



New Products, Product Applications and Controls "Refresher"

Doug Oppedal, LC IESNA



Energy Independence and Security Act of 2007 – Amendment

- *New lumens per watt requirement for lamp manufacturers:*

Summary: New 2012 Standards for General Service Fluorescent Lamps (GSFL)
 Issued by the US Department of Energy June 29, 2009

Lamp Type	Correlated Color Temperature	Energy Conservation Standard lm/W
4-Foot (T8-T12) Medium Bi-pin ≥25W	≤ 4,500K	89
	> 4,500K and ≤ 7,000K	88
2-Foot (T8-T12) U-Shaped ≥25W	≤ 4,500K	84
	> 4,500K and ≤ 7,000K	81
8-Foot (T8-T12) Slimline ≥52W	≤ 4,500K	97
	> 4,500K and ≤ 7,000K	93
8-Foot (T8-T12) High Output	≤ 4,500K	92
	> 4,500K and ≤ 7,000K	88
4-Foot (T5) Miniature Bi-pin Standard Output ≥26W	≤ 4,500K	86
	> 4,500K and ≤ 7,000K	81
4-Foot (T5) Miniature Bi-pin High Output ≥49W	≤ 4,500K	76
	> 4,500K and ≤ 7,000K	72

Effective Date of new DOE standards: July 14, 2012



Current exemptions continue [For example, lamps with CRI ≥87, cold temp. (CT), UV, etc.]

Impact for Lamps $\leq 4500\text{K}$ and $> 4,500\text{K}$ and $\leq 7,000\text{K}$

- T12 4-ft. & 2-ft U-lamps with medium bi-pin bases
 - Majority of F40 and F34T12 lamps and all FB40 and FB34T12 U-lamps fail.
 - 4-ft. requires 3560 lumens @ 40W and 3030 lumens @ 34W to pass @ 89 LPW.
 - 2-ft. U-lamps require 3360 @ 40W and 2856 @ 34W to pass @ 84 LPW.
 - CWX/DX/DSGN50/C50 are exempt due to CRI.
- T12 8-ft. Slimline with single pin bases
 - All 75W F96T12 lamps fail.
 - All 60W F96T12/ES fail except for the 800/SPX Series & some 700/SP long life Series.
 - CWX/DX/DSGN50/C50 are exempt due to CRI.
- T12 8-ft. 800mA HO with RDC bases
 - All 110W F96T12 HO lamps fail. Requires enhanced coatings with 10,120 lumens to pass.
 - All 95W F96T12/ES/HO fail except for enhanced 800 Series. Requires 8740 lumens to pass.
 - CWX/DX/DSGN50/C50 are exempt due to CRI; CW/CT & D/CT are exempt.
- T8 4-ft. & 2-ft. U-lamps with medium bi-pin bases
 - All 4-ft. T8 basic 700/SP Series lamps @ 2800 lumens fail. Requires 2850 lumens to pass.
 - All other 4-ft. pass.
 - All 2-ft. 800/SPX Series U-lamps pass. Some 700/SP Series pass.
- T8 8-ft. Slimline with single pin bases
 - All pass except some 700/SP Series. Requires 5723 lumens @ 59W to pass.
- T8 8-ft. HO with RDC bases
 - All pass except some 700/SP Series. Requires 7912 lumens @ 86W to pass.
- T5 4-ft with miniature bi-pin bases
 - All pass.

New criteria for incandescent lamps as well

Just in case – 3,100 lumens/32 watts = 96.9

Ballasts

Northwest Trade Ally Network
 www.nwta.com/lighting

Each fluorescent lamp ballast :

- **Manufactured** on or after July 1, 2009;
 - **Sold** by the manufacturer on or after October 1, 2009;
 - **Incorporated** into a luminaire by a manufacturer on or after July 1, 2010;
 - **Replacement ballasts manufactured** on or after July 1, 2010
 - **Replacement ballasts sold** by a manufacturer on or after October 1, 2010
- shall have a power factor of .90 or greater and have the following ballast efficacy factors:

Application for Operation of	Ballast Input Voltage	Total Nominal Lamp Watts	Ballast Efficacy Factor
One F34T12 lamp	120	34	2.61
	277	34	2.61
Two F34T12 lamps	120	68	1.35
	277	68	1.35
Two F96T12/ES lamps	120	120	0.77
	277	120	0.77
Two F96T12HO/ES	120	190	0.42
	277	190	0.42

Stock piling?

**Ballast efficacy factor of a 2-lamp magnetic ballast and 2, F34T12 lamps:
 .88 ballast factor / .73 input watts = 1.21**



What does this mean for utility incentive programs?

