Energy Saving Products, Legislation & LEDs

SYLVANIA

The Subject List

- Legislation Review
- LEDs
  - How they work
  - LED Retrofits
- Energy Saving Product Review & New Products
  - PENTRON Lamps
  - OCTRON SUPER SAVER
  - High Efficiency Ballasts
  - POWERBALL Ceramic Metal Halide
  - Dimmable CFL

The Energy Policy Act of 2005: Lighting Products

Effective January 1, 2008…

- **Mercury Vapor Lamp Ballasts** for general illumination applications may not be manufactured or imported
  - Late in 2005, a notice in the Federal Register clarified that this also includes new luminaires containing such ballasts
  - 2007 EISA legislation provides for continued use in specialty applications provided the ballast is marked “Not for general illumination” and identifies the specialty application

And beginning **July 1, 2010**…

- New efficiency requirements for **ballasts operating Energy Saver-type T12 fluorescent lamps** go into effect
- By 2010, ballast manufacturers cannot manufacture replacement ballasts that do not pass the new Ballast Efficacy Factors (BEF) requirements.
- Exceptions
  - Dimming ballasts that dim to 50% or lower
  - T12 HO ballasts capable of starting down to -20° F
  - Low power factor ballasts (<.90) labeled for use in residential applications only

Metal Halide Fixtures

It's a Pulse Start world!

Covers

- Metal halide lamp fixtures operated with lamps ≥150W but ≤ 500W shall contain one of the following
  - A **pulse-start** metal halide ballast with a minimum ballast efficiency of 88% or
  - A magnetic probe-start ballast with a minimum ballast efficiency of 94% or
  - A non-pulse-start electronic ballasts with
    - A minimum ballast efficiency of 92% for wattages > 250W
    - A minimum ballast efficiency of 90% for wattages ≤ 250W

Exclusions

- Fixture with regulated lag ballasts
- Fixtures with electronic ballasts to operate at 480V
- Fixtures that
  - Are only rated for 150W lamps and
  - Are rated for use in wet locations and
  - Contain a ballast that is rated to operate at ambient air temperatures above 50°C

Effective Date

- Applies to fixtures manufactured on or after the later of 1/1/2009
  Or the date that is 270 days after the date of enactment

State laws with earlier effective dates remained in effect until the Federal standards became effective

2009 Rules: General Information

2009 DOE Lamp Rule Making

- Covers basically the same lamp families covered by EPAct 1992
  - **Incandescent (& Halogen)** Reflector Lamps (IRL)
  - General Service **Fluorescent Lamps** (GSFL)
  - Declared that the R20, BR30, ER30, BR40 and ER40 lamps exempted by EISA 2007 continue to be exempt
  - Adds 4-ft. T5 standard and HO fluorescent lamps with miniature bi-pin bases
- Process started in 2007
- Published in the *Federal Register* on July 14, 2009
- Becomes final on September 14, 2009
- **Effective date to be in July 14, 2012** – 3 years after publication in the *Federal Register*

Key Impacts on IRL Products – Industry in General

- **All of today's standard PAR halogen lamps will be eliminated**.
- Likely that all 130V PAR halogen lamps will be eliminated.
- Only a few of today's halogen reflector lamps, e.g. PAR20, PAR30 and PAR38, can meet the standards in the Final Rule.
- In order to meet the new standards, **reflector lamps will need to use new technologies such as infrared (IR) coatings** and optimized reflector coatings.
  - IR coatings redirect wasted heat energy emitted by the lamp filament back to the filament, increasing the temperature of the filament, and thus enabling it to produce more light without increasing wattage.
  - Optimized reflector coatings will more efficiently direct light produced by the lamp out of the lamp and into the space being illuminated.
  - Other technology options are also being explored.
- The few existing lamps that meet the new standards are **more expensive** than the standard halogen lamps on the market today.
  - While the initial cost of the new higher efficiency reflector lamps will be higher, the consumer should see a payback through reduced electrical bills depending on the amount of time the lamps are "on".

Key Impacts on T12 Fluorescents

- **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**
  - A very few very high lumen rare earth phosphor lamps will pass
  - 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 & few some 700/SP long life Series lamps
  - 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 & 10,120 lumens to pass
  - **All 95W F96T12/ES/HO fail**; requires enhanced coatings & 8740 lumens to pass
  - CWX/DX/DSGN50/C50 are exempt due to CRI
  - F96T12/CW/HO/CT & D/HO/CT (Cold Temperature) are exempt

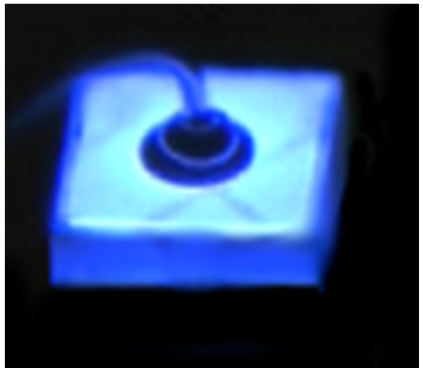
Key Impacts on T8 & T5 Fluorescents

- T8 4-ft. & 2-ft. U-lamps with medium bi-pin bases
  - **All 4-ft. T8 basic 700 Series lamps @ 2800 lumens fail**
  - All other 4-ft. pass
  - Some 700 Series 2 ft. U-lamps pass; all 2-ft. 800 Series U-lamps 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**
  - Intent of T5 standard is to keep lesser performing lamps out of the U.S. market

What is an LED?

