


U.S. Department of Energy
Energy Efficiency and Renewable Energy

Test Procedures for Fluorescent Lamp Ballasts in Standby Mode NOPR Public Meeting

Building Technologies Program
Office of Energy Efficiency and Renewable Energy
U.S. Department of Energy

February 2, 2009

http://www1.eere.energy.gov/buildings/appliance_standards/residential/fluorescent_lamp_ballasts.html




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Introduction

Purpose of the Public Meeting

- Present DOE's proposed test procedure.
- Seek comment from participants on the test procedure.
- Discuss specific issues or questions related to the proposal.
- Discuss the next steps for the rulemaking.

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Introduction

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- 2 Interpretation of Active Mode
- 3 Interpretation of Standby Mode
- 4 Interpretation of Off Mode
- 5 Scope of Applicability
- 6 Standby Mode Overview for Fluorescent Lamp Ballasts
- 7 New Test Conditions for Measuring Standby Mode Power
- 8 Test Procedure Measurements and Burden

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Introduction

Comments and Issues from Participants

- Workshop participants are invited to provide summary comments or statements at this time.
- Participants are also invited to raise their issues on the NOPR for discussion today.

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Regulatory History

Regulatory History

Energy Policy and Conservation Act, 1975 Established energy conservation standards and methods of test procedure development for consumer products. (42 U.S.C. 6291–6309)

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National Appliance Energy Conservation Amendments of 1988 Added fluorescent lamp ballasts as covered products, required development of a test procedure, set minimum efficiency standards and required DOE to review those standards.

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54 FR 6076, February 7, 1989 Established fluorescent lamp