- Not sure yet but if T12's don't pass then T8's become baseline
- If T8's are baseline then there may not be incentives for the "average" T8
- Some of the 700 series T8s have 2,800 lumens or 87.5 lumens per watt. They wouldn't make it so 800 series might be baseline
- We are looking ahead to see what options are out there....
- ***It wouldn't surprise me if a lamp manufacturer comes up with a T12 that complies***



The NEMA Premium Electronic Ballast Program for New Luminaires

- High performance ballasts in new luminaires – difficult to order in the past.....
- The new NEMA program makes it easier
- Several luminaire manufactures will install "NEMA" ballasts that conform to the Consortium for Energy Efficiency (CEE1.org) go to www.nema.org premium ballasts
- Specification example: " Luminaire shall contain a NEMA Premium electronic ballast (do not substitute) Also, specify starting method, number of lamps, and ballast factor (low, normal, high)"

Why aren't all CEE ballasts in the NEMA list?

- There is a nominal fee to join
- Sign a memorandum of understanding
- Provide shipping data.....



Look for this label on a ballast

Consortium for Energy Efficiency



HP 120 and 277 V T8 Ballasts
QUALIFYING PRODUCTS¹
High-Performance 120 and 277V T8 Ballasts
 CEE High-Performance Commercial Lighting Systems Initiative
 Updated 12/01/09

For a list of qualifying 347 V T8 ballasts, see: www.cee1.org/com/com-lt/347-ballasts.xls

Click "Open" When "Connect to www.cee1.org" box opens, click on "Cancel" twice

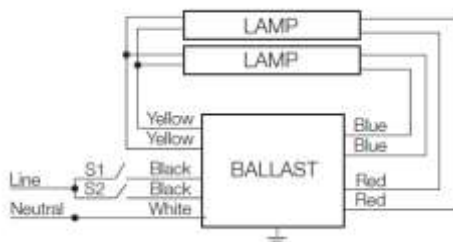
Legend: **Red Font** is a product no longer manufactured, but still meets the criteria as a qualifying product

Manufacturer	Product Name	Model Number	NEMA ¹ Premium ²	Voltage (V)	Ballast Type ³	Ballast Factor Range	Ballast Factor	Input Watts (W)	BEF ³
HP T8 Qualified Ballasts with 1 Lamp									
ACCUPRO	High Efficiency	AP-132P-UNV	yes	120/277	I	Normal	0.91	29	3.14
American Ballast	High Efficiency	AB1-32-IP-UNV-HE	yes	120/277	I	Normal	0.91	29	2.14
Dynamic Ballast	High Efficiency	DY 132 IS WV - HE	no	120/277	I	Normal	0.88	28	3.14
General Electric	GE Ultramax	GE-132-MAX-N/Ultra	yes	120/277	I	Normal	0.88	28	3.11
		GE-132-MAX-L/Ultra	yes	120/277	I	Low	0.77	25	3.05
	UltraStart	GE132-MVPS-L	yes	277	P	Low	0.72	25	2.68
		GE132-MVPS-N	yes	277	P	Normal	0.89	30	2.97
		GE132-MVPS-H	yes	277	P	High	1.18	39	3.03
		Profile	GE-132-MV-N	yes	120/277	I	Normal	0.87	28

New step dim ballast on the market

Hi-low electronic ballasts. Great for existing dual switching.

- 100% to 50% to off. User has option to increase from 50% light.
- In many cases 50% may be enough.
- Occupancy sensor turns on to 50% then the user could manually turn on to 100%
- Occupancy sensor then turns all off.



Sylvania



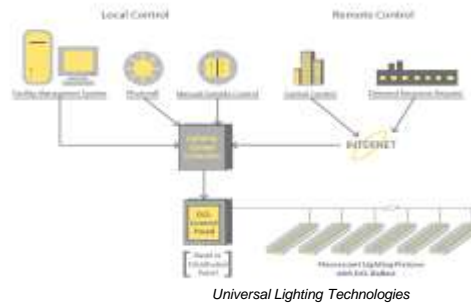
- Power on – Device starts in low light setting.
- Simply toggle Off/On for high light level.

Precision Paragon

Demand ballasts

Northwest Trade Ally Network
 Call us at 800.446.6111

- Receives signal through power line carrier technology from utility or EMS systems
- Reduces load by 30% to 50% depending on manufacturer during peak periods or daylight harvesting device
- Sylvania, Universal and others.....