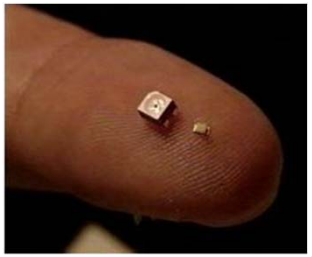
Definition:

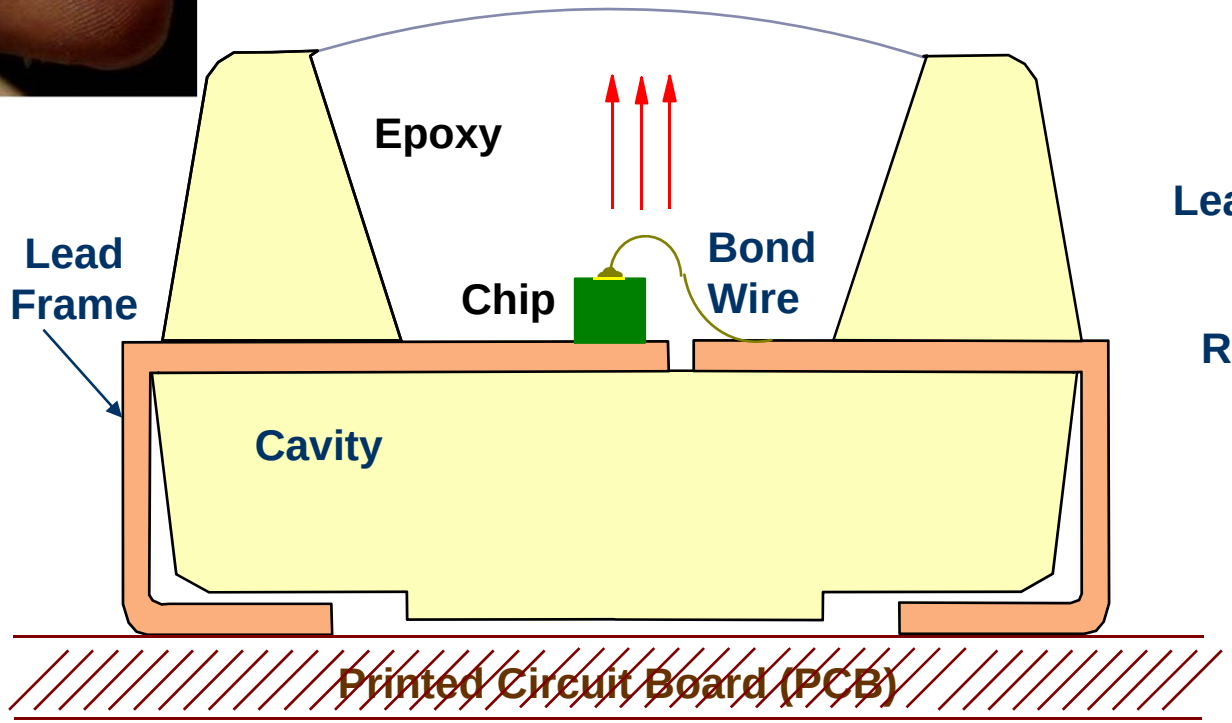
„An LED, or light-emitting diode, is a semiconductor device that emits narrow-spectrum light when electrically biased in the forward direction.“

