

August 2014

Effects of Legislation on Lighting

Ballast Efficiency Standards

- effective November 14,2014 and replaces ballast standards established by the DOE Rulemaking in 2000
- Establish a new ballast efficiency measurement metric known as Ballast Luminous Efficiency (BLE)
- **Coverage:**
 The rule goes beyond T12 to also regulate T8 and T5 electronic ballasts, operating on 120-277V and 60Hz with a power factor greater than or equal to 0.90 for commercial application and 0.50 for residential applications. The rulemaking covers:
 - Residential and nonresidential instant start, rapid start and programmed start ballasts operating
 - T5 4ft. miniature bi-pin (standard and high output)
 - T8 4-ft. and 2-ft. U-shaped with medium bi-pin bases
 - T12 8-ft. single-pin base
 - T12 8ft. recessed double contact high output lamps
 - Sign ballasts that operate 8-ft high output lamps
 - Currently standard applies to T12 ballasts only
- **Exemption**
 - Dimming ballasts that dim to 50% or less of maximum output
 - Electromagnetic ballasts that are labeled and marketed for use in EMI sensitive environment
 - Programmed start ballasts operating 4ft medium bi-pin lamps that deliver less than 140 mA of discharge current per lamp
- **Requirements**
 - Residential ballasts must meet FCC 47 CFR part 18 and be designed, labeled and marketed only for use in residential application
 - Sign ballasts must acquire a UL Type 2 rating and be designed, labeled and marketed only for use in outdoor signs.
 - All ballasts must meet Ballast Luminous Efficiency (BLE) metric standard.

BLE = A/(1+B*average total lamp arc power ^ -C) Where A, B, and C are as follows:			
Description	A	B	C
Instant start and rapid start ballasts (not classified as residential) that are designed to operate	0.993	0.27	0.25
4-foot medium bi-pin lamps.			
2-foot U-shaped medium bi-pin lamps.			
8-foot slimline lamps.			
Programmed start ballasts (not classified as residential) that are designed to operate	0.993	0.51	0.37
4-foot medium bi-pin lamps.			
2-foot U-shaped medium bi-pin lamps.			
4-foot miniature bi-pin standard output lamps.			

4-foot miniature bi-pin high output lamps.			
Instant start and rapid start ballasts (not classified as sign ballasts) that are designed to operate 8-foot high output lamps.	0.993	0.38	0.25
Programmed start ballasts (not classified as sign ballasts) that are designed to operate 8-foot high output lamps.	0.973	0.70	0.37
Sign ballasts that operate 8-foot high output lamps	0.993	0.47	0.25
Instant start and rapid start residential ballasts that operate	0.993	0.41	0.25
4-foot medium bi-pin lamps.			
2-foot U-shaped medium bi-pin lamps.			
8-foot slimline lamps.			
Programmed start residential ballasts that are designed to operate	0.973	0.71	0.37
4-foot medium bi-pin lamps.			
2-foot U-shaped lamps.			

Impact on Electronic Fluorescent ballasts

- Most of the existing T12 and a number of T8 ballasts will be redesigned to meet requirements
- Existing inventories can be sold until they are exhausted
- Majority of outdoor sign and residential-only ballasts are at greater risk

Energy Star Lamps V1.0

- Effective September 30,2014
- EPA’s intent was to merge existing specifications into one technology-neutral specification and to further increase quality and reliability
- **Scope:**
All integrated ballasts and drivers CFLs and LEDs lamps classified into
 - Omnidirectional: A, BT, P, PS, S and T shapes
 - Decorative: B, BA, C, CA, DC, F and G shapes
 - Directional: R, BR, ER, MR and PAR
 - Non-standard Lamp Form: Bare spiral, bare mini spiral, bare twin tubes, bare triple tubes, bare quadruple tube, covered CFLs, Covered CFLs with reflectors...
 - Base types E26, E26d, E17, E11, E12, GU24, GU5.3, and GX5.3
- **What’s new?**
Performance criteria for energy star certification have improved, including:
 - Increased luminous efficacy

Luminous Efficacy: All Lamps		
Lamp Type	ENERGY STAR Requirements	
	Lamp Rated Wattage (watts)	Minimum Lamp Efficacy (initial lm/W)
Omnidirectional	<15	55
	≥15	65
Directional	<20	40
	≥20	50
Decorative	<15	45
	15 ≤ W <25	50

	≥25	60
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- Increased minimum hours rated life: CFL: **10,000 hours.** ; LED: **15,000 hours** (decorative); **25000 hours** (others)
- Decreased mercury content
 - Lamps of wattage less than 23W should have a mercury content of 2.5mg or less
 - Lamps of wattage greater than 23W should have a mercury content of 3.0 mg or less
- longer minimum warranty period based on 3 hours use per day:
 - Lamps with rated life of 15000 hours or less should have a minimum warranty period of 2 years
 - Lamps with rated life greater than 15000 hours should have a minimum warranty period of 3 years