More new ballast options:

- 480 volt step down transformer UL listed for lighting applications (GE). Mounts next to any electronic ballast
- Three level T8 ballast (Robertson)
- Seven level T5 ballast (OS)
- Six lamp T8 Ballast (GE)
- T8 electronic ballast with a BF of ONE (OS)



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 Call us at 800.446.6111

Today's T8's

Northwest Trade Ally Network
 1-800-833-8333

- 32 watt with 3,100 lumens, 85% CRI, 42,000 hours 95% lumen maintenance (97 lumens per watt)
- 28 watt with 2,725 lumens, 85% CRI, 42,000 hours 95% lumen maintenance (97 - 98 lumens per watt)
- 25 watt with 2,475 lumens, 85% CRI, 42,000 hours 95% lumen maintenance (99 lumens per watt)
- Coming soon.....23 watt T8 with 2000 lumens
- All of the above are now dimmable from one mfg. Check first!
- 84 watt F48T8 VHO with 7,200 lumens, 85% CRI, 25,000 hours 95% lumen maintenance (86 lumens per watt) 60F to 160F
- **First Generation T8 – 32 watt with 2,800 lumens, 75% CRI, 20,000 – 24,000 hours (88 lumens per watt)**

Osram Sylvania/Philips

Ballast factor refresher

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 1-800-833-8333

- T8 lamp lumens of 3,100
- Normal ballast factor of .88
- Actual lumens per lamp = 2728
- T8 lamp lumens of 3,100
- High ballast factor of 1.15
- Actual lumens per lamp = 3,565
- T8 lamp lumens of 3100
- Low ballast factor of .75
- Actual lumens per lamp = 2,325





Controls with 25 and 28 watt T8's

- Remember - Use Program start ballasts when using controls!!
- Currently, there aren't any low watt program start ballasts on the www.cee1.org ballast list
- They are available and they may add them to the list or exceptions may be made



T5 Lamps:

- 28 watt T5 with 3,050 lumens, 85% CRI, 20,000 hours, 109 lumens per watt at 95° F (98 at 77° F)
- 54 watt T5HO with 5,000 lumens, 85% CRI, 35,000 hours, 93 lumens per watt at 95° F (82 at 77° F)
- **NEW low watt T5HO's with the same Lumen output: Philips 49 watt, GE and Osram Sylvania each have a 51 watt!**
- T5VHO – 95 watt with 7,200 lumens, 277/480 Volt - 76 lumens per watt and designed for extreme conditions – 10% lumen maintenance, 65F to 170F
- All T5 ballasts have a ballast factor of 1
- *They are metric (not 48")*

HID

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 Commercial & Industrial Lighting

- CMH with integrated ballasts
- Higher CRI now available
- Lower watt HID lamps that screw into existing pulse start fixtures
- Dimming HID to 50% with controls
- 94% efficient electronic HID ballasts, 200, 250 and 350 watt
- New product that extends lamp life with 90% lumen maintenance, provides feedback and can be adjusted for reduced loads and specific times. Individually control fixtures or groups via software



Metro light



Osram Sylvania



Philips



New Options for Exterior Lighting



Beta, Orion, Precision/Paragon



Northwest Trade Ally Network
 Commercial & Industrial Lighting

Linear Fluorescent

- T5HO pole mount 48" shoe box (shoe box for long feet)
- T5HO 24" wall packs
- Canopy
- Improved CRI of 85% when compared to Metal Halide
- Instant on and no re-strike time issues
- Dual level switching with Integral occupancy sensors (great for car lots and security)
- Typical T5HO with lamp life of 35,000 hours... Kumho makes one that is rated for 100,000 hours!! Some installed in Oregon currently under review



Could this be the new low hanging fruit?



Precision/Paragon Orion



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Energy Wise Ltg 6-lamp T5HO floods



Induction wall pack

Induction

Northwest Trade Ally Network
 Careers@nwtanetwork.com



Pros:

- Ultra-long life – 100,000 hours - based on 11 hours per day.
- Crisp white light with high CRI - 80+ CRI.
- Wide operating technology - -40F to 158F.
- High lumen output - 63-80 LPW.
- Excellent Lumen Maintenance - 70% @ 60,000hrs.
- No color shift over life of lamp.
- Instant on, regardless of temperature.
- Resistant to Vibrations
- Extended Warranties – industry average is 5 years.
- Usually less than LED but lasts as long

Cons:

- High Initial Cost – Approximately \$200 to \$250 more than equivalent HID fixture.
- Physically larger than HID- can be difficult to fit into a fixture housing
- Current technology offering does not include dimming.

Precision/Paragon



Induction - different shapes and sizes. Now available in high wattage

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TUBULAR	HH-ILS-TP200-5K	200	1.80-0.76	210	17000	81	> 70%	> 80	5000K	100,000
TUBULAR	HH-ILS-TDC200-5K	200	1.80-0.76	210	17000	81	> 70%	> 80	5000K	100,000
TUBULAR	HH-ILS-TDC250-5K	250	2.25-0.95	263	21250	81	> 70%	> 80	5000K	100,000
TUBULAR	HH-ILS-TDC300-5K	300	2.72-1.14	315	27000	86	> 70%	> 80	5000K	100,000
TUBULAR	HH-ILS-TDC400-5K	400	3.63-1.52	420	36000	86	> 70%	> 80	5000K	100,000

Fulham

LED (just a few)