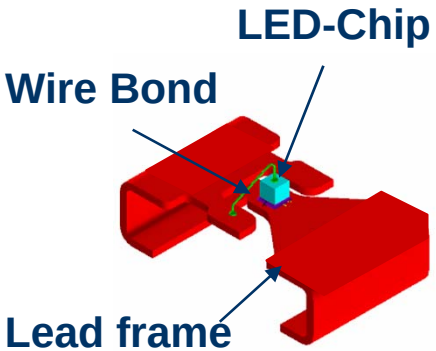


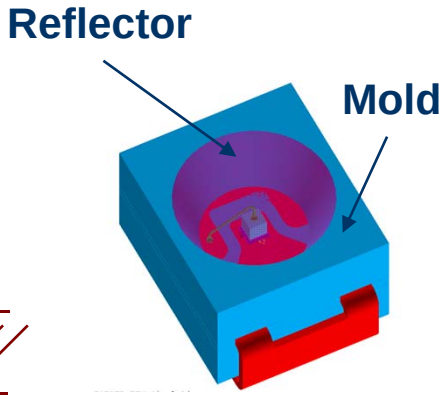
Structure of Surface-Mounted (SMT) LED

A Typical TOPLED







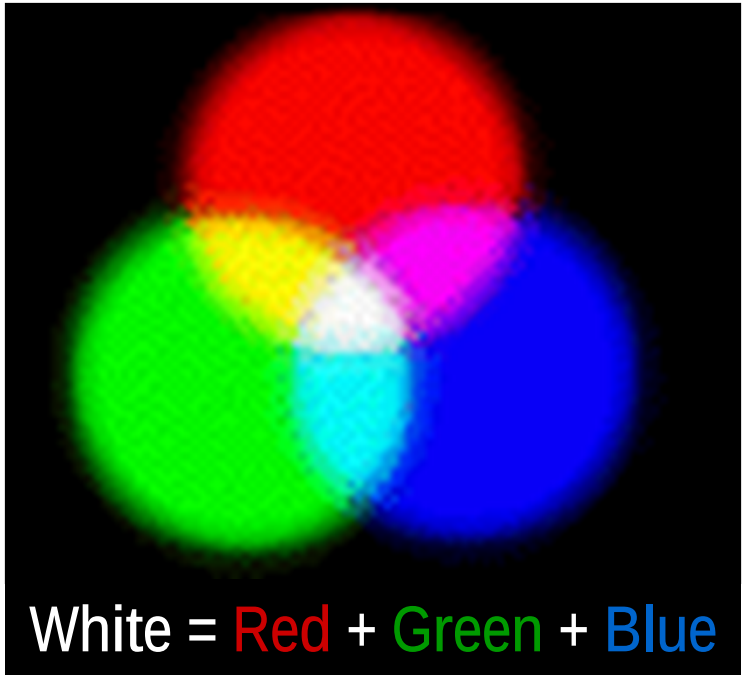


How many ways can you make White Light?

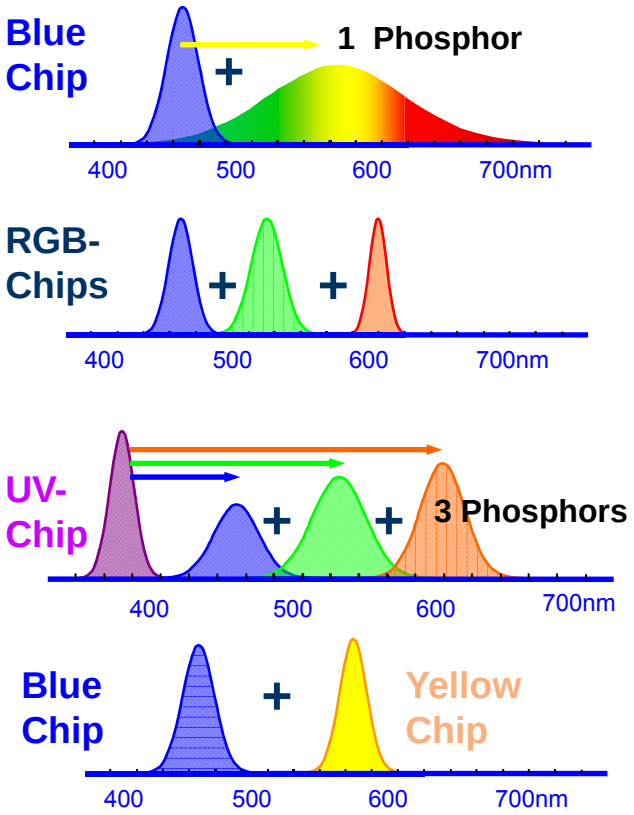
Tri-Color Colorimetry

Red/ Green/ Blue – primary colors

White – mixture of 3 primary colors



White LED Approaches



What is LED Binning?

Binning: sorting of both chips and finished LED packages by color and brightness group.

Each LED can be tested for specific characteristics such as:

- luminous intensity
- luminous flux

Brightness

- forward voltage
- dominate wavelength
- chromaticity

Color

Used to maintain color consistency within a finished product

LED Lamps: A-line & B10

Product Features & Benefits

Replacements for incandescent - High R9 & R13, closely matches halogen color (non-dimmable applications)

A-Line

Lamp	LED	INC
Wattage	8 W	40W
Light Output	350 lm	390 lm
Lifetime L_{70}	25K hrs	3K hrs
CCT	3000K	2700K
CRI	82	95

80% energy savings and 8x longer life than incandescent

B10

September

Lamp	LED	INC
Wattage	6 W	15W
Light Output	150 lm	120 lm
Lifetime L_{70}	25K hrs	1.5K hrs
CCT	2700K	2700K
CRI	83	95

16x longer life than incandescent B10 bulb

SYLVANIA

LED PAR Lamps

Product Features & Benefits

Replacements for Halogen PAR – High R9 & R13, closely matches halogen color (non-dimmable applications)

PAR38

Lamp	LED	HAL
Wattage	16 W	60W
Beam Angle	30°	30°
Center Beam Candle Power	2350 cd	2500 cd
Lifetime L_{70}	25K hrs	3K hrs
CCT	3000K	2875K
CRI	87	95

75% energy savings and 8x longer lifetime

PAR30LN

Lamp	LED	HAL
Wattage	13 W	50W
Beam Angle	30°	30°
Center Beam Candle Power	1350 cd	1850 cd
Lifetime L_{70}	50K hrs	2.5K hrs
CCT	3000K/3500K	2850K
CRI	82/85	95

74% energy savings and 16x longer lifetime

LED PAR Lamps

Product Features & Benefits

Replacements for Halogen PAR – High R9 & R13, closely matches halogen color (non-dimmable applications)

PAR20

Lamp	LED	HAL
Wattage	6 W	25 W
Beam Angle	25°& 60°	50°
Light Output	250 lm	250 lm
Lifetime L_{70}	50K hrs	3K hrs
CCT	3000K	2775K
CRI	85	95

