Proposed New Attachment to Version 2.0: Ceiling Fan Light Kit Requirements

Exclusion of magnetic ballasts: Indoor fixtures that use magnetic ballasts cannot be ENERGY STAR qualified under this specification.

Self-ballasted pin based lamps: Indoor and outdoor light kits that use a self-ballasted pin based lamp can be ENERGY STAR qualified light kits if all applicable requirements for qualifying products are met. This includes the requirement that the average rated life of the lamp must meet or exceed 10,000 hours and that the maximum measured ballast case temperature during normal operation inside the light kit does not exceed the ballast manufacturer maximum recommended temperature.

Temporary allowance for decorative LEDs: EPA encourages the use of innovative light source technologies such as LEDs. LEDs used as decorative lighting elements in ceiling fan light kits are allowed as long as the total wattage of the LEDs does not exceed five (5) watts, the average LED system (LED and driver) efficacy is at least 20 lumens per watt, and the LED is used to supplement a primary light source that meets all of the applicable performance characteristics outlined in the Eligibility Criteria. The ENERGY STAR Partner must supply the following LED information to EPA: total wattage consumed by all the LEDs, manufacturer warranty, an LED manufacturer specification sheet that shows wattage, efficacy, LED life, color, and lumen depreciation. This is a temporary allowance for the use of LEDs; EPA plans to develop more comprehensive specifications for LED performance as the technology advances and becomes more widely used in residential applications.

Table 1 - Ceiling Fan Light Kits: Requirements

Performance Characteristic	ENERGY STAR Specification
Note: Only electronic ballasts may be used to meet the requirements of this table. In addition, light kits that utilize compact fluorescent lamps that do not have a plug-in base (i.e use a mogul, medium, or other screw base) are not eligible to earn the ENERGY STAR.	
Combined Lamp & Ballast Requirements:	
System Efficacy Per Lamp Ballast Platform in Lumens Per Watt (LPW)[1],	≥ 50 LPW for all lamp types below 30 total listed lamp watts. ≥ 60 LPW for all lamp types that are ≤ 24 inches and ≥ 30 total listed lamp watts. ≥ 70 LPW for all lamp types that are > 24 inches and ≥ 30 total listed lamp watts.

[1] Efficacy shall be determined by the following equation:

$$\text{Efficacy [Lumens per Watt]} = \frac{\text{Measured Lamp Lumens [Lumens]}}{\text{Measured Input Power [Watts]}}$$

Lamp Lumens: Lamp lumens must be measured using the lamp and ballast that are shipped with the light kit.

Input Power: Input power must be measured with the lamp and ballast that are shipped with the light kit.

Lamp Requirements:	
Lamp Life	For lamps shipped with the light kits, the average rated life of the lamp must be ≥ 10,000 hours.
Lumen Maintenance	Lamp shall have an average rated lumen maintenance of at least 80% of initial lamp lumens at 40% (4,000 hours minimum) rated lamp life.
Color Rendering Index (CRI)	CRI for lamps used in light kit must be ≥ 80
Correlated Color Temperature	Lamps must have one of the following designated correlated color temperatures (CCT): 2700K, 3000K, 3500K, 4100K, 5000K, or 6500K.
Lamp/Lampholder Compatibility	Lamps must utilize an ANSI/IEC standardized lamp base configuration, as defined by ANSI C81.61 and IEC 60061-1. The lampholder must be designed to accept lamps with ANSI/IEC standardized lamp base configurations for all applicable wattages. For example, if the ballast can operate lamps with multiple wattages (e.g., an 18W, 26W, or 32W lamp) then the lampholder must be designed to accept lamps with ANSI/IEC standardized lamp base configurations for all three applicable wattages. In addition**,** lamps shall either: • Meet the requirements of an ANSI/IEC standardized lamp specification sheet, as defined by ANSI C78.901-2001 and IEC 60901 (for compact fluorescent lamps) or ANSI C78.81-2001 and IEC 60081 (for linear lamps) if an applicable standard exists, or, • If no ANSI/IEC lamp standard exists (e.g., a spiral compact fluorescent lamp), a custom lamp specification sheet must be provided at the time of submittal. Specific lamp characteristics that should be included in the lamp specification sheet are detailed in Table 3.
Lamp Labeling Requirement	A manufacturer designation that encompasses the lamp manufacturer name, wattage, correlated color temperature, and color rendering index must be labeled on the lamp or lamp base.
Electronic Ballast Requirements (Note: Magnetic Ballasts May Not Be Used in Light Kits):	
General	Per ANSI C82.11 Section 5 except paragraph 5.3.1.
Lamp Start Time	The time needed after switching on the lamp to start continuously and remain illuminated must be an average of one second or less.
Power Factor	≥ 0.5
Lamp Current Crest Factor	≤ 1.7