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www.csl.com/ledlighting



Eco-fit Retro

Beta, Leotek

LED Street lighting

Northwest Trade Ally Network
www.csl.com/ledlighting

DOE Gateway project – City of Portland, Oregon. NE Lija Loop and N.E. Gertz Road. Partially funded by The Energy Trust of Oregon.
http://www1.eere.energy.gov/buildings/ssl/gatewaydemos_results.html



Qty	Source Type	Luminaire Power (W)	Total Power (W)	Hours	Energy (kWh)	Reduction
8	HPS	120	960	4380	4205	N/A
8	LED	53	426	4380	1866	55%

Department of Energy Gateway program

Results

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3.2 Payback

A price quote provided by a local distributor for the Leotek luminaires was \$449.00 per unit. Installation time for both the HPS cobra head and the LED unit appears to be similar; installation cost, therefore, is assumed as similar and is estimated at about \$213 per pole for a new installation.² For a retrofit scenario, where conventional 100W HPS fixtures in good operating condition are swapped for LED products, the cost also includes removal of the existing fixture and is estimated at \$346.² Simple payback for a retrofit scenario calculates as:

$$(\$449 + \$346) / (\$25.08 + \$14.40/\text{yr}) = 20.1 \text{ years} \quad \text{Annual savings}$$

In the case of new construction, where only the incremental cost for the LED product (\$449 - \$150 = \$299)² is considered and the installation cost drops out due to equivalency between the two options, simple payback falls to:

$$(\$299) / (\$25.08 + \$14.40/\text{yr}) = 7.6 \text{ years} \quad \text{Maintenance savings}$$

Again, realizing this payback would require the City to renegotiate the lighting energy and maintenance rate schedules offered by the local provider.

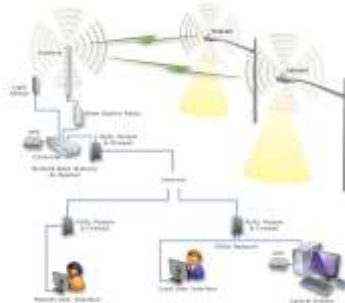
	HPS Values	LED Values
Max	2.2 fc	0.5 fc
Min	0.2 fc	0.1 fc
Average	0.8 fc	0.3 fc
Max/Min	9.8	5.4
Avg/Min	3.4	2.8
Std. Dev	0.6 fc	0.1 fc
Coefficient of Variation	0.8	0.5

Exterior control options

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Photo cells that:

- Turn on at dusk and operate for a specific time period including smart clocks that adjust to time, day, year including daylight savings time adjustments
- Plug in wireless devices that control, meter and monitor individual or groups of luminaires



How would you currently re-switch existing parking lot lights?

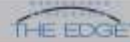
Ripley Controls

LED Canopy Lighting

Northwest Trade Ally Network
Commercial & Subcontracting

BetaLED™ Project Brief Overview

Murphy USA - Plano, TX



A Look on the Bright Side



Yikes

Murphy USA gas station and c-store in Plano, TX, retrofitted half of this facility with 98 THE EDGE canopy fixtures from BetaLED. The LED fixtures clearly outperform the existing HID technology, offering a more inviting, brighter experience. The LED fixtures lower energy costs by 31 percent while improving brightness and uniformity throughout. Additional benefits include virtually eliminating maintenance due to the BetaLED fixture's life rating of greater than 100,000 hours and eliminating the disposal of hazardous mercury found in traditional lighting fixtures.

After testing the "full-and-hull" lighting for 90 days, the rest of the HID fixtures were swapped out for another 18 THE EDGE fixtures. An additional THE EDGE security fixture makes the entire property all LED, a total of 32 luminaires.

We are currently working on several gas station projects in Oregon using the same product. The payback is estimated at 6.2 years with incentives.

We will have photo's and results soon.....

Soon!

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Photos by Dyna Flow - BETA product



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Jim's Market 76

16, 400 watt MH

12, 106 watt LED

Before



After



Photos by owner - Furnished and installed by Dyna Flow – BETA product



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So many products to choose from, how do you make the right choice?

Ask questions:

Does it have an ENERGY STAR Label ? – If not:

1. IESMA LM-79-08 test report (if they don't have it, you may want to stop there)
2. Lighting facts Label – basically gives you the information off an LM 79 test report
3. Warranty
4. How long have they been in business
5. NRTL listed (similar to UL)
6. Lumen maintenance (light output at 70% of rated life) LM-80 , soon to come, TM-21 Method for estimating life of LED



Light Emitting Diodes (LED's) Solid State Lighting (SSL)

- Where are we? www1.eere.energy.gov/buildings/ssl/
Go to this site to "read all about it".
- Gateway – Study and reporting of LED installations
- CALiPER – testing available products (commercially Available LED Product Evaluation Reporting) Typically over 50% have not meet manufacturer claims
- SSL Quality Advocates – Lighting Facts Label
- ENERGY STAR – Setting the standard for SSL (go to website for list)
- Keeping an eye on LED replacement lamps - CALiPER round "8" found over 50% did not meet mfg claims