75% energy savings and 16x longer life

PAR16

Lamp	LED	HAL
Wattage	4 W	25W
Beam Angle	20°	30°
Center Beam Candle Power	340/370 cd	357 cd
Lifetime L_{70}	25K hrs	3K hrs
CCT	3000K/6500K	2750K
CRI	82/80	95

84% energy savings and 8x longer life

LED MR16 Lamps

Product Features & Benefits

- Replacement for 20W Halogen MR16 (non-dimmable applications)
- 60% energy savings and 16x longer lifetime
- High CRI - high R9 & R13, closely matches halogen color

Lamp	LED	HAL
Wattage	8 W	20W
Beam Angle	35°	35°
Light Output	220 lm	220 lm
Lifetime L_{70}	50K hrs	3K hrs
CCT	3000K	3000K
CRI	82	95

SYLVANIA

DULUX EL Dimmables

14W Twist (NAED 29969)

- 60W replacement
- 8,000 hours
- 800 lumens
- Energy star
- 82 CRI
- 2700K

24W Twist (NAED 29968)

- 100W replacement
- 8,000 hours
- 1500 lumens
- 82 CRI
- 2700K

14W R20 (NAED 28998)

- 50W replacement
- 8,000 hours
- 500 lumens
- 82 CRI
- 2700K

19W R40 (NAED 28997)

- 75W replacement
- 8,000 hours
- 900 lumens
- 82 CRI
- 2700K

DULUX EL Dimmables

15W BR30 Dimmable (NAED 29465)

- 65W replacement
- 6,000 hours
- 600 lumens
- 82 CRI
- 2700K and 3000K

Cold cathode dimmable CFLs

5W A15 dimmable (Naed 29743)

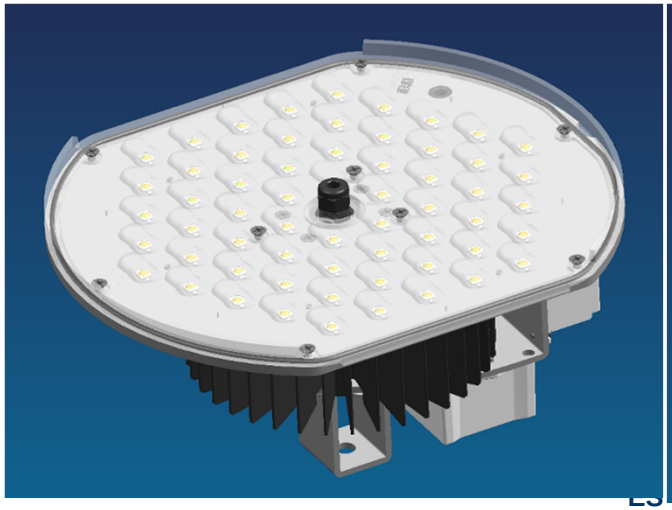
- 15W Incandescent replacement
- Lasts 25,000 hours, unlimited switching cycles
- 2700K
- Application
  - Decorative
  - Chandelier

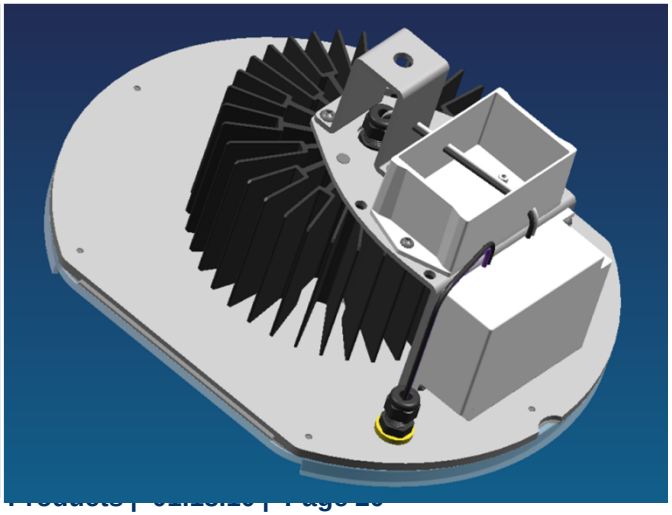
5W B10 dimmable (Naed 29742)

- 15W incandescent replacement
- Candelabra base with medium base adaptor
- Lasts 25,000 hours, unlimited switching cycles
- 2700K
- Application
  - Decorative
  - Chandelier

LED Post Top Retrofit Benefits

- Mercury Free
- Consumes less than 40 watts
- Environmentally friendly – energy savings and don't have to discard existing fixtures
- Easy to install in as little as 15 minutes
- True IES Type III and Type V photometrics
- Outperforms high pressure sodium footcandle for footcandle
- 12+ Year average life
- Exceptional light management – dark skies friendly





LED Post Top Retrofit Benefits

- No cycling or restrike delays
- Universal voltage power supply
- Ultra High Efficiency 5700K OSRAM SYLVANIA LEDs
  with warmer color temperatures available
- High performance thermal management
- Short, open, and thermal overload protected
- Extreme temperature tested
- UL recognized power supply and components
- Full 5 year warranty
- No risk 60 day return policy – test 4, return for a full refund

Works in a wide variety of fixture types!