Buy American Act

- A provision under the American Recovery and Reinvestment Act of 2009 (ARRA)
- Funds provided by the Act for project on public buildings or public works should be used for goods produced in the United States
- **Exemption:**

Some lamps categories are exempted from the regulation based on the fact that sufficient quantities and /or of satisfactory quality cannot be produced or manufactured in the United States. Such a waiver is known as a non-availability exception. Products qualifying for a non-availability exception are:

 - 1) LED traffic lights, arrows, and crosswalk signals;
 - 2) Fluorescent electronic lighting ballasts (with the exception of electronic dimming ballasts for fluorescent lamps that are capable of operating the lamps below 50% of their rated light output)
 - Our ProLume T5, T8, T12, circline and CFL ballasts
 - 3) Screw base and pin-base compact fluorescent lamps (with the exception of plug-in CFLs longer than 10 inches)
 - All our ProLume CFLs (spirals and covered)
 - All our ProLume plug ins except the long twin tubes (PLLs) with 10” or greater (PLL24; PLL36, PLL40, PLL55)

2009 DOE IRL & GSFL Lamp Rule Making

- Effective **July 14, 2012** for IRL, the rule covers many of the lamp families addressed by EPACT 1992.
- Among reflectors, the lamps that are covered are: PAR20, PAR30, PAR38, R20, BR30, ER30, BR38, BR40 and ER40 in wattages between 40 and 205.
- The GSFL lamp rule making became effective July 14,2014 and covers the T8-T12 8-ft. Slimline and HO, 4-ft. Rapid Start; 2-ft. U-Bend and 4-ft. T5 Rapid Start
- **Note:** Previously GSFLs were exempt at 82 CRI for high color rendering. The DOE changed this to 87 CRI in April 2011, which was earlier than originally expected
- Exemptions for non-general lighting applications which/ are:
 - Promote plant growth
 - For cold temperature applications
 - Colored fluorescent lamps
 - Impact-resistant fluorescent lamps
 - Reflectorized or aperture lamps
 - Used in reprographic equipment

- Produce radiation in the ultra-violet range
- Have a CRI of 87 or greater

Impact on Incandescent & Halogen Reflector Lamp (IRL) Products

- Most of the standard PAR halogen lamps has been eliminated
- Only a few halogen reflector lamps (e.g., PAR20, PAR30, PAR38) has met the Final Rule standards
- Most 130V PAR Halogen lamps has been eliminated, because of increased efficiency standard above 125V
- The existing lamps that meet the new standards are more expensive than standard Halogen lamps on the market today (gas mixtures, reflector materials and IR capsules largely contribute to increased cost)
- Continuing exemption under EISA 2007 for the R20 (45W or less); BR30, ER30, BR40, and ER40 (50W or less); BR30, BR40, and ER40 that are exactly 65W; no exemptions for PAR lamps 40W and over were made.

Impact on General Service Fluorescent Lamp (GSFL) Products

Covered product definitions include 4-foot and 8-foot linear and 2-foot U-Bend lamps. Regulated wattages are displayed in the table below by lamp, starting type and output. Following is a more detailed discussion of the efficiency regulations as they relate to GSFL.

Covered General Service Fluorescent Lamps by Minimum Wattage						
	T12/T10		T8		T12/T8 U-Bend	T5
	Instant Start (Slimline)	Rapid Start	Instant Start (Slimline)	Rapid Start	Rapid Start	Rapid Start
Standard rated wattage and above	52W	25W	52W	25W	25W	26W
High Output rated wattage and above	52W	All HO, RDC base lamps	52W	All HO, RDC base lamps	N/A	49W

Lamp type	Correlated Color Temperature	Minimum Average Lamp Efficacy (lm/W)
4-foot Medium Bi-pin (F40T12, F34T12, F40T10, F32T8, F28T8, F25T8ES)	≤4500K	
	>4500K and ≤7000K	88
2-foot U-Shaped (FB40T12, FB34T12, FB32T8, FB31T8, FB28T8)	≤4500K	84
	>4500K and ≤7000K	81
8-foot Slimline (F96T12, F96T8)	≤4500K	97
	>4500K and ≤7000K	93
8-foot High Output (F96T12HO, F96T8HO)	≤4500K	92
	>4500K and ≤7000K	88
4-foot Miniature Bi-pin Standard Output (F28T5)	≤4500K	86
	>4500K and ≤7000K	81
4-foot Miniature Bi-pin High Output (F54T5HO, F49T5HO)	≤4500K	76
	>4500K and ≤7000K	72