Process

- Mfg's send in their product to one of the ITL for the IESNA LM-79-08 test. ITL's are listed on http://www1.eere.energy.gov/buildings/ssl/test_labs.html
- **LM-79-08 IESNA** Approved Method for the Electrical and Photometric Measurements of Solid-State Lighting Products
 - *Specifies procedures for measuring total luminous flux, electrical power, luminous efficacy, and chromaticity of SSL luminaires and replacement lamp products.*
- **LM-80-08 IESNA** Approved Method for Measuring Lumen Maintenance of LED Light Sources
 - *Specifies procedures for determining lumen maintenance of LEDs and LED modules (but not luminaires) related to effective useful life of the product.*
- **TM-21** – soon to come -Lumen Depreciation Lifetime Estimation Method for LED Light Sources
 - *Will provide a method for determining an LED luminaire or integral replacement lamp's expected operating life, based on initial performance data collected per IES-LM-80.*
- **Beware of the "Super Chip"**



Cold Cathode

Northwest Trade Ally Network
 Commercial & Industrial Lighting

C ³ Cold Cathode CFL Series	Incandescent Lamp
3W C ³	= 11W Incandescent
5W C ³	= 25W Incandescent
8W C ³	= 40W Incandescent
13W C ³	= 60W Incandescent
18W C ³	= 75W Incandescent

Pros

- 25,000 hour average rated life, standard CFL's average 8,000 hours
- Dimmable down to an average of 30% (based on manufacturer)
- High lumens per watt: 35-55
- Wide operating temperature range: 160F to -20F
- Lamps can withstand rapid cycling, cool temperature and high vibration applications.

Ushio, TCP

Cons:

- Only lower wattages available, market research concluded that it's unlikely to see further expansion of wattages in the future
- Limited color temperatures : 2700K and 4100K only
- Not recommended for use with electronic dimming
- Available in self-ballasted screw in base only (no 2-piece yet available)
- Cost about 50% more than standard CFL's

S/P Ratio example

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Better quality and white/blue light means better "visual performance"

Existing System

Existing HID System	Lamp Qty & Type	Initial Lamp Lumens	Mean Lumens Per Lamp	S/P (1) Ratio	S/P (2) Adjusted Lumens	System Input Watts	Lumens (3) Per Watt	Rated Life (Hours)
HPS-150 Standard	1 HPS150	15,000	13,500	0.62	9,298	190	49	24,000
MH-175 Standard	1 MH175	13,500	8,775	1.49	11,977	210	57	10,000
HPS-250 Standard	1 HPS250	27,000	24,300	0.62	16,717	295	57	24,000
MH-250 Standard	1 MH250	20,500	13,500	1.49	18,425	297	62	10,000

Re-Lighting Options

Existing HID System	Lamp Qty & Type	Initial Lamp Lumens	Mean Lumens Per Lamp	S/P (1) Ratio	S/P (2) Adjusted Lumens	System Input Watts	Lumens (3) Per Watt	Rated Life (Hours)
QLA - QL35 System	1 QL35/840	3,500	2,800	1.62	4,079	95	74	100,000
QLB - QL85 System	1 QL85/840	8,000	4,800	1.62	6,993	85	82	100,000
ICA - ICE70 & QT100 Ballast	1 ICE70/841	6,500	4,030	1.62	7,037	77	91	100,000
ICB - ICE100 & QT100 Ballast	1 ICE100/841	8,000	5,945	1.62	8,661	103	84	100,000

Google: What is Visually Efficient Lighting?

by: Dr. Samuel M. Berman, Ph. D.

S/P ratios can be obtained from some lamp manufacturers.

Precision-Paragon



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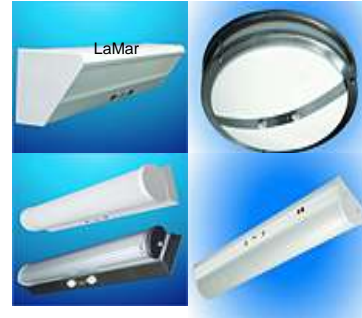
Parking structures and stairwells

FH-105 Super High Frequency Occupancy Sensor



Precision Paragon

Order one or build your own using fixture mount occupancy sensors with high low operation.....



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T5's in a freezer (insulated housings)



Energy Wise Lig

- This application saved 50% energy and increased light levels by 20%+
- Some applications are dual switched with occupancy sensors

Lighting Controls Refresher

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 1-800-833-6633



Turn it off... Best buy for the buck in retrofit applications is an occupancy sensor.

- Passive Infrared - moving heat - open spaces
- Ultrasonic - Doppler- partitions - cubicles
- Microphonic - sound – partitions – restrooms
- Two technology Passive infrared and Ultrasonic

Passive infrared and Microphonic
 Use in areas with obstructions



Team Work!