LED Acorn Performance – no small difference

LED Acorn Performance – no small difference

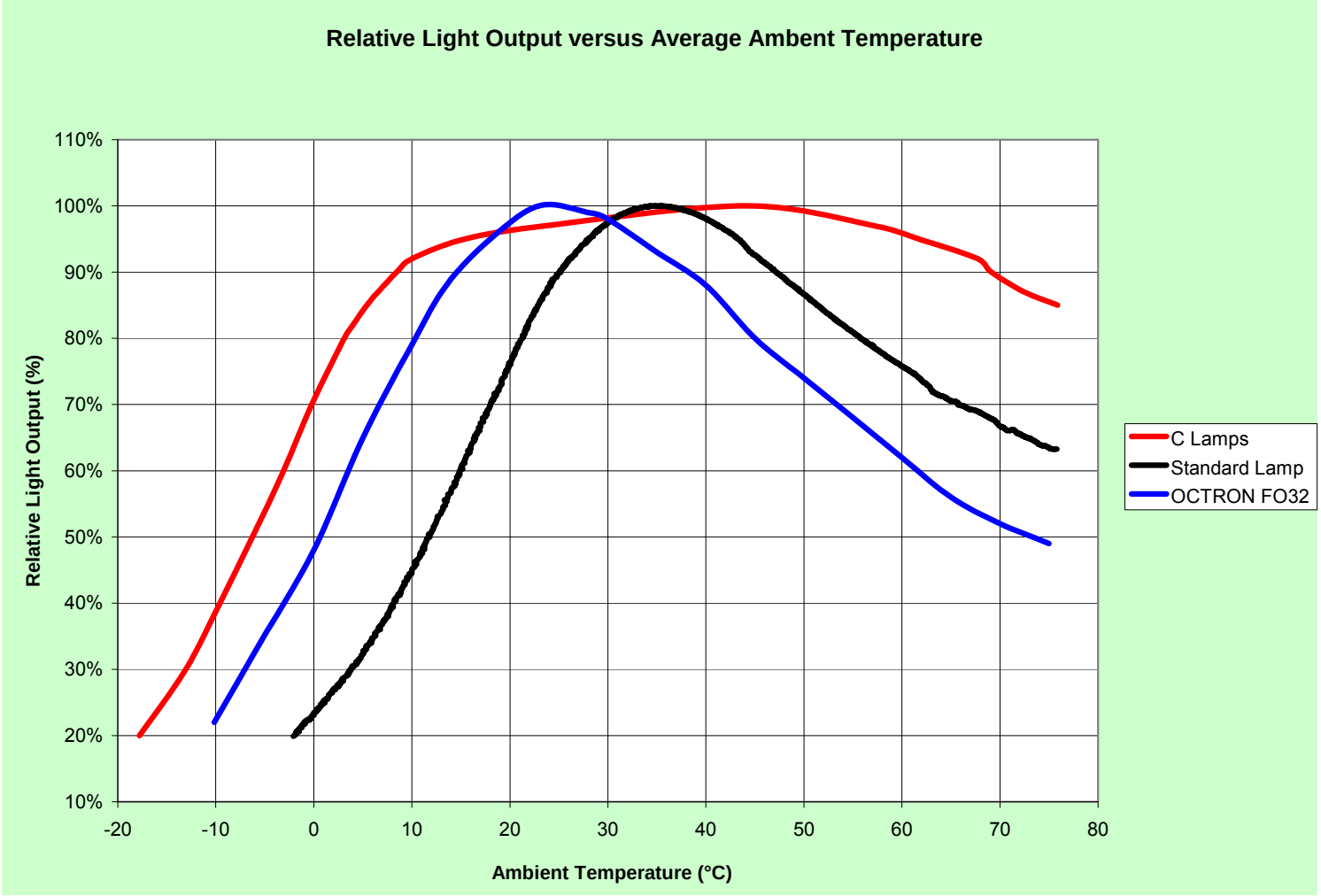
PENTRON® C HO

- **Declare independence from temperature with PENTRON C !!!**
- **PENTRON C opens new applications**
  - More light output over a wider temperature range
- **90% light output from 10°C to 70°C**
- **TCLP complaint - ECOLOGIC®**
  - Same low dosing as standard FP54 T5 HO lamp
- **Allows fluorescent to be used in more traditional HID applications**

FP54/835/**C**/HO/ECO

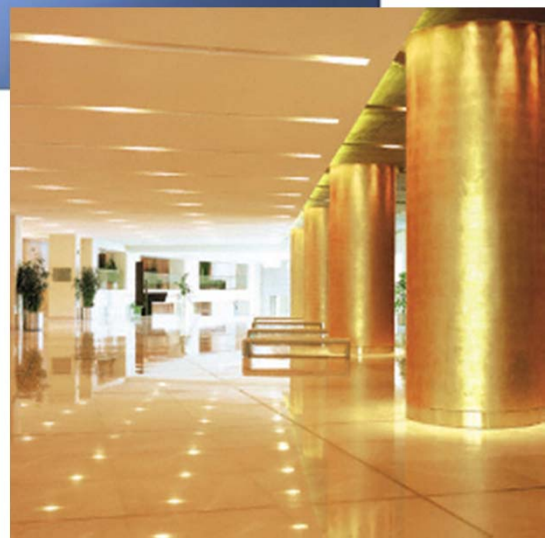
SYLVANIA

PENTRON C - OSI Exclusive



PENTRON® HO SUPERSAVER®

Product Features & Benefits



Delivers same light as standard 54WT5

- Four foot nominal length
- **Wattage: 50W**
- 5000 lumens @ 35°C
- CCT: 3000K, 3500K, 4100K & 5000K
- CRI: 85
- Average rated life:
  - 30,000 hours at 3hrs/start
  - 40,000 hours at 12 hours/start
- TCLP compliant and lead free
- Operate on QUICKTRONIC® PROSTART® T5HO Ballast
- Dimmable
- 6% Energy savings Vs standard 54W lamp
- QUICK 60+® system warranty

SYLVANIA

OCTRON®XP® XL ECOLOGIC®3

Product Features

Lamps last 50% longer than conventional T8 lamps

Average Rated Lamp Life:

Instant Start

- **36,000 hrs @ 3hrs/start &**
  40,000 hrs @ 12hrs/start

Programmed Start

- **40,000 hrs @ 3hrs/start &**
  46,000 hrs @ 12hrs/start

- Four-foot lamps:
  - Full wattage 32W – 2950 initial lumens*
  - 2 SUPERSAVER® versions
    28W – 2600 lumens
    25W – 2400 lumens
- 97% lumen maintenance
- 3500K, 4100K & ***New*** 5000K
- 3500K & 4100K - 85 CRI 5000K - 80CRI

Applications:
Retail, Schools, Offices, Hospitals, Industrial

QUICK 60+® system warranty
48 months for OCTRON XP® XL lamps
(60 months on lamps for schools)
60 months for ballast

OCTRON® 23W XP® SUPERSAVER® ECOLOGIC®3

Product Features & Benefits

Lowest wattage lamp in the industry

Four-foot lamps:

- **23W – 2000 lumens**
- Average rated life

  3 hrs per start/12 hrs per start:

  24,000/36,000 hours - IS

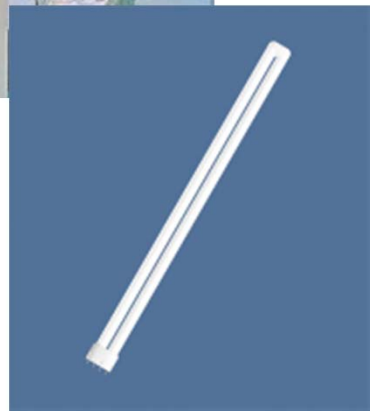
  36,000/42,000 hours - PS
- 95% lumen maintenance
- 3500K, 4100K, 5000K
- 85 CRI
- 8% energy savings Vs 25WSST8
- **28% energy savings Vs 32WT8**
- **Lower mercury content – 2.9 mg**

Applications:

Cove, Hallways, Over lit Offices

DULUX® L 25W SUPERSAVER®

Product Features & Benefits



Applications:

2X2 fixtures

Wall wash

Cove

Energy savings replacement for FT40DL

- Wattage: 25W
- 2500 lumens
- CCT: 3000K, 3500K & 4100K
- CRI: 85
- Average rated life: 20,000 hours
- 86% lumen maintenance
- TCLP compliant
- Operates on QUICKTRONIC® QHE DL ISN & QTP TT5 PSN Ballasts
- 38% energy savings Vs standard 40W lamp
- Improved fixture efficiency
- QUICK 60+® system warranty

SYLVANIA

DULUX® T/E SUPERSAVER®

December

Product Features & Benefits

Energy saving replacements for standard lamps

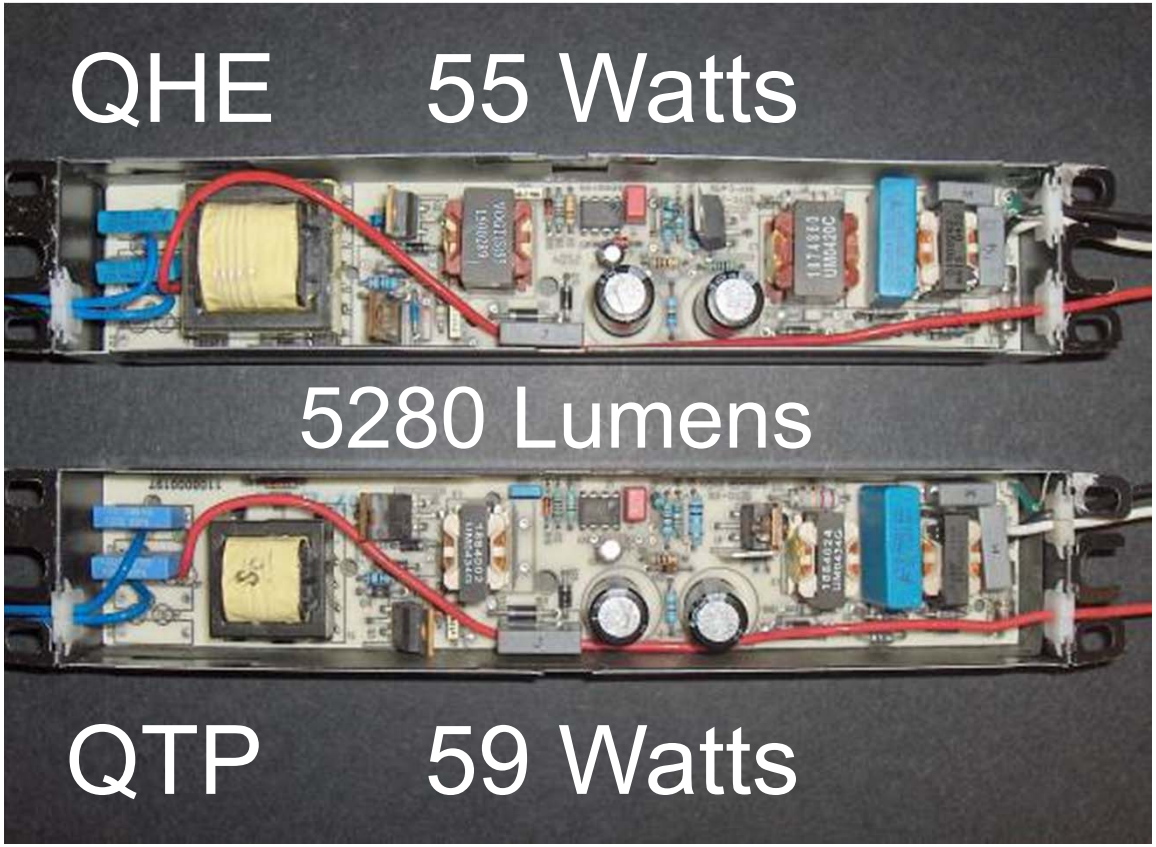
Applications:

Down lights recessed fixtures, Wall sconces, Pathway

- Triple tube, 4-pin compact fluorescent lamps
- Wattages:
  - **23W** **1620 lumens**
  - **29W** **2160 lumens**
  - **38W** **2880 lumens**
- Replacements for 26W, 32W & 42W DULUX T/E lamps
- CCT: 3000K, 3500K & 4100K
- CRI: 85
- Average rated life: 12, 000 hours
- TCLP compliant
- Up to 10% Energy savings
- QUICK 60+® system warranty

SYLVANIA

What is High-efficiency ?



What's 4 Watts?

- 4 Watts
- 4000 hours
- $.10/kWh

$1.60

Using higher grade components

SYLVANIA

www.sylvania.com

T8 & T5HO QUICKSTEP®

(Bi-level) Dimming

Bi-level dimming is just a Quick Step away!

- Easily switch from 100% to 50%
- High efficiency UNV (120-277V)
- Two lamp PROStart® models
- Meets energy code switching requirements
  - California Title 24 compliant
  - ASHRAE
  - EPAct
- T8 ballasts operate all full wattage lamps
  - 55W @ 0.87 BF
  - 27W @ 0.34 BF

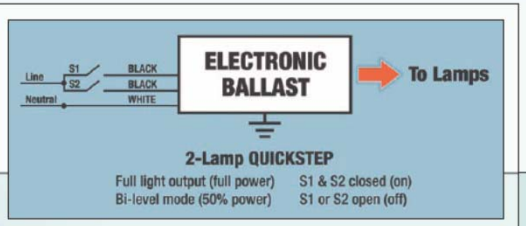
see pages 80-81

- T5HO ballast runs FP54T5HO lamps
  - 96W @ 0.80 BF
  - 52W @ 0.40 BF

see pages 60-61

Applications:

- Offices, schools & conference rooms
- Bi-level control with standard wall switches



2-Lamp QUICKSTEP

Full light output (full power) — S1 & S2 closed (on)
Bi-level mode (50% power) — S1 or S2 open (off)

QUICKSTEP® BI-LEVEL DIMMING

78

SEE THE WORLD IN A NEW LIGHT SYLVANIA

see pages 80-81

- T8 ballasts operate all full wattage lamps
  - 55W @ 0.87 BF
  - 27W @ 0.34 BF

2008 IES PROGRESS Report SELECTION

see pages 60-61

- T5HO ballast runs FP54T5HO lamps
  - 96W @ 0.80 BF
  - 52W @ 0.40 BF

SYLVANIA

2-wire or not 2-wire? That is the question.

POWERSENSE® is the answer!

T8 & T5 POWERSENSE

Dimming HIGH EFFICIENCY BALLASTS

see pages 82-87

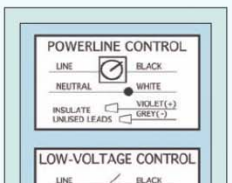
The industry's first product to operate on power line Fluorescent controllers and/or low-voltage (0-10 Vdc) controls.

For Individual Offices or Conference Rooms Use Powerline Controls:

- Easy install with 2-wire power line dimmer
- Easier to retrofit; no additional control wires

POWERSENSE Ballasts

- 100-5% dimming range for fluorescent T8 lamps (F032, 25 & 17T8)
- 100-1% dimming range for fluorescent T5 lamps (FP14, 21, 28 & 35T5)
- Universal voltage (120-277V)



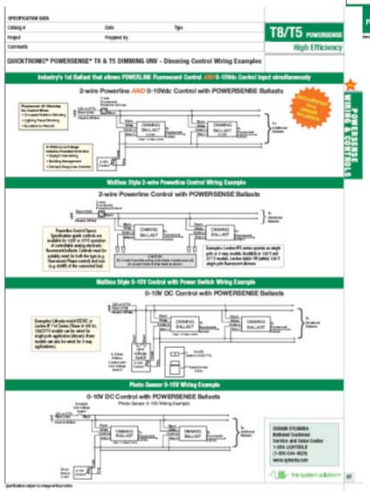
Daylight Harvesting or Building Automation Applications:

- Use standard low-voltage devices (0-10 Vdc, Class 1 or 2) to control the lighting system
- For new construction & retrofits

POWERSENSE® T8 & T5

see pages 82-87

2008 IES PROGRESS Report SELECTION



SYLVANIA

METALARC® Pulse Start

Product Overview

- Offered in 39W -1000W
- E17, BT28, BT37, PAR38
- Clear & coated
- Improved lumen maintenance
- Reduced color shift through Life
- Faster Re-strike
  - 7-12 minutes - Standard
  - 5 –7 minutes - Pulse Start

Requires ballast with an igniter

Exclusive Universal Offering: 175W, 250W & 400W

Available now

New Enclosed Rated E17 - 70W, 100W and 150W

NEC 2005 & 2008 require new construction and/or major renovation to use PRO-TECH lamps with EX39 sockets in open fixtures or fixture with a lens

Applications

- Industrial, retail, lobbies/atriums, flood lighting, security lighting

SYLVANIA

POWERBALL® Ceramic Metal Halide

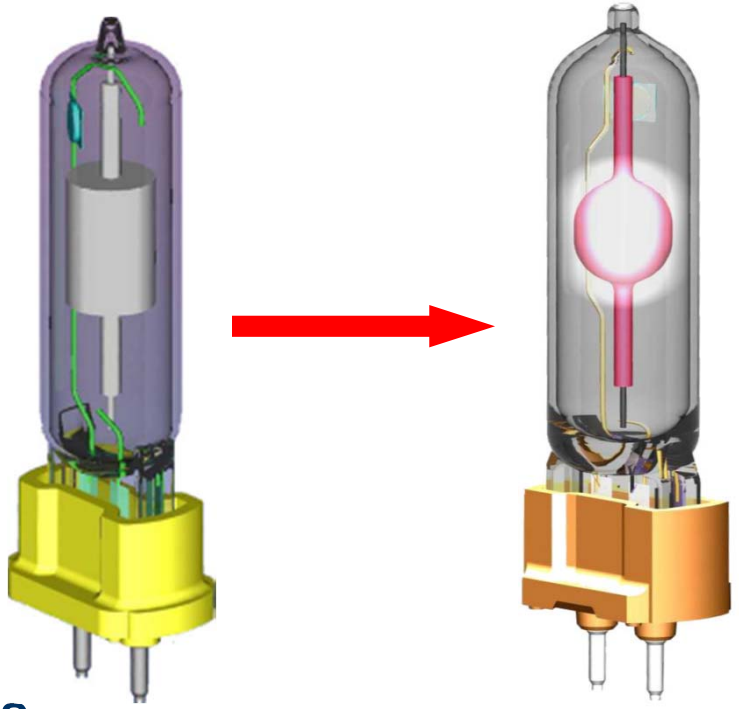
WE HAVE THE COMPETITIVE ADVANTAGE

POWERBALL=Longer Life

POWERBALL=Light Quality

- Color Shift
- Color Consistency
- Brilliant white light

POWERBALL=High CRI and high R9's



Exclusive first to market patented POWERBALL®

METALARC® POWERBALL® EL ECOLOGIC®

Product Comparison

POWERBALL® EL *24WPAR38 Integrated* Vs Halogen PAR38

Halogen PAR38 Spot (W)	Avg. Rated Life (hrs)		Spot CBCP (Candela)		Energy Savings	
	Halogen	POWERBALL ® EL	Halogen	POWERBALL ® EL	Watts	Dollars*
120	3,000	12,000	22,500	26,000	96	$115
90	3,000	12,000	20,000	26,000	66	$79
75	3,000	12,000	19,200	26,000	51	$61
60	3,000	12,000	16,000	26,000	36	$43

*Energy savings per lamps over life time – based on $0.10 kWh

POWERBALL® EL *24WPAR30LN Integrated* Vs Halogen PAR30

Halogen PAR30LN Spot (W)	Avg. Rated Life (hrs)		Spot CBCP (Candela)		Energy Savings	
	Halogen	POWERBALL ® EL	Halogen	POWERBALL ® EL	Watts	Dollars*
75	2,500	12,000	12,000	21,000	51	$61
50	2,500	12,000	7,000	21,000	26	$31

*Energy savings per lamps over life time – based on $0.10 kWh

METALARC ® POWERBALL® Ceramic Metal Halide

PAR20, PAR30, PAR38

- PAR20: 20W, 39W (10° and 30°) ***New 39W - 940***
- PAR30: 20W, 39W, & 70W (10° and 30°) ***New 39W, 70W - 940***
  - ***New product proposal – 50WPAR30***
- PAR38: 70W, 100W and 150W (15°, 25°, 65°) ***Increased life to 15,000 hours***

Medium & Mogul Base Lamps

- E17 Open Rated: 50W, 70W, 100W &
- 150W(Clear/Coated)
- ***New E17 Enclosed Rated***: 70W, 100W & 150W(Clear/Coated)
- BT28: 250W (Clear/Coated) ***Increased life to 20,000 hour***
- BT37: 320W (Clear/Coated)

2008 PROGRESS Report SELECTION

SYLVANIA

QUESTIONS ?