th>% light output</th>
</tr>
</thead>
<tbody>
<tr>
<td>T8-835-32watt</td>
<td>60.7</td>
<td>0%</td>
<td>100%</td>
</tr>
<tr>
<td>T8-835-25watt</td>
<td>49.4</td>
<td>19% less</td>
<td>15% less</td>
</tr>
<tr>
<td>LED-A-20watt</td>
<td>39.1</td>
<td>35% less</td>
<td>27% less</td>
</tr>
<tr>
<td>LED-B-22watt</td>
<td>39.0</td>
<td>35% less</td>
<td>39% less</td>
</tr>
<tr>
<td>LED-C-17watt</td>
<td>33.2</td>
<td>45% less</td>
<td>37% less</td>
</tr>
</tbody>
</table>

*LED T8s are marketed as replacements for fluorescent T8 lamps. They are usually 1” diameter tubes with a row of LEDs running down the length, with medium bipin (G13) bases at each end.

**The DLC has redefined this class of product as a Kit; see www.designlights.org for details.
Morning Class: 10:00 am — 12:00 pm (see fees below)

Large Volume Spaces: A Design Approach for Lighting Retrofits

*Instructor: Jeff Robbins, LC, MIES*

As the interest in ever lower power densities becomes more focused, lighting industry professionals are looking for tools to aid them when designing industrial spaces, big box spaces, gymnasiums and parking lots. This intermediate level class provides methods to maximize energy savings in existing buildings and new construction. By combining multiple low cost strategies in an integrated way, increased energy savings and a high quality visual environment can be achieved. This class demonstrates through computer models and practical examples a clear path to meeting aggressive energy savings goals. Note: As this is an intermediate class, basic lighting knowledge is suggested.

Lunch: 12:00 pm — 1:00 pm (included in registration)

Afternoon class: 1:00 pm — 3:00 pm (see fees below)

Office Buildings: A Design Approach for Lighting Retrofits

*Instructor: Eric Strandberg, LC*

This intermediate level class, enables professionals in the lighting industry to achieve ever lower power densities in a variety of office spaces including garages to maximize energy savings in existing buildings and new construction. By combining multiple low cost strategies that integrate modern lighting, controls and daylighting opportunities, increased energy savings and a high quality visual environment can be achieved. This class demonstrates a clear path to meeting aggressive energy savings goals through the use of computer models and practical examples. Note: As this is an intermediate class, basic lighting knowledge is suggested.

**Class locations and dates**

<table>
<thead>
<tr>
<th>Location</th>
<th>Date</th>
<th>Location Details</th>
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</thead>
<tbody>
<tr>
<td>Everett, WA</td>
<td>Tue., Mar. 12th</td>
<td>Snohomish Co. PUD; 2320 California St, Everett, WA 98201</td>
</tr>
<tr>
<td>Boise, ID</td>
<td>Tues., Mar. 19th</td>
<td>Idaho AGC; 1649 West Shoreline Drive, Boise, ID 83702</td>
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<tr>
<td>Portland, OR</td>
<td>Wed., Mar. 27th</td>
<td>AIA Portland; 403 NW 11th Ave, Portland, OR 97209</td>
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<tr>
<td>Bellevue, WA</td>
<td>Wed., Apr. 3rd</td>
<td>Residence Inn; 605 114th Ave SE, Bellevue, WA 98004</td>
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<tr>
<td>Tacoma, WA</td>
<td>Wed., Apr. 10th</td>
<td>Courtyard by Marriott; 1515 Commerce St, Tacoma, WA 98402</td>
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<tr>
<td>Seattle, WA</td>
<td>Wed., Apr. 17th</td>
<td>Lighting Design Lab; 2915 4th Ave South, Seattle, WA 98134</td>
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**Class fees**

<table>
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<tr>
<th>Category</th>
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<tr>
<td>Standard registration</td>
<td>$30 per class (lunch included)</td>
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<tr>
<td>Employees of sponsoring organizations</td>
<td>$10 per class (lunch included)</td>
</tr>
<tr>
<td>Students (with valid university/college ID)</td>
<td>$10 per class (lunch included)</td>
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Register at [www.lightingdesignlab.com](http://www.lightingdesignlab.com). Registration and payment are required in advance. For assistance, contact us at 206-325-9711 x0 or info@lightingdesignlab.com

Eric Strandberg has been one of the Lighting Design Lab lighting specialists for over fifteen years and has over twenty five years in the lighting industry. In 1995 he came to the Lighting Design Lab in an effort to promote energy efficiency and quality lighting design. This work includes; developing and teaching classes, writing articles, new technology evaluation and project consultation, on almost every aspect of lighting design and conservation.
Off-State Power

by Jeff Robbins, LC, MIES

Off-State Power is the amount of energy consumed by an electronic device even though it is in a powered off state. Included among which are those LED fixtures having on-board controls, such as a switch, dimmers, occupancy sensors, motion detectors, or photo-sensors. Using a conventional switch, when the switch is off, the electrical circuit is broken and no power is consumed. In modern electronic switching circuits, a fixture can be off, while a small amount of electricity, known as ‘phantom power’ is still being used to keep the on-board device operating.

This power state, which is often overlooked but can significantly reduce system efficacy, occurs when one or more of these electrical components are positioned between the power supply and the LEDs. When wired in this manner, the fixture will continue to draw power even when the LEDs are off. That power can be in excess of 2 watts, and the resulting total cumulative losses can represent as much as 2% of a system’s total load.

Off-State Power consumption is eliminated in some LED fixtures powered directly from line voltage. In that case the power stage is integrated into the fixture’s electronics and is therefore located ‘downstream’ of the system’s devices which require or can control the power side of the circuit. Some poorly designed fixtures consume almost as much power in the “OFF” state as they do in the “ON” state.

LDL Services

The Lighting Design Lab reaches out to decision-makers on commercial and industrial lighting projects in the Pacific Northwest territory. Our technical staff will work one-on-one with you to discuss and demonstrate lighting strategies suited to your commercial or industrial project. Confirm your lighting ideas, try out new equipment and find appropriate, energy-efficient lighting solutions for your needs.

- Lighting designers
- Specifiers
- Architects
- Interior designers
- Engineers
- Contractors
- Facilities managers
- Building operators

The LDL also offers classes, facility tours, a demonstration area, mockups, and an extensive library of books, product catalogs and industry reference materials. We maintain the LDL LED Qualified List, making the Lab the gateway for manufacturers seeking to have their products approved for regional utility rebates.
The Lighting Design Lab Newsletter is published by the Lighting Design Lab. Please send any comments or requests to be removed from our mailing list, please email us at info@lightingdesignlab.com

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(li) Light meter in our lighting history case. (ri) Clients and staff viewing a recent lighting mockup.

Stay tuned for a new LDL brochure

Learn all about who we are and what we do in the new and improved informational brochure for the Lighting Design Lab due out later this year.

Don’t forget to keep up with the latest in efficient commercial and industrial lighting. “Like” us on Facebook or contact us to schedule a consultation or a tour of our facilities.

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