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Huge results with fixture mount sensors!

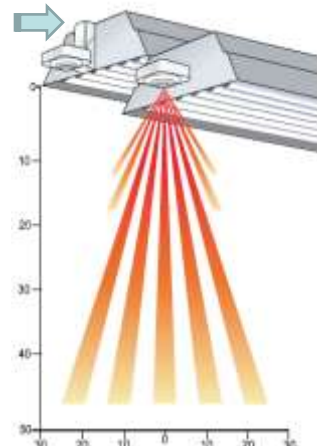
Things to consider:

- Infrared
- Activate photo cell option (who's in charge)
- View – masking kits or rotating adjustments
- Height
- Mounting brackets
- Timing
- Bi-level
- Alternating relays (extend luminaire lamp life)
- Order with options

Hubbell



Sensor Switch



Sensor Placement

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 Career & Technical Education

- Use the appropriate technology and coverage
- Long and narrow view
- High or low ceiling
- Partitions/obstructions/open view



Wall or Ceiling

- Infrared
- Ultrasonic
- Microphonic
- Two technology
- 180 degree
- 360 degree
- 500 sq. ft.
- 1,000 sq. ft.
- 1,500 sq. ft.
- 2,000 sq. ft.

Cheat Sheet

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 Career & Technical Education

- | | |
|---|--------------------------------|
| 1. Small open office | 1. Switch infrared |
| 2. Small office with partitions | 2. Switch two technology |
| 3. Large open office | 3. Ceiling infrared |
| 4. Large open office with partitions/obstructions | 4. Ceiling/wall two technology |
| 5. Open restrooms | 5. Switch Infrared |
| 6. Restrooms with stalls | 6. Ceiling two technology |
| 7. Hallways and Aisles | 7. Wall mount infrared |
| 8. Individual high bay lighting | 8. Fixture mount infrared |
| 9. Zonal high bay lighting | 9. Wall mount infrared |



Leviton, Wattstopper, Hubbell, Sensor switch



Other Occupancy sensor choices

- Two relays in one unit
- Alternating relays for dual switched fixtures
- Night lights
- Walk through features
- Manual or auto on adjustment settings
- Dimming
- Built in photo cell
- Fan loads
- Low temperature/high humidity/wet location
- Isolated relays (for contact closures) HVAC and BMS
- Plug loads
- Data Loggers



Leviton, Wattstopper, Hubbell, Sensor switch

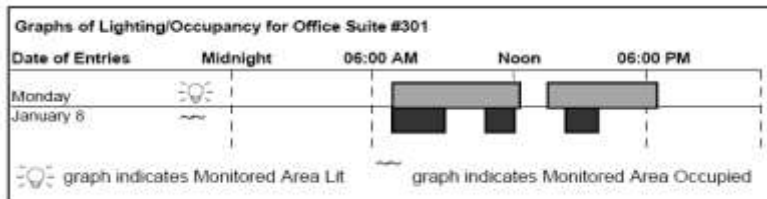


Estimate control savings



Sensor Switch

Several manufacturers provide the service and/or tools. Use in existing and new construction projects.

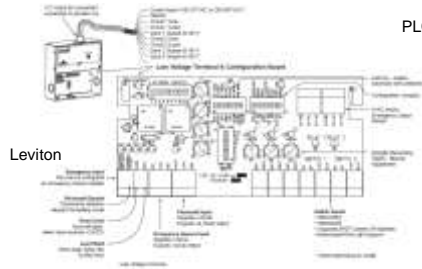


Daylight Harvesting Systems

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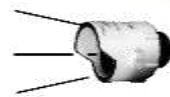


Sensor Switch



Leviton

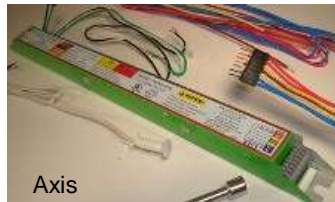
PLC



Wattstopper



Philips



Axis

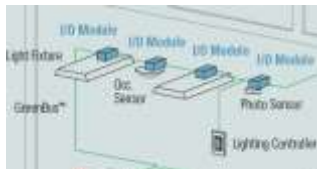


Wattstopper

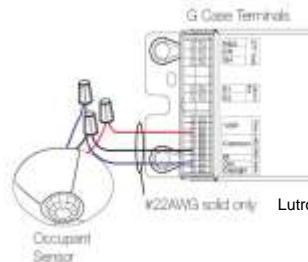


Plug and Play Control Systems

Northwest Trade Ally Network
www.nwta.com/lighting



Encelium



Lutron




Sensor Switch



WattStopper

Wireless

Northwest Trade Ally Network
 Commercial & Industrial Lighting

EnOcean Technology

Northwest Trade Ally Network
 Commercial & Industrial Lighting

No Wires. No Batteries. No Limits.