Maximum Measured Ballast Case Temperature During Normal Operation Inside Light kit(s)	Not to exceed the ballast manufacturer maximum recommended ballast case temperature during normal operation inside a light kit. **Note:** This performance characteristic is separate and distinct from thermal requirements established by UL, which governs safety rather than longevity of the ballast. All qualified light kits are expected to meet this requirement
Electromagnetic and Radio Frequency Interference	Ballast must meet FCC requirements for consumer use (FCC 47 CFR Part 18 Consumer Emission Limits)
Ballast Frequency	20 to 33 kHz or ≥ 40 kHz
Transient Protection	Per ANSI C82.11b, paragraph 5.10.1 (100kHz Ring Wave, 2.5kV, both common mode and differential mode, 7 strikes)
End of Life Protection	All ballasts that operate lamps sized T5 and smaller must contain an end of life protection circuit. For ballasts that operate multiple lamps and are required to have end of life protection, the ballast must shut down no more than two lamps when one of the lamps has reached end of life. For example, a light kit with one ballast and five lamps must not shut down more than the lamp that has reached end of life plus one additional lamp.
Dimming	Light kits that utilize dimmable ballasts shall be dimmable from 100% to 30%, or less, of maximum light output, or be switchable to three levels of brightness, not including the off position.
Safety - Ballasts and "Non Edison base Fluorescent Adapters"	The cover page of a safety test report or a general coverage statement must be provided to demonstrate compliance with ANSI/UL 935 or UL 1993, as appropriate.
Light Kit Requirements	
Light Kit Warranty	A written warranty must be included with light kit packaging at the time of shipment, which covers repair or replacement of defective parts of the light kit housing and electronics (excluding the lamp) for a minimum of two years from the date of purchase.
Noise	Class A sound rating for electronic ballasts within the light kit, not to exceed a measured level of 24 dBA (audible) when the ballast is installed in the light kit.
Lamp Shipment Requirement	All light kits must be shipped with the lamp(s).
Replaceable ballast	Ballasts in all light kits must be accessible and removable by an electrician without the cutting of wires and without damage to the housing or decorative elements of the light kit.
Safety - Hardwired Light kits[2]	The cover page of a safety test report or a general coverage statement must be provided to demonstrate compliance with UL 1598.
Product Packaging for Consumer Awareness Requirements	Product packaging language is required that clearly describes the nominal color designation of the lamp in units of Kelvin (i.e., 2700K, 3000K, 3500K, 4100K, 5000K, or 6500K).

2 Regarding ceiling fans that are intended to be used outdoors, light kits must be compliant with NFPA 70, the National Electrical Code (NEC), including requirements for damp locations (Articles 410-4a and Article 100).

Table 2 – Reference Standards and Required Documentation

Performance Characteristic (refer to Tables 1 and 2 as appropriate)	**Methods of Measurement Reference Standards**	**Required Documentation** (to be attached to QPI Form)
System Efficacy: Lamp Lumens Input Power	IESNA LM-9; LM-66; ANSI C82.2	Laboratory test results must be produced using the specific lamp and ballast combination that will operate in the light kit. For this test, a sample of three or more lamps must be used. Two of the three samples must pass in order to qualify for ENERGY STAR. Provide: 1. a test report from a laboratory accredited by NVLAP or one of its MRA signatories; or 2. an EPA approved Platform Letter of Qualification that lists the lamp/ballast combination used in the light kit and the test result for this performance characteristic; or 3. EPA-approved documentation from an industry association, such as the NEMA/ALA matrices. **Note:** If the laboratory used for this test is accredited by NVLAP or one of its MRA signatories it must also have a scope of accreditation that includes the method of measurement reference standard for this performance characteristic.