Impact on General Service Fluorescent Lamp (GSFL) Products (continued)

- T12 4-ft. & 2-ft. U-Bends with medium bi-pin bases
 - Majority of F40 and F34T12 lamps and all FB40 and FB34T12 U-Bends failed
- T12 8-ft. Slimline
 - All 75W F96T12 lamps failed
 - All 60W F96T12/ES failed except for Ultra50
 - High CRI lamps exempt
- T12 8-ft. 800mA HO with Recessed DC bases
 - All 110W F96T12 HO lamps failed; required enhanced coatings & 10,120 lumens to pass

- All 95W F96T12/ES/HO failed; required enhanced coatings & 8,740 lumens to pass
- T8 4-ft. & 2-ft. U-Bends with medium bi-pin bases
 - T8 700 Series lamps failed; 800 and 900 series passed
 - All 2-ft. 800 Series U-Bends passed
- T8 8-ft. Slimline
 - T8 700 Series lamps failed; required 5,723 lumens at 59W to pass
- T5 4-ft. with miniature bi-pin bases
 - All pass; intent of T5 standard is to keep lesser performing halo phosphor-based lamps out of U.S. market

2007 Energy Independence and Security Act

EISA 2007 provides for federal minimum efficiency standards that affect A-line lamps and incandescent reflector lamps. Other provisions within the law include regulations for ballasts used in Metal Halide Fixtures.

A-Line Lamps

- The incandescent A-Line regulations primarily affect the common 40W, 60W, 75W, and 100W incandescent lamps. Effects of the legislation are not limited only to A-Shape lamps. It also covers Globes, Chandelier and PS lamps. EISA 2007 requires an increase in efficiency by approximately 30% starting in 2012 by requiring a reduction in lamp wattage while maintaining lumen levels; most specialty and decorative lighting are not regulated and continue to be sold. Since most incandescent lamps were not able to achieve the outlined standards, most has been phased out on the dates the law went into effect.

Today's Wattage	Maximum Rated Wattage	Lumen Range*	Min Efficacy Required (lm/w)	Minimum Life	Effective Date**
100W	72W	1490-2600	20.69	1000 Hrs	1/1/2012
75W	53W	1050-1489	19.81	1000 Hrs	1/1/2013
60W	43W	750-1049	17.44	1000 Hrs	1/1/2014
40W	29W	310-749	10.68	1000 Hrs	1/1/2014
* Reduced by 25% for Modified Spectrum Lamps					
** CA has the option to adopt standards one year earlier. All other states preempted.					

- CA adopted the more stringent efficacy standards January 1, 2011, one year ahead of 2012 implementation.

Incandescent Reflector Lamps

- All R20, R30, R40, PAR20, PAR30, PAR38, BR40, ER30, ER40 and BPAR had to meet Halogen efficiency levels except:
 - Lamps rated at 50 watts or less that are ER30, BR30, BR40 or ER40 lamps
 - Lamps rated at 65 watts that are BR30, BR40 or ER40 LAMPS
 - R20 incandescent reflector lamps rated 45 watts or less

Metal Halide Fixtures

- EISA 2007 standards essentially eliminate the use of magnetic ballasted probe start systems in new fixtures. The groups affected are Metal Halide lamp fixtures designed to be operated with lamps rated greater than or equal to 150 watts but less than or equal to 500 watts. These fixtures shall contain a pulse start metal halide ballast with a minimum ballast efficiency of 88 percent, magnetic probe-start ballast with a minimum efficiency of 94 percent, a non-pulse start electronic ballast with a minimum ballast efficiency of 92% for wattages greater than 250 watts; or a minimum ballast efficiency of 90% for wattages less than or equal to 250 watts. Exceptions are provided for:
 - Regulated-lag ballasts
 - Electromagnetic ballast operating at 480V
- Exemptions effective **January 1, 2009**:
 - Fixtures with regulated lag ballasts;
 - Fixtures that use electronic ballast that operate at 480 volts;
 - Fixtures that:
 - Are only rated for 150 watt lamps and

- Are rated for use in wet locations and
- Contain a ballast that is rated to operate at ambient air temperatures of 50°C.

FTC Lighting Facts Label

- Product labeling depicts product performance and energy usage information using required package and on-lamp disclosures. The stated objective is to move consumers away from selecting lamps based solely on wattage and encourage behavior wherein product selection is based on performance and annual energy usage cost.
- Provides consumers with point-of-sale product performance and energy usage information in a format not that dissimilar to the Nutrition Facts label in terms of design and layout.
- This Lighting Facts label supplants the previous disclosures required by DOE. The FTC, which oversees the Lighting Facts label for most lamps require the new label on general service lamps between 40 and 60 watts. This decision excludes current lamps in the range of 100 and 75 watts that do not pass DOE efficacy standards.