Energy Harvesting - EnOcean Alliance solutions make use of energy created from slight changes in motion, pressure, light, temperature or vibration. The self-powered wireless sensors help make buildings smarter, safer, more comfortable and more energy-efficient. No batteries - product manufacturers, building professionals and end-users can now realize the promise of battery-less and wire-free control systems. Because they are anchored by self-powered sensors and switches, EnOcean-enabled buildings are more flexible and cost-efficient to design, build and operate.

EnOcean has several partners or manufacturers that use their technology



Range from 50 to 150 feet depending on product and application.

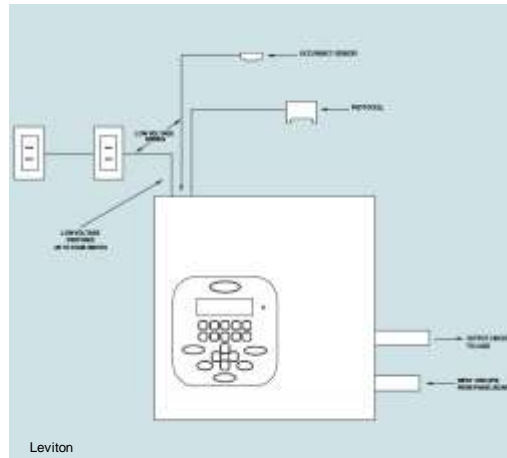
Peel and stick.....

Visit: <http://www.enocean-alliance.org/en/>

Relay panels



- Astronomical time clock. Where am I?
- Zone control
- Low voltage switch
- Remote access
- Sensor input
- Contact closure input
- Photo cell input.



Lewis and Clark College Gym

Northwest Trade Ally Network
 Commercial & Industrial Lighting



Simple padlock on a keypad keeps control savings at a maximum

New relay panels intersected lighting circuits that were breaker controlled and tied into BMS on a strict schedule





Northwest Trade Ally Network
Lantern@6.com@lighting

Every other light is on by zonal occupancy sensor input to relay panel



T5HO 6-lamp was replaced first, then the control system 2 years later.

Lewis and Clark College – Team Electric

Tennis Dome



64 - 1000 watt MH up-light



145 footcandles on a sunny day

64 - new 6-lamp T5HO indirect lighting



Seven wall switch occupancy sensors all tied into existing lighting contactors.

Lewis and Clark College – Team Electric



Lewis and Clark lighting controls

Gym:

- \$3,015 per year savings plus the convenience of an automated control system
- Local utility incentive - \$7,400 plus tax credits (8.8 year payback)

Tennis

- \$15,872 per year savings using new lighting and simple occupancy sensor control... good for security
- Local utility incentive - \$30,494 plus tax credits (3.2 year payback)



Portland State University



Existing controls system had failed several years ago.



6 new relay panels were installed with new switching schedules that coincide with the school year schedule, including holidays off.

- \$21,081 per year savings plus the convenience of an automated controls system
- Local utility incentive \$14,911 plus tax credits (1.3 year payback)

Extra Effort Consulting



Northwest Trade Ally Network
 Christenson Electric

- 42 story building plus 7 floors in Plaza (over 11,600 T8 luminaires)
- The tower's 3-lamp T8's were controlled by individual wall switches except for the center lamp that was controlled by a mechanical time clock.
- Plaza lighting was controlled by mechanical time clock
- New relay panels were tied into EMS system with new switching schedule
- **Over 1 million kWh saved estimating a \$69,000 saving per year on their energy bill**
- **Simple payback of 3.4 years before tax credits!!**

US Bank Tower

Northwest Trade Ally Network
 Christenson Electric



12 circuit simple relay panel tied into existing EMS

Override toggle switch for employees. Lights will blink off/on then employee walks to switch to override lights on floor for another hour or two



T8 to T8

Northwest Trade Ally Network
 1-800-833-6666

- There are a lot of first generation T8's out there
- Many of the first retrofits were one for one using the same number of lamps and a normal ballast factor
- What was the lighting power density 10 to 15 years ago? Maybe 2 to 3 watts per square foot for an office....It could be providing 70 footcandles!
- It's now 1 watt per sq. ft. in Oregon and is expected to drop by 10% in 2010 and we can get by with 30 footcandles in certain office environments

Interior Lighting Options

Northwest Trade Ally Network
 1-800-833-6666

- Standard Retrofit T12 to T8. We should all know how to do this by now (www.cee1.org)
- Most retrofits using low ballast factors (.75) will provide the same or higher light levels than an existing T12 system with improved quality of light
- De-lamp using different ballast factors can provide adequate light levels while reducing lamps
- New on the market.....retrofit kits that include a high performance lens