Lamp Start Time	ANSI C82.11-5.2	Laboratory test results must be produced using the specific lamp and ballast combination that will operate in the light kit. For this test, a sample of three or more lamps must be used. Two of the three samples must pass in order to qualify for ENERGY STAR. Provide: 1. a test report from a laboratory accredited by NVLAP or one of its MRA signatories; or 2. an EPA approved Platform Letter of Qualification that lists the lamp/ballast combination used in the light kit and the test result for this performance characteristic; or 3. EPA-approved documentation from an industry association, such as the NEMA/ALA matrices; or 4. a test report from an OSHA NRTL laboratory.

Lamp Life	IESNA LM-40-01; LM-65-01; IEC 60091; IEC 60901; ANSI C82.1; ANSI C82.11	Laboratory test results must be produced using the specific lamp that will operate in the light kit and either the ballast that will operate in the light kit or a commercially available ballast that meets the applicable ANSI ballast requirements for the lamp being tested. For this test, a sample of ten or more lamps must be used. Provide: 1. a test report from a laboratory accredited by NVLAP or one of its MRA signatories; or 2. an EPA approved Platform Letter of Qualification that lists the lamp/ballast combination used in the light kit and the test result for this performance characteristic; or 3. EPA-approved documentation from an industry association, such as the NEMA/ALA matrices; or 4. a test report from an ISO 9000 registered facility. Manufacturers may obtain ENERGY STAR conditional qualification for their light kit if all of the following items are provided: 1) A letter on letterhead from a NVLAP laboratory, one of its MRA signatories, or an ISO 9000 registered facility demonstrating lamp life testing has begun. 2) A laboratory report proving that testing has been completed for at least 40% of rated life. 3) The date for testing completion. Conditional approval will only be granted for a period of no longer than 325 days. Note: If the laboratory used for this test is accredited by NVLAP or one of its MRA signatories it must also have a scope of accreditation that includes the method of measurement reference standard for this performance characteristic.

Lumen Maintenance	IESNA LM-40-01; IESNA LM-9-99; IESNA LM-65-01; IESNA LM-66-00; ANSI C78.5	Laboratory test results must be produced using the specific lamp that will operate in the light kit. For this test, a sample of ten or more lamps must be used to demonstrate that at least 80% of the samples achieved the required lumen maintenance value. Provide: 1. a test report from a laboratory accredited by NVLAP, one of its MRA signatories; or 2. an EPA approved Platform Letter of Qualification that lists the lamp/ballast combination used in the light kit and the test result for this performance characteristic; or 3. EPA-approved documentation from an industry association, such as the NEMA/ALA matrices; or 4. a test report from an ISO 9000 registered facility.
Color Rendering Index	IESNA LM-58; CIE 13.3	Laboratory test results must be produced using the specific lamp that will operate in the light kit. For this test, a sample of ten or more lamps must be used to demonstrate that at least 80% of the samples achieved the required color rendering index value. Provide: 1. a test report from a laboratory accredited by NVLAP or one of its MRA signatories; or 2. an EPA approved Platform Letter of Qualification that lists the lamp/ballast combination used in the light kit and the test result for this performance characteristic; or 3. EPA-approved documentation from an industry association, such as the NEMA/ALA matrices. **Note:** If the laboratory used for this test is accredited by NVLAP or one of its MRA signatories it must also have a scope of accreditation that includes the method of measurement reference standard for this performance characteristic.

Correlated Color Temperature	IESNA LM-58; LM-16	Laboratory test results must be produced using the specific lamp that will operate in the light kit. For this test, a sample of ten or more lamps must be used. Test results must demonstrate that at least 90% of the lamps tested fall within a 7-step ANSI Mac Adam ellipse. Provide: 1. a test report from a laboratory accredited by NVLAP, one of its MRA signatories; or 2. an EPA approved Platform Letter of Qualification that lists the lamp/ballast combination used in the light kit and the test result for this performance characteristic; or 3. EPA-approved documentation from an industry association, such as the NEMA/ALA matrices; or 4. a test report from an ISO 9000 registered facility. It is also intended that the lamp manufacturer will meet the following quality requirements during the production runs of each lamp model: 1. The lamp manufacturer is required to maintain color control such that a minimum of 90 percent of the ongoing production (as represented by samples tested from each production shift for the same color and when typically evaluated over 12 month period) will fall within the 7 step Mac Adam color ellipse associated with the designated (manufacturer declared) target color. 2. For the purposes of meeting color control the lamp manufacturer must maintain testing equipment calibrated to international practices and standards and must compile the ongoing color control data in a manner so that is can be easily reviewed upon EPA request. 3. At a minimum, the manufacturer's color quality control program must maintain the following information for a 3-year period:

		a. Test dates and sample size (minimum of two lamps per production shift) b. Test results (x,y) for each sample lamp measured c. Test results (all x,y data) for sample lamps plotted graphically against the designated seven step color ellipse and available for review at least on a quarterly basis d. Records to substantiate that 90 percent of the (x,y) data points fall within the applicable seven (7) step Mac Adam ellipse. Manufacturers are encouraged to exceed this target.
Noise	Class A sound rating for electronic ballasts within the light kit, not to exceed a measured level of 24 dBA (audible) when the ballast is installed in the light kit and is measured using a sound meter (similar in performance to B&K type 2209) where the microphone is located 12 inches from the light kit in any direction.	No supplemental documentation required. **Note:** A laboratory test report must be submitted upon EPA request.
Light Kit Warranty	No Standard Available (Use manufacturer protocol)	Provide a copy of the actual two-year light kit manufacturer written warranty that is included with product packaging.
Dimming	No Standard Available (Use manufacturer protocol)	No supplemental documentation required. **Note:** A laboratory test report proving the light kit is dimmable from 100% to 30% must be submitted upon EPA request.
Lamp/Lampholder Compatibility: Lamp Base Configuration	 ANSI C81.61; IEC 60061-1	 Provide manufacturer data indicating the lamp base type used.

Lamps Compliant with an ANSI-IEC Standard (for lamp dimensions and electrical parameters) Lamps Not Compliant with an ANSI-IEC Standard (for lamp dimensions and electrical parameters)	ANSI C78.901-2001; ANSI C78.81-2001; IEC 60901; IEC 60081 ANSI C78.901-2001; ANSI C78.81-2001 (used as a reference for the format and type of information required on a custom lamp specification sheet)	Provide manufacturer data indicating applicable ANSI-IEC lamp data sheet number. Provide a manufacturer lamp specification sheet that describes the following (use the ANSI lamp data sheets found in ANSI C78.901 and C78.81 as a reference for the format and type of information requested): 1. Lamp Description, including: • Lamp Model Number • Nominal Wattage • Bulb Designation / Lamp Size (i.e., T4, T5, T8, etc.) • Lamp Base Type as defined by ANSI C81.61 or IEC 60061-1(i.e., 2G13, GR10q, etc.) • Starting Circuit Application (i.e., rapid start, preheat, etc.) 2. Dimensional Characteristics, including diagram 3. Lamp Operating Characteristics, including: • Approximate wattage (W) • Voltage(V) • Current (A)
Lamp Labeling Requirement	No Standard Available (Use manufacturer protocol)	Provide a copy of the actual language that will be included on the base of the lamp.
Replaceable Ballast	No Standard Available (Use manufacturer protocol)	Provide a copy of the language that includes guidance on ballast replacement and states that the ballast is replaceable with the use of a “qualified electrician.”
Safety: Indoor • Hardwired Light kits • Ballasts and “Non-Edison based Fluorescent Adapters”	UL 1598 ANSI/UL 935 or UL 1993	Provide the cover page of a safety test report or a general coverage statement from an OSHA NRTL laboratory. Provide the cover page of a safety test report or a general coverage statement from an OSHA NRTL laboratory.

Safety: Outdoor	NFPA 70, the National Electrical Code (NEC), including requirements for wet locations when applicable (Articles 410-4a and Article 100)	Provide the cover page of a safety test report or a general coverage statement from an OSHA NRTL laboratory. Include evidence of a Rain Test for Wet Locations, when applicable.
Power Factor	ANSI C82.11-3.3.1	Laboratory test results must be produced using the specific ballast that will operate in the light kit. For this test, a sample of three or more ballasts must be used. At least two of the three samples must pass in order to qualify for ENERGY STAR. Provide: 1. a test report from a laboratory accredited by NVLAP or one of its MRA signatories; or 2. an EPA approved Platform Letter of Qualification that lists the lamp/ballast combination used in the light kit and the test result for this performance characteristic; or 3. EPA-approved documentation from an industry association, such as the NEMA/ALA matrices; or 4. a test report from the manufacturer

Lamp Current Crest Factor	ANSI C82.11-3.3.3 and 5.6 ANSI C82.1-5.6.1	Laboratory test results must be produced using the specific ballast that will operate in the light kit. For this test, a sample of three or more ballasts must be used. At least two of the three samples must pass in order to qualify for ENERGY STAR. Provide: 1. a test report from a laboratory accredited by NVLAP or one of its MRA signatories; or 2. an EPA approved Platform Letter of Qualification that lists the lamp/ballast combination used in the light kit and the test result for this performance characteristic; or 3. EPA-approved documentation from an industry association, such as the NEMA/ALA matrices; or 4. a test report from an OSHA NRTL laboratory.

