



ENERGY STAR

Lighting Specifications Update

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ENERGY STAR 2010 Products Partner Meeting

Denver, Colorado



Learn more at energystar.gov



Outline



- Introduction & Background
 - Lighting specification integration
 - Technology neutrality
- ENERGY STAR Luminaires
 - Ceiling & Ventilation Fans
- ENERGY STAR Lamps
- Lighting Controls Scoping
- Enhanced Testing and Verification

Introduction & Background



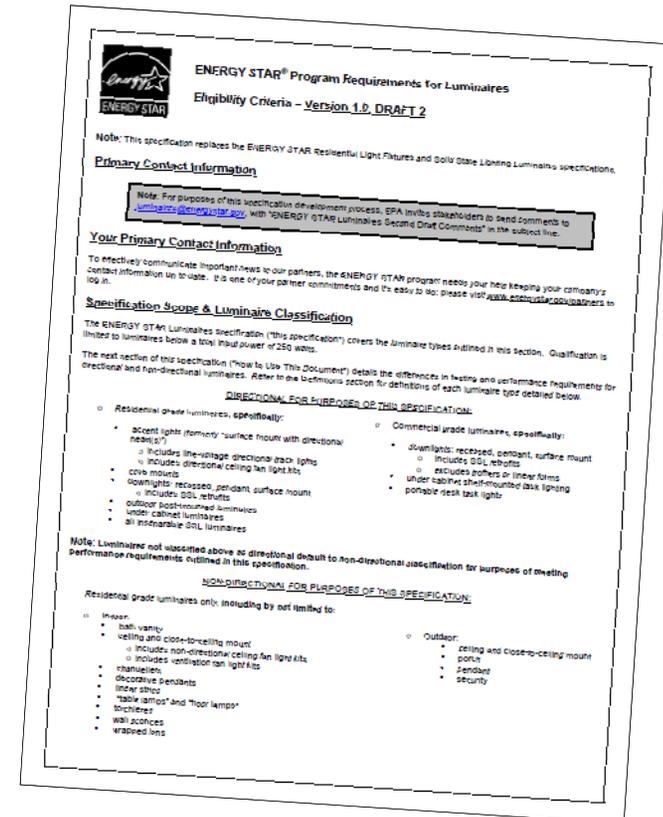
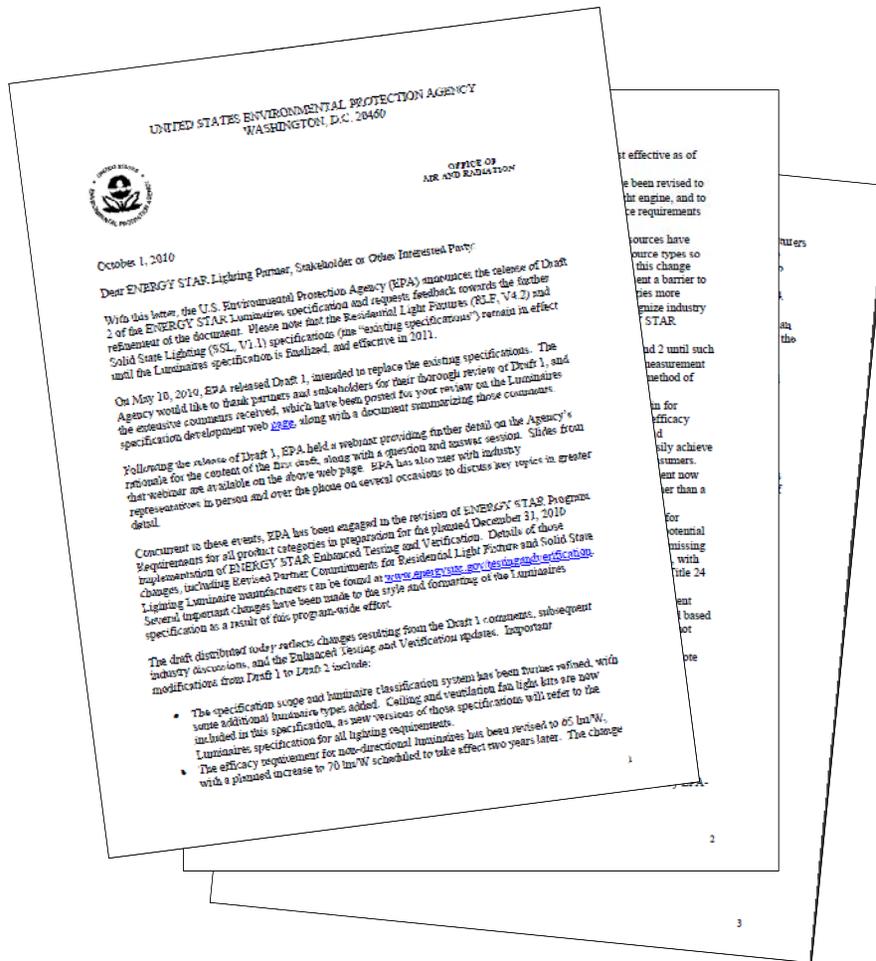
- New MOU signed September 30, 2009
- Lighting Integration Proposal released December 4, 2009
 - Residential Light Fixtures v4.2 (RLF)
 - Solid State Lighting Luminaires v1.1 (SSL)
 - Compact Fluorescent Lamps v4.0 (CFL)
 - Integral LED Lamps v1.1 (ILL?? ILEDL?)
- Technology neutrality

ENERGY STAR Luminaires V1.0



- Combines RLF & SSL scope
 - RLF & SSL to be sunset in 2011
- Draft 1 released May 10, 2010
- 54 comment letters received
- Webinar June 8, 2010
- www.energystar.gov/luminaires
- Draft 2 released today!

ENERGY STAR Luminares V1.0 Draft 2 Released This Morning



ENERGY STAR Luminaires V1.0



ENERGY STAR® Program Requirements for Luminaires

Eligibility Criteria – Version 1.0, DRAFT 2

Note: This specification replaces the ENERGY STAR Residential Light Fixtures and Solid State Lighting Luminaires specifications.

Primary Contact Information

Note: For purposes of this specification development process, EPA invites stakeholders to send comments to luminaires@energystar.gov, with "ENERGY STAR Luminaires Second Draft Comments" in the subject line.

Your Primary Contact Information

To effectively communicate important news to our partners, the ENERGY STAR program needs your help keeping your company's contact information up to date. It is one of your partner commitments and it's easy to do: please visit www.energystar.gov/partners to log in.

Specification Scope & Luminaire Classification

The ENERGY STAR Luminaires specification ("this specification") covers the luminaire types outlined in this section. Qualification is limited to luminaires below a total input power of 250 watts.

The next section of this specification ("How to Use This Document") details the differences in testing and performance requirements for directional and non-directional luminaires. Refer to the Definitions section for definitions of each luminaire type detailed below.

DIRECTIONAL FOR PURPOSES OF THIS SPECIFICATION:

- Residential grade luminaires, **specifically:**
 - accent lights (formerly "surface mount with directional head(s)")
 - includes line-voltage directional track lights
 - includes directional ceiling fan light kits
 - cove mounts
 - downlights: recessed, pendant, surface mount
 - includes SSL retrofits
 - outdoor post-mounted luminaires
 - under cabinet luminaires
 - all inseparable SSL luminaires
- Commercial grade luminaires, **specifically:**
 - downlights: recessed, pendant, surface mount
 - includes SSL retrofits
 - excludes troffers or linear forms
 - under cabinet shelf-mounted task lighting
 - portable desk task lights





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 - outdoor post-mounted luminaires
 - under cabinet luminaires
 - all inseparable SSL luminaires
- Commercial grade luminaires, specifically:
 - downlights: recessed, pendant, surface mount
 - includes SSL retrofits
 - excludes troffers or linear forms
 - under cabinet shelf-mounted task lighting
 - portable desk task lights

Note: Luminaires not classified above as directional default to non-directional classification for purposes of meeting performance requirements outlined in this specification.

NON-DIRECTIONAL FOR PURPOSES OF THIS SPECIFICATION:

Residential grade luminaires only, including but not limited to:





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- cove mounts
- downlights: recessed, pendant, surface mount
 - includes SSL retrofits
- outdoor post-mounted luminaires
- under cabinet luminaires
- all inseparable SSL luminaires
- portable desk task lights

Note: Luminaires not classified above as directional default to non-directional classification for purposes of meeting performance requirements outlined in this specification.

NON-DIRECTIONAL FOR PURPOSES OF THIS SPECIFICATION:

Residential grade luminaires only, including by not limited to:

- Indoor:
 - bath vanity
 - ceiling and close-to-ceiling mount
 - includes non-directional ceiling fan light kits
 - includes ventilation fan light kits
 - chandeliers
 - decorative pendants
 - linear strips
 - “table lamps” and “floor lamps”
 - torchieres
 - wall sconces
 - wrapped lens
- Outdoor:
 - ceiling and close-to-ceiling mount
 - porch
 - pendant
 - security





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Definitions

Accent Light (Luminaire): A directional luminaire employed to emphasize a particular object or surface feature, or to draw attention to a part of the field of view (adapted from IES RP-16-10: "Accent Lighting"). Includes line-voltage directional track luminaires.

ALA: American Lighting Association.

ANSI: American National Standards Institute.

Aperture Size (downlights): The maximum distance between the points inside the luminaire where light escapes the luminaire.

ASSIST: Alliance for Solid State Illumination Systems and Technologies.

ASTM: American Society for Testing of Materials.

Ballast: A device used with an electric-discharge lamp to obtain the necessary circuit conditions (voltage, current, and waveform) for starting and operating. (IES RP-16-10)

Ballast Frequency: The number of waves or cycles of electromagnetic radiation per second, usually measured in Hz. (Lighting Fundamentals Handbook, Electric Power Research Institute, 1992)

Bath Vanity Luminaire: wall-mounted luminaires located adjacent to a mirror.

Ceiling / Close-to-Ceiling Mount Luminaire: Ceiling-mounted luminaires that direct less than 90% of light downward and are not intended to accent an object or an area within a space.

CFL: A compact fluorescent lamp (pin based or self-ballasted screw base). See Compact Fluorescent Lamp.

Chandeliers: Decorative, often branched, luminaires suspended from the ceiling incorporating multiple light sources.

CIE: Commission Internationale de l'Eclairage (International Commission on Illumination).

Color Rendering: A general expression for the effect of a light source on the color appearance of objects in conscious or subconscious comparison with their color appearance under a reference light source. (IES Handbook 9th Edition)

Color Rendering Index (CRI): A measure of the degree of color shift objects undergo when illuminated by the light source as compared with those same objects when illuminated by a reference source of comparable color temperature. (IES Handbook 9th Edition)

Compact Fluorescent Lamp (CFL): A fluorescent lamp with a small diameter glass tube (T5 or less) that is folded, bent, or bridged to create a long discharge path in a small volume. The lamp design generally includes an amalgam and a cold chamber, or a cold spot to control the mercury vapor pressure and light output. (IES RP-16-10)

Commercial Luminaire: A luminaire marketed and intended to be used in a commercial, industrial or business environment, exclusive





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Product Qualification

A. Product Families: grouped product submissions for ENERGY STAR qualification shall meet the following requirements:

Qualified products within a product family shall be identical to the tested, representative model with the exception of allowed variations listed in Table 1, below. The representative model shall be the variation expected to have the greatest difficulty meeting the performance criteria outlined in this specification.

Table 1: Allowable Variations Within Product Families

Housing / Chassis	Allowed so long as the light source or lampholder, ballast or driver, and heat sink (as applicable) are integrated into housing / chassis variations in such a way that the thermal performance of the luminaire is not degraded by changes to the housing / chassis. Thermal measurements of each variation may be required (e.g. ballast case temperature, TMP _{LED} , or TMP _C).
Heat Sink / Thermal Management Components	Not allowed.
Finish	Allowed.
Mounting	
Reflector / Trim	Allowed so long as luminaire light output is not reduced.
Shade / Diffuser	Allowed so long as neither luminaire light output nor air flow are reduced.
Light Source (refers to the make and/or model of the source; also review CCT below)	Allowed so long as variations will not negatively impact luminaire's compliance with any performance criteria in this specification.





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Photometric Performance Requirements

Luminous Efficacy and Output Requirements: **NON-DIRECTIONAL RESIDENTIAL Luminaires**

Note: Luminaire types not denoted as directional on the first page of this specification shall be evaluated as non-directional, based on source photometry. The performance values in this section pertain to the performance of the source (system including ballast or driver) within a luminaire.

Source Type	ENERGY STAR Requirements		Methods of Measurement and/or Reference Standards	Supplemental Testing Guidance
	Source Efficacy	Source Minimum Light Output		
Fluorescent <ul style="list-style-type: none"> linear compact self ballasted compact (GU24) circline 	<p>Until Sept. 1, 2013: ≥ 65 lm/W per lamp-ballast platform</p> <p>After Sept. 1, 2013: ≥ 70 lm/W per lamp-ballast platform</p> <p>All lamp and ballast permutations (makes and models) employed in a given luminaire</p>	<p>Lamp-ballast platform shall provide a minimum of 800 lumens.</p> <p><u>Exception:</u> chandeliers and bath vanity luminaires featuring more than 3 heads shall provide a minimum of 450 lumens per head.</p>	<p>Linear & circline: IES LM-9-09</p> <p>Compact & self ballasted compact: IES LM-66-00</p> <p>ANSI C78.81-2010 (for T8)</p> <p>IEC 60081 data sheets (for T5)</p>	<p>Laboratory test results shall be produced using the specific lamp and ballast combination that will be used in production.</p> <p>Linear fluorescent luminaires which do not ship with lamps shall be tested using lamps compliant with ANSI C78.81-2010 (for T8) or IEC 60081 data sheets (for T5).</p> <p>Luminaires with ballast(s) capable of operating multiple fluorescent lamp types shall be tested either with the lamp(s) shipped with the luminaire, or if a lamp is not supplied, with one of the lamp types detailed on the packaging.</p> <p>Sample Size: ≥ 3 lamp-ballast combination samples shall be tested.</p> <p>Passing Test: all samples shall pass.</p>





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<p>pressure sodium</p>	<p>dimmmable versions of GU24 based integrated lamps are required to meet reduced efficacy requirements as outlined in qualification requirements for those lamps.</p>			<p>the luminaire.</p> <p>Sample Size: ≥ 3 lamp-ballast combination samples shall be tested.</p> <p>Passing Test: all samples shall pass.</p>
<p>Solid State: LED Light Engine</p>	<p>LED light engine efficacy shall meet or exceed the values detailed below, as determined by comparing the <i>in situ</i> T_b temperature and the LED light engine LM-xx test report.</p> <p>Until Sept. 1, 2013: ≥ 65 lm/W per LED light engine</p> <p>After Sept. 1, 2013: ≥ 70 lm/W per LED light engine</p>	<p>Each LED light engine <i>in situ</i> shall provide a minimum of 800 lumens.</p> <p><u>Exception:</u> chandeliers and bath vanity luminaires featuring more than 3 heads shall provide a minimum of 450 lumens per head.</p>	<p>IES LM-xx-1x</p> <p>Note: EPA is working with industry to develop the above test procedure:</p> <p><i>IES Approved Method for the Characterization of LED Light Engines and Integrated LED Lamps for Electrical and Photometric Properties as a Function of Temperature</i></p>	<p>Laboratory test results shall be produced using the specific LED package(s), LED module(s) or LED array(s) and LED driver combination (LED light engine) that will be used in production.</p> <p>Sample Size:</p> <ul style="list-style-type: none"> • 1 complete luminaire sample (LED light engine installed); and • 2 additional LED light engine samples external to luminaire; and • Any components and/or materials required to install additional LED light engines in luminaire. <p>Passing Test: all LED light engine samples, tested in the luminaire, shall pass.</p>



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Luminous Efficacy, Output and Zonal Lumen Density Requirements: **DIRECTIONAL RESIDENTIAL** Luminaires

Note: Luminaire types denoted as directional on the first page of this specification shall be evaluated based on luminaire photometry. The performance values in this section pertain to the performance of the entire luminaire, including optics.

Luminaire Type	ENERGY STAR Requirements			Methods of Measurement and/or Reference Standards	Supplemental Testing Guidance
	Luminaire Efficacy	Luminaire Minimum Light Output	Luminaire Zonal Lumen Density Requirement		
Cove Mount	45 lm/W	<p>Luminaire shall deliver a minimum of 200 lumens (initial) per lineal foot.</p> <p>The minimum required light output (in lumens) is calculated by dividing the total luminaire length in inches by 12, then multiplying the result by 200.</p> <p>Note: The equation applies to all luminaire configurations. For rectangular geometries the "measured luminaire length" is the longest dimension of the luminaire. For circular geometries the "measured luminaire length" is the diameter.</p>	Luminaire shall deliver a minimum of 35% of total lumens within the 120°-150° zone (vertical angles).	<p>Fluorescent: IES LM-41-98</p> <p>Solid State: IES LM-79-08</p> <p>High Intensity Discharge: IES LM-46-04</p> <p>ANSI C78.81-2010 (for T8)</p> <p>IEC 60081 data sheets (for T5)</p>	<p>Laboratory test results shall be produced using the specific lamp and ballast or LED package(s), LED module(s) or LED array(s) and LED driver combination that will be used in production.</p> <p>Linear fluorescent luminaires which do not ship with lamps shall be tested using lamps compliant with ANSI C78.81-2010 (for T8) or IEC 60081 data sheets (for T5).</p> <p>Fluorescent luminaires with ballast(s) capable of operating multiple fluorescent lamp types shall be tested either with the lamp(s) shipped with the luminaire, or if a lamp is not supplied, with one of the lamp types detailed on the packaging.</p> <p>High intensity discharge luminaires with ballast(s) capable of operating multiple lamp types shall be tested with the lamp(s) shipped with the luminaire.</p>





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Luminous Efficacy, Output and Zonal Lumen Density Requirements: **DIRECTIONAL COMMERCIAL** Luminaires

Note: Luminaire types denoted as directional on the first page of this specification shall be evaluated based on luminaire photometry. The performance values in this section pertain to the performance of the entire luminaire, including optics.

(Note: ENERGY STAR qualification is available for only the following commercial luminaire types. Other commercial luminaire types will not be reviewed for qualification.)

Luminaire Type	ENERGY STAR Requirements			Methods of Measurement and/or Reference Standards	Supplemental Testing Guidance
	Luminaire Efficacy	Luminaire Minimum Light Output	Luminaire Zonal Lumen Density Requirement		
Portable Desk Task	29 lm/W	Luminaire shall deliver a minimum of 200 lumens (initial).	Luminaire shall deliver a minimum of 85% of total lumens (initial) within the 0-60° zone (symmetric about the center of the beam).	Fluorescent: IES LM-41-98 Solid State: IES LM-79-08	Laboratory test results shall be produced using the specific lamp and ballast or LED package(s), LED module(s) or LED array(s) and LED driver combination that will be used in production.
Downlights: • recessed • surface • pendant • SSL retrofits	42 lm/W	≤ 4.5" aperture: 345 lumens (initial) > 4.5" aperture: 575 lumens (initial)	Luminaire shall deliver a minimum of 75% of total lumens (initial) within the 0-60° zone (axially symmetric about the nadir).	High Intensity Discharge: IES LM-46-04 ANSI C78.81-2010 (for T8)	Linear fluorescent luminaires which do not ship with lamps shall be tested using lamps compliant with ANSI C78.81-2010 (for T8) or IEC 60081 data sheets (for T5).
Under Cabinet	29 lm/W	Luminaire shall deliver a minimum of 125 lumens (initial) per lineal foot. The minimum required light output (in lumens) is	Referring to the plane perpendicular to the length of the luminaire, the luminaire shall deliver a minimum of 60% of total lumens (initial) within the 0-60° zone (symmetric about	IEC 60081 data sheets (for T5)	Fluorescent luminaires with ballast(s) capable of operating multiple fluorescent lamp types shall be tested either with the lamp(s) shipped with the luminaire, or if a lamp is not supplied, with one of the lamp types detailed on the packaging. High intensity discharge luminaires with ballast(s) capable of operating multiple lamp





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Light Source Life Requirements: All Luminaires

Source Type	ENERGY STAR Requirements	Methods of Measurement and/or Reference Standards	Supplemental Testing Guidance
Solid State	<p>Luminaires shall meet the following L₇₀ rated lumen maintenance life values:</p> <ul style="list-style-type: none">• 25,000 hours for residential grade indoor luminaires• 35,000 hours for residential grade outdoor luminaires• 35,000 hours for commercial grade luminaires <p>Lifetime claims in excess of the above requirements shall be substantiated with LM-80-08 test report data and lumen maintenance projections based upon guidelines in IES TM-21-11.</p> <p>Refer to Lumen Maintenance Requirements in the next section.</p>		



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Lumen Maintenance Requirements: Directional and Non-Directional Luminaires

Source Type	ENERGY STAR Requirements	Methods of Measurement and/or Reference Standards	Supplemental Testing Guidance
<p>Solid State Option 1: Component Performance (select either option 1 or option 2, below)</p>	<p>The LED package(s) / LED module(s) / LED array(s) shall deliver, <i>in situ</i>:</p> <ul style="list-style-type: none"> • L₇₀(25,000 hours) for residential indoor • L₇₀(35,000 hours) for residential outdoor, or commercial <p>Lumen maintenance projections shall be based on guidance from IES TM-21, the <i>in situ</i> TMP_{LED} temperature of the hottest LED in the luminaire, the forward drive current applied to each LED package/module/array model ("device"), and the IES LM-80 test report for the device which, in addition to LM-80 reporting requirements, shall provide each of the following:</p> <ul style="list-style-type: none"> • sampling method and sample size (per LM-80 section 4.3) • test results for each T_s and drive current combination • description of device including model number and whether device is an LED package, module or array (see Definitions) 	<p>Measurement: IES LM-80-08</p> <p>Lumen maintenance projection: IES TM-21-11 (in draft)</p> <p>Note: EPA is following industry efforts to develop the above test procedure:</p> <p><i>Projecting Long Term Lumen Maintenance of LED Packages</i></p> <p>Upon its publication, EPA intends to reference this technical memorandum.</p> <p>Chromaticity specifications: ANSI C78.377-2008</p>	<p>For downlights, one trim ring and one reflector may be used with the three luminaire samples.</p> <p>Luminaire Sample Size: three complete luminaires.</p> <p>LM-80 Sample Size: minimum sample size of 25 units for LED packages, or 10 units for LED modules or arrays, for each T_s and drive current combination. Each sample set may be composed entirely of one target CCT, or may be split between no more than two adjacent target CCT values as outlined in ANSI C78.377 (e.g. 2700 and 3000K, or 3500K and 4000K).</p> <p>Passing Test: all of the conditions below shall be met. If any of the conditions are not met, the component performance option may not be used and the applicant shall use Option 2, below, for compliance.</p> <ol style="list-style-type: none"> 1. In each sample luminaire, the TMP_{LED} temperature, measured <i>in situ</i>, is less than or equal to the temperature(s) specified in the LM-80 test report for the corresponding or higher drive current, within the manufacturer's specified operating current range. 2. The drive current measured in the luminaire is less than or equal to the drive current specified in the LM-80 test report at the corresponding temperature or higher. 3. Guidance from TM-21 indicates L₇₀ projection meets or





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Correlated Color Temperature (CCT) Requirements: All Indoor Luminaires (Exemption: Outdoor Luminaires)

Source Type	ENERGY STAR Requirements	Methods of Measurement and/or Reference Standards	Supplemental Testing Guidance
Fluorescent <ul style="list-style-type: none"> • linear • compact • self ballasted compact (GU24) • circline 	Lamps shipped with luminaires shall have one of the following nominal correlated color temperatures (CCT): <ul style="list-style-type: none"> • 2700 K • 3000 K • 3500 K • 4100 K 	Measurement (linear & circline): IES LM-9-09 Measurement (compact & self ballasted compact): IES LM-66-00 Calculation: CIE 15:2004	Laboratory test results shall be produced using the specific lamp that will operate in the luminaire and either the ballast that will operate in the luminaire or a commercially-available ballast that meets the applicable ANSI ballast requirements, if applicable, for the light source being tested. Sample Size: ≥ 10 lamps shall be tested. Passing Test: ≥ 90% of the lamps tested fall within a 7-step ANSI MacAdam ellipse for the designated CCT.
High Intensity Discharge	<ul style="list-style-type: none"> • 5000 K (commercial only) 	Measurement: IES LM-51-00	
Solid State	Packaging requirements: The luminaire (directional luminaires) or LED light engine (non-directional luminaires) shall have one of the following nominal correlated color temperatures (CCTs): <ul style="list-style-type: none"> • 2700 K • 3000 K • 3500 K • 4000 K • 5000 K (commercial only) 	Chromaticity specifications: ANSI C78.377-2008 Measurement (directional): IES LM-79-08 Measurement (non-directional): IES LM-xx-1x NOTE: EPA is working with industry to develop the above test procedure:	For downlights, one trim ring and one reflector may be used with the three luminaire samples. LED light engine CCT shall meet the requirement as determined by evaluating the <i>in situ</i> T _b temperature against the LED light engine LM-xx test report. Sample Size: three complete luminaires, or three LED light engines. Passing Test: all luminaires shall pass.





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Color Rendering Requirements: All Indoor Luminaires (Exemption: Outdoor Luminaires)

Source Type	ENERGY STAR Requirements	Methods of Measurement and/or Reference Standards	Supplemental Testing Guidance
Fluorescent <ul style="list-style-type: none"> • linear • compact • self ballasted compact (GU24) • circline 	Lamps shipped with luminaires shall meet or exceed $R_a \geq 80$.	Measurement (linear & circline): IES LM-9-09 Measurement (compact and self ballasted compact): IES LM-66-00 Calculation: CIE 13.3-1995	Laboratory test results shall be produced using the specific lamp that will operate in the luminaire and either the ballast that will operate in the luminaire or a commercially-available ballast that meets the applicable ANSI ballast requirements, if applicable, for the light source being tested. Sample Size: ≥ 10 lamps shall be tested. Passing Test: $\geq 80\%$ of the samples shall achieve the required color rendering index value.
High Intensity Discharge <ul style="list-style-type: none"> • metal halide • ceramic metal halide • high pressure sodium 		Measurement (high intensity discharge): IES LM-51-00 Calculation: CIE 13.3-1995	
Solid State	The luminaire (directional luminaires) or LED light engine (non-directional luminaires) shall meet or exceed $R_a \geq 80$.	Directional measurement: IES LM-79-08 Non-Directional (LED light engine)	For downlights, one trim ring and one reflector may be used with the three luminaire samples. LED light engine CRI shall meet the requirement as determined by evaluating the <i>in situ</i> T_b temperature against the LED light engine LM xx test report





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Color Maintenance Requirements: Solid State Indoor Luminaires Only (Exemption: Outdoor Luminaires)

ENERGY STAR Requirements	Methods of Measurement and/or Reference Standards	Supplemental Testing Guidance
<p>The change of chromaticity over the first 6,000 hours of luminaire operation shall be within 0.007 on the CIE 1976 (u',v') diagram, as demonstrated by either:</p> <ul style="list-style-type: none"> the IES LM-80 test report for the employed LED package/array/module model, or as demonstrated by a comparison of luminaire chromaticity data in LM-79 reports at zero and 6,000 hours. 	<p>IES LM-80-08 IES LM-79-08 Interim operation: ANSI/UL 1598-2008 UL 153-2002</p>	<p>Laboratory test results shall be produced using the specific lamp and ballast or LED package(s), LED module(s) or LED array(s) and LED driver combination that will be used in production.</p> <p>For the LM-79 option, luminaire shall be operated continuously in accordance with ANSI/UL 1598-2008 or UL 153-2002 during the interim 6,000 hours; any deviations from this shall be reported. Also, LED light engines shall be operated continuously <i>in situ</i> during the interim 6,000 hours. During initial and final LM-xx measurements, T_b temperature shall be controlled to match T_b temperature measured when LED light engine is operated <i>in situ</i>.</p> <p>Sample Size (LM-80 option): same as Lumen Maintenance, Option 1.</p> <p>Sample Size (LM-79 option): three complete luminaires, or three LED light engines and the necessary number of luminaires required to operate the engines continuously <i>in situ</i>.</p> <p>Passing Test (LM-80 option): for all LM-80 samples, at any measurement point from zero through 6,000 hours, the distance of the chromaticity coordinates from the initial (zero-hour) chromaticity coordinates shall not exceed 0.007 at the temperature(s) adjacent to the measured <i>in-situ</i> TMP_{LED} temperature, and at the corresponding drive current.</p> <p>Example 1: an LM-80 test report provides data at $T_s = 55^\circ C, 85^\circ C$ and $105^\circ C$, and the measured <i>in-situ</i> TMP_{LED} temperature value is $89^\circ C$. Neither the $85^\circ C$ nor the $105^\circ C$ LM-80 data may show chromaticity shift exceeding 0.007 at any measurement point from zero through 6,000 hours, for the corresponding drive</p>





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Electrical Performance Requirements

Source Start Time Requirements: Directional and Non-Directional Luminaires (Exemption: Outdoor Luminaires)

Source Type	ENERGY STAR Requirements	Methods of Measurement and/or Reference Standards	Supplemental Testing Guidance
Fluorescent <ul style="list-style-type: none"> • linear • compact • self ballasted compact (GU24) • circline 	Light source shall remain continuously illuminated within one second of application of electrical power. 	ANSI C82.11 Consolidated-2002 Section-5.2	Laboratory test results shall be produced using the specific lamp and ballast or LED package(s), LED module(s) or LED array(s) and LED driver combination that will be used in production. Sample Size: ≥ 3 lamps, lamp-ballast combinations, or LED package(s)/LED module(s)/LED array(s) and LED driver combinations shall be tested. Passing Test: all samples shall pass.
High Intensity Discharge <ul style="list-style-type: none"> • metal halide • ceramic metal halide • high pressure sodium 		No standard available (as of September 2010). Note: For indoor luminaires EPA does not allow the starting times detailed in ANSI C82.4-2002	
Solid State		No standard available (as of September 2010).	
Halogen Incandescent (outdoor only)		No standard available (as of September 2010).	





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Source Run-Up Time Requirements: Directional and Non-Directional Luminaires (Exemption: Outdoor Luminaires)

Source Type	ENERGY STAR Requirements	Methods of Measurement and/or Reference Standards	Supplemental Testing Guidance
Fluorescent <ul style="list-style-type: none"> • linear • compact • self ballasted compact (GU24) • circline 	Elapsed time for lamps to reach 90% of rated lumen output after application of electrical power shall be: <ul style="list-style-type: none"> • ≤ 1 minute for non-amalgam lamps • ≤ 3 minutes for amalgam lamps 	Linear & circline: No standard available (as of September 2010). Compact & self-ballasted compact: ANSI C78.5-2003, clause 4.8.	Laboratory test results shall be produced using the specific lamp and ballast or LED package(s), LED module(s) or LED array(s) and LED driver combination that will be used in production. Sample Size: ≥ 3 lamp-ballast combinations, or LED package(s)/LED module(s)/LED array(s) and LED driver combinations shall be tested.. Passing Test: all samples shall pass.
High Intensity Discharge <ul style="list-style-type: none"> • metal halide • ceramic metal halide • high pressure sodium 	Light source shall reach 90% of rated lumen output within one minute of application of electrical power.	No standard available (as of September 2010). Note: For indoor luminaires EPA does not allow the warm-up times detailed in ANSI C82.4-2002.	
Solid State		No standard available (as of September 2010).	
Halogen Incandescent (outdoor only)	Exempt		





ENERGY STAR® Program Requirements for Luminaires

Eligibility Criteria – Version 1.0, DRAFT 2



Dimming Requirements: All Luminaires Marketed as Dimmable (Exemption: Non-Dimmable Luminaires)

Source Type	ENERGY STAR Requirements	Methods of Measurement and/or Reference Standards	Supplemental Testing Guidance
Fluorescent <ul style="list-style-type: none"> • linear 	<p>The luminaire and its components shall meet the applicable requirements outlined in currently available industry dimming standards.</p> <p>Luminaires employing linear T8 lamps shall meet dimming requirements outlined in NEMA LL 9-2010.</p> <p>Luminaires employing linear T5 lamps shall meet dimming requirements outlined in the IEC 60081 lamp data sheets. (note: as of September 2010, dimming requirements are pending)</p>	<p>Linear T8: NEMA LL 9-2010</p> <p>Linear T5: IEC 60081 lamp data sheets (as of September 2010, being updated to include dimming requirements):</p> <p>6520: 14 watt 6530: 21 watt 6620: 24 watt 6640: 28 watt 6650: 35 watt 6730: 39 watt 6750: 49 watt 6840: 54 watt 6850: 80 watt</p>	<p>Laboratory test results shall be produced using the specific ballast that will operate in the luminaire.</p> <p>Sample Size: ≥ 3 ballast samples shall be tested.</p> <p>Passing Test: all samples shall pass.</p> <p>100% to 35%</p>
Fluorescent <ul style="list-style-type: none"> • compact • self ballasted compact (CBCA) 	<p>The luminaire and its components shall provide smooth dimming from 100% to 35% of total light output.</p>	<p>No standard available (as of September 2010).</p>	<p>Laboratory test results shall be produced using the specific lamp and ballast combination that will be used in production.</p> <p>Sample Size: ≥ 3 samples shall be tested.</p> <p>Passing Test: all samples shall pass.</p>





ENERGY STAR® Program Requirements for Luminaires

Eligibility Criteria – Version 1.0, DRAFT 2



	requirements outlined in the IEC 60081 lamp data sheets. (note: as of September 2010, dimming requirements are pending)	6620: 24 watt 6640: 28 watt 6650: 35 watt 6730: 39 watt 6750: 49 watt 6840: 54 watt 6850: 80 watt	
Fluorescent <ul style="list-style-type: none"> • compact • self ballasted compact (GU24) • circline 	The luminaire and its components shall provide smooth dimming from 100% to 35% of total light output.	No standard available (as of September 2010).	<p>Laboratory test results shall be produced using the specific lamp and ballast combination that will be used in production.</p> <p>Sample Size: ≥ 3 samples shall be tested.</p> <p>Passing Test: all samples shall pass.</p>
High Intensity Discharge <ul style="list-style-type: none"> • metal halide • ceramic metal halide • high pressure sodium 	The luminaire and its components shall provide smooth dimming from 100% to 50% of lamp power.		
Solid State	The luminaire and its components shall provide smooth dimming from 100% to 35% of total light output.		<p>Laboratory test results shall be produced using the LED package(s), LED module(s) or LED array(s) and LED driver combination that will be used in production.</p> <p>Sample Size: ≥ 3 samples shall be tested.</p> <p>Passing Test: all samples shall pass.</p>
Halogen Incandescent (outdoor only)	May not feature dimming.		None.





ENERGY STAR® Program Requirements for Luminaires

Eligibility Criteria – Version 1.0, DRAFT 2



Photosensor Control Requirement: Halogen Incandescent Outdoor Luminaires Only (Exemption: Indoor Luminaires)

Source Type	ENERGY STAR Requirements	Methods of Measurement and/or Reference Standards	Supplemental Testing Guidance
Halogen Incandescent (outdoor only)	The luminaire shall contain an integrated photosensor that automatically prevents operation during daylight hours. In addition, the control shall automatically reactivate within 6 hours of a manual override or testing operation.	No standard available.	None.

- availability of photosensors listed by UL for outdoor applications
- interactions between qualified luminaires due to installation problems (e.g. one luminaire is turned off due to the light output of another luminaire)
- lack of photosensor requirements in state building codes featuring more stringent lighting requirements (e.g. California, Oregon, Washington)
- inability to apply photosensor controls to certain popular luminaire designs due to geometrical constraints
- aesthetic concerns
- photosensor reliability concerns
- installations that would be better served by one central photosensor controlling outdoor circuits





ENERGY STAR[®] Program Requirements for Luminaires

Eligibility Criteria – Version 1.0, DRAFT 2



Lamp Current Crest Factor Requirements: Directional and Non-Directional Luminaires

Source Type	ENERGY STAR Requirements	Methods of Measurement and/or Reference Standards	Supplemental Testing Guidance
Fluorescent <ul style="list-style-type: none"> • linear • compact • self ballasted compact (GU24) • circline 	≤ 1.7	Linear & circline: ANSI C82.11 Consolidated-2002 Sections 3.3.3 and 5.6 unless otherwise specified in ANSI C78.81. Compact: ANSI C78.901-2005	Laboratory test results shall be produced using the specific ballast that will operate in the luminaire. Sample Size: ≥ 3 ballast samples shall be tested. Passing Test: all samples shall pass.
High Intensity Discharge <ul style="list-style-type: none"> • metal halide • ceramic metal halide • high pressure sodium 	≤ 1.8	Metal halide: ANSI C78.43-2007 High pressure sodium: ANSI C78.42-2007 Measurement: ANSI C82.6-2005 section 6.9	
Solid State Halogen Incandescent (outdoor only)	Exempt.		



ENERGY STAR Luminaires v1.0



- Draft 2 comment period closes Friday, October 29, 2010
 - luminaires@energystar.gov
- All received comments to be posted to energystar.gov/luminaires unless marked “Do Not Post”
- Expect to finalize in November
- Final draft will be distributed next
- Proposed effective date September 1, 2011

ENERGY STAR Luminaires v1.0



- ENERGY STAR Ceiling Fan and Ventilation Fan specifications will reference Luminaires specification for all light kits
- Ventilation Fan spec could include allowances for thermal considerations
- Ceiling Fan light kits are included in Luminaires scope:
 - Directional heads: see Accent Light requirements
 - Others: see Non-Directional requirements



ENERGY STAR Lamps v1.0

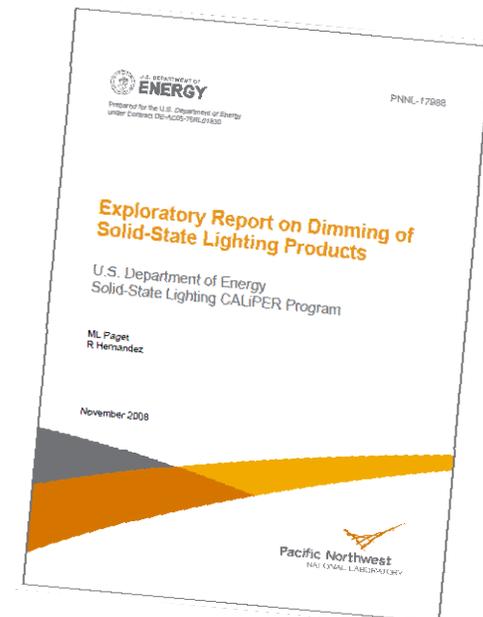


- Combines CFL & Integral LED Lamp scope
 - Existing specs to be sunset once effective
- Draft 1 to be released late 2010 / early 2011
- Technology neutral
 - Top performing ‘light bulbs’
 - Opportunity to raise the bar for this ENERGY STAR category (general service lamps)
 - Provides an objective means for raising the bar later
- www.energystar.gov/lamps (not yet)
- lamps@energystar.gov (not yet)

Lighting Controls Specification



- EPA has been scoping as a potential new category, likely for residential only
- Protocol standards essentially non-existent
- Vast majority of CFL & RLF are non-dimming
- DOE study on compatibility of SSL lamps with dimming: mixed results



Lighting Controls Specification



- What is the energy savings potential?
 - Cost effective?
 - LRC review: highly dependent on load being controlled
 - NEMA working group conducting a study
- How to ensure positive consumer purchase of ENERGY STAR lighting + controls?
 - Worst case: bad experience, lighting product and control are uninstalled (by electrician), consumer associates experience with...





Enhanced Testing and Verification

Enhanced Testing and Verification: Background and Purpose



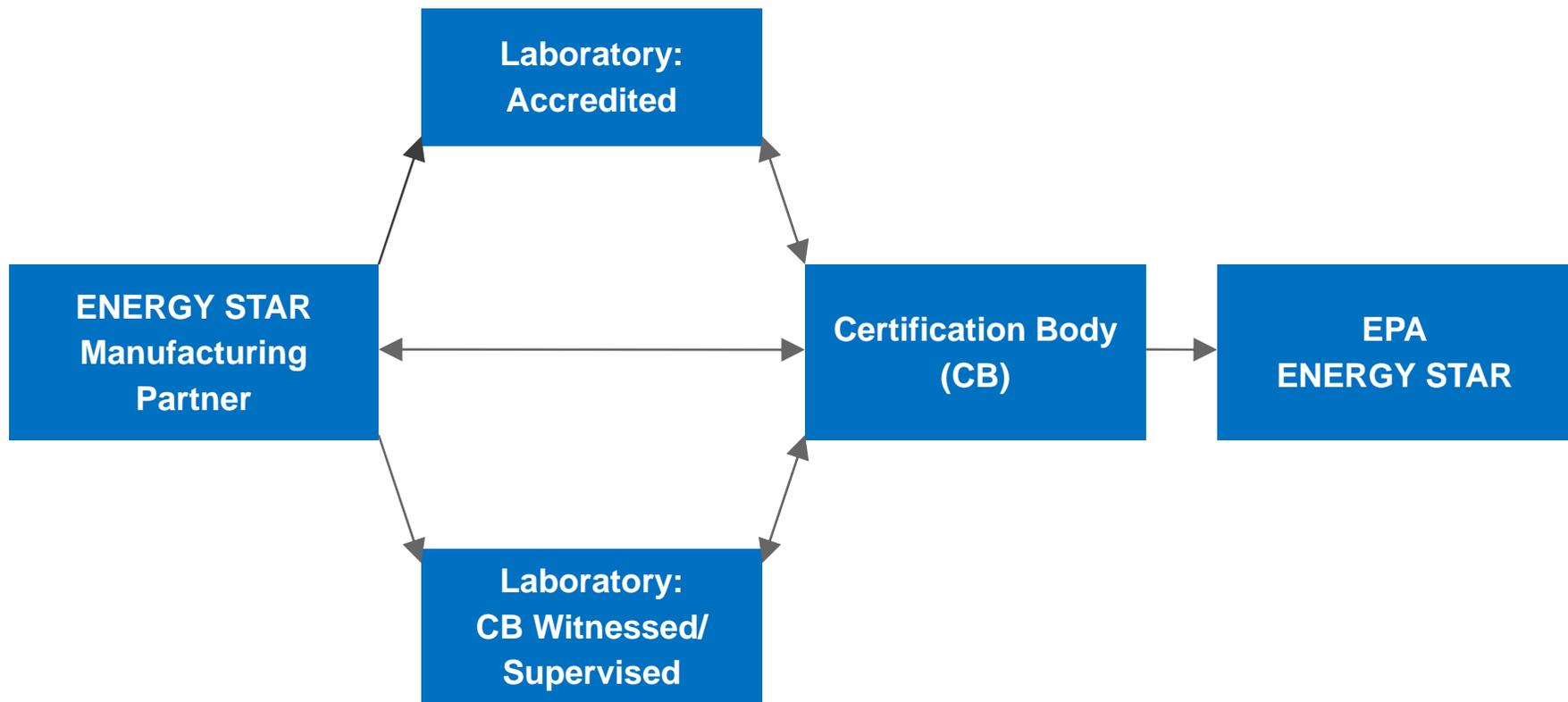
- Through over 15 years of shared effort, EPA and partners have built something of real value – the ENERGY STAR brand
- Maintaining the value of this brand requires ensuring products labeled with the ENERGY STAR deliver on their promise to the consumer
- Recent developments: increased scrutiny of voluntary programs
 - Inspector General Reports at EPA and DOE
 - Government Accountability Office ENERGY STAR Investigation

New Approach to ENERGY STAR Qualification and Verification Testing



- Third-party certification of test data prior to qualification and labeling
 - EPA-recognized certification bodies, laboratories, and accreditation bodies
- Verification testing after qualification
 - Verify that products continue to meet the ENERGY STAR requirements regardless of changes in the production process

Qualification Flowchart



Participation



- Accreditation Bodies (ABs)
 - Recognized: **18**
 - **13** different countries including China, Japan, Taiwan, UK
- Laboratories
 - Applications under review: **43** accredited labs
- Certification Bodies (CBs)
 - Applications under review: **6**

CB Role #1: Product Qualification Through Performance Certification



- CB will be responsible for operating a product certification program compliant with ISO/IEC Guide 65. CB will fulfill this role by:
 - Verifying that the test data originated from an EPA-recognized laboratory
 - Comparing test data to relevant product specifications
- After certification process is completed, CB will notify partners of qualification or rejection, or request additional information
- If CB determines the product is qualified, it will provide EPA with appropriate data so the product may be added to the Qualified Product List

Re-Evaluation in the Event of Significant Changes



- CB to re-evaluate product performance in the event of changes that could affect the ENERGY STAR qualification status of a product the CB has certified
 - Partner must inform the CB about any such changes
 - CB evaluates results of retesting

CB Role #2: Verification Testing



- CBs to administer testing
- Minimum of 10% of ENERGY STAR qualified models to be tested per year, taking product families into account
- Combination of random and pre-selected models
- Unit procurement: Off-the-shelf where feasible; other channels possible as long as 3rd party personnel select unit(s)
- EPA-recognized 3rd party laboratory must be used.
- CB reports results to EPA; failing products disqualified

CB Role #3: Challenge Testing



- CB to have in place a challenge testing procedure
- Conditions of initiation:
 - Challengee has been notified
 - Model number has been clearly identified
 - Sound basis has been established
- CB reports results to EPA; failing products disqualified

Witnessed or Supervised Manufacturers' Test Laboratories



- CB may operate a program to accept test data from a **first-party** lab operating under witness or supervision, i.e., a witnessed or supervised manufacturer's test lab (WMTL / SMTL)
- Lab must still operate in accordance with ISO/IEC 17025, and test products per relevant ENERGY STAR test methods
- CB assesses lab to these requirements
- If a lab is accredited and EPA-recognized, the CB shall enroll it only as an SMTL, not a WMTL.

Implementation



- EPA proposed edits to Program Requirements to reflect enhanced testing and verification
 - Partner Commitments
 - Eligibility Criteria
 - Test Methods
- Partners will be invited to **recommit to new Partner Commitments via MESA in mid/late October.**
- New Program Requirements **effective December 31, 2010.**
- In discussion with **International Partners** regarding their testing/verification plans.

Implementation



Beginning January 1, 2011

- **New Products:** All new products seeking qualification will have to be **tested in an EPA-recognized lab**, and their test reports will have to be reviewed and certified as meeting ENERGY STAR requirements by an EPA-recognized CB.
- **Currently qualified** products:
 - Will **NOT need to be retested**.
 - As specifications are revised, products will need to be tested per the new requirements.

Resources



- www.energystar.gov/testingandverification
 - Final requirements for accreditation bodies, labs, and certification bodies
 - Updated program requirements for all products (partner commitments, eligibility requirements, and test methods)
 - Lists of EPA-recognized ABs, CBs, Laboratories



Happy Birthday Peter Banwell!



Thank You! Questions?



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www.energystar.gov/luminaires

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