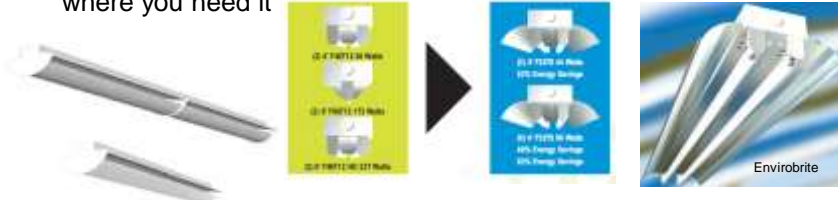
Lithonia

Kits

Northwest Trade Ally Network
 Careers@nwtanetwork.com

8' fluorescent kits to 4, 32 watt lamp kits:

- In most cases you should use a kit with a reflector to direct the light where you need it



- You can use 8' T8's.... Some mfg's now have lamp lives up to 30,000 hours
- High performance 32 watt T8's have lamp lives up to 42,000 hours +
- Kits vs. new fixtures – recycle existing channel and usually less expensive to furnish and install (if existing is in decent shape)
- Jazz it up as an option***

Parabolic recessed lighting

Northwest Trade Ally Network
 Careers@nwtanetwork.com

Parabolics were once the premium choice when computers were introduced into the work space (screen glare issue). They directed light down and shielded the source

We discovered that:

- People sitting below them were experiencing problems with direct light and glare without diffusion
- Higher max to min light levels, not an even ambient lighting system
- The walls and ceilings appeared to be dark with a perceived feeling that you are in a cave or the room was smaller



Improve the lighting and save energy at the same time



Example project:

Existing conditions:

- 3-lamp parabolic, 18 cell
- F32T8/741 (2,800 lumens 75% CRI)
- Typical office space with 9' ceilings
- Reflectance of 80% ceiling, 50% wall and 20% floor
- 8' x 10' spacing
- Current depreciated light levels, 55 to 65 footcandles
- Hours of operation – 10 hours 5-days per week and 4 hours on the weekend with holidays off (conservative)
- Plane of calculation, 2.5 feet.



T8 to T8 Options



Options	Description	Lamp type	Ballast Factor	Input watts	CRI	Lamp Life	% saved to base line	Light levels	LPD
Base line 1	3-lamp Parabolic T12	F34T12/CW	0.88	130	60	20,000	n/a	50	2.6
Base line 2	3-lamp Parabolic T8	F32T8/74L	0.88	88	75	20,000	n/a	50	1.8
Option 1	Retro existing to 2-lamp with reflector	F25T8/84L	0.75	38	85	36,000	57%	28	0.8
Option 2	Retro existing with 3-lamp low watt T8	F25T8/84L	0.75	57	85	36,000	35%	40	1.1
Option 3	Retro existing to 2-lamp Low watt E58	F25T8/84L	0.75	38	85	36,000	57%	43	0.8
Option 4	Retro existing to 2-lamp Low watt reflector/Pris lens	F25T8/84L	0.75	38	85	36,000	57%	32	0.8

Layout example

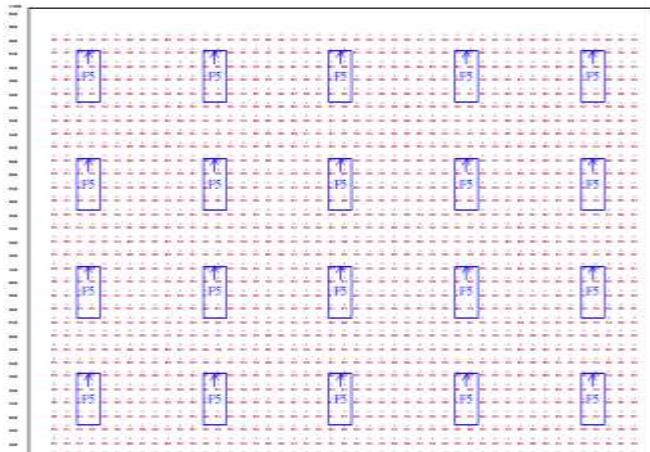


LitePro 2.025 Point-By-Point Results
 PROJECT: T8 to T8(1) GROUP: 1 AREA: T8 2-lamp pris GRID: New Grid
 PREPARED BY:
 VALUES ARE FC, SCALE: 1 IN= 1.0FT, HORZ GRID (UL, HORZ CALC, Z= 2.5
 ROOM REFLECTANCES: 80 / 50 / 20 (Ceiling/Walls/Floor)
 Computed in accordance with IES recommendations

11/19/2009

Statistics

GROUP	MIN	MAX	AVE	AVE/MIN	MAX/MIN
(=)	17.0	37.7	31.1	1.84	2.22





Thank you!

- There is a lot more out there, wish we had more time.....
- Check with your local manufacturer representative for new products and technologies
- Introductions
- Visit the table tops.....



- *Thank you to all manufactures and contractors for providing images and technical information!*