Measured Maximum Ballast Case Temperature During Normal Operation Inside Light kit(s) **NOTE:** existing requirement but EPA is now enforcing compliance	UL 1598, Section 11 (Acceptable when the thermocouple is placed at the hot-spot location indicated by the ballast manufacturer.) -OR- Lighting Research Center (LRC) "Proposed Durability Testing Method: Temperature" available at http://www.lrc.rpi.edu/programs/lightingTransformation/pdf/durabilityTestingFinalReport.pdf **Note:** All qualified light kits are expected to meet the Measured Maximum Ballast Case Temperature During Normal Operation Inside Light kit(s) requirement.	Laboratory test results must be produced using the light kit with the highest operating temperature among all light kits being qualified, the specific ballast that will operate in the light kit, and a lamp with the same wattage and lamp type (e.g., triple-tube, quad tube, spiral) that will operate in the light kit. For this test, a sample of one or more light kits must be used. The supplemental documentation should include the following: • Light kit model(s) tested • Lamp model(s) and ballast model(s) tested • Measured maximum ballast case temperatures • Ambient temperature • Test procedure, including description of light kit installation, thermocouple location(s), and time that elapsed before readings were taken. • Ballast Manufacturer Maximum Recommended Case Temperature During Normal Operation Inside the Light kit(s) • Ballast Hot Spot Location Diagram from the ballast manufacturer Provide a test report from: 1. a laboratory accredited by NVLAP or one of its MRA signatories; or 2. an OSHA NRTL laboratory; or 3. the light kit or ballast manufacturer
Electromagnetic and Radio Frequency Interference	Consumer Limits Per FCC 47 CFR Part 18.305 and 18.307	No supplemental documentation required. **Note:** A laboratory test report must be submitted upon EPA request.

Ballast Frequency	Oscilloscope instruction manual	Laboratory test results must be produced using the specific ballast that will operate in the light kit. At least two of the three samples must pass in order to qualify for ENERGY STAR. Provide: 1. a test report from a laboratory accredited by NVLAP or one of its MRA signatories; or 2. an EPA approved Platform Letter of Qualification that lists the lamp/ballast combination used in the light kit and the test result for this performance characteristic; or 3. EPA-approved documentation from an industry association, such as the NEMA/ALA matrices; or 4. a test report from the manufacturer
Transient Protection	ANSI C82.11b, paragraph 5.10.1	Laboratory test results must be produced using the specific ballast that will operate in the light kit. For this test, a sample of three or more ballasts must be used. All samples must pass in order to qualify for ENERGY STAR. Provide: 1. a test report from a laboratory accredited by NVLAP or one of its MRA signatories; or 2. an EPA approved Platform Letter of Qualification that lists the lamp/ballast combination used in the light kit and the test result for this performance characteristic; or 3. EPA-approved documentation from an industry association, such as the NEMA/ALA matrices; or 4. a test report from the manufacturer

End of Life Protection	IEC 61347-2-3 Amendment 1 to Edition 1 2004-06 (or ANSI C82.11-2005, upon its release)	Laboratory test results must be produced using the specific ballast that will operate in the light kit. For this test, a sample of one or more ballasts must be used. For all ballasts that that operate T4 and/or T5 sized lamps, demonstrate that the ballast is in compliance with the referenced standards by providing: 1. a test report from a laboratory accredited by NVLAP or one of its MRA signatories; or 2. an EPA approved Platform Letter of Qualification that lists the lamp/ballast combination used in the light kit and the test result for this performance characteristic; or 3. EPA-approved documentation from an industry association, such as the NEMA/ALA matrices; or 4. a test report from the ballast manufacturer For all ballasts that operate T3 and smaller sized lamps, provide from the ballast manufacturer a circuit diagram and an accompanying engineering description outlining the scheme that is used to achieve the end of life function within the ballast.
Product Packaging for Consumer Awareness Requirements	No Standard Available (Use manufacturer protocol)	Provide a written copy or a PDF graphic of the language that will be displayed on the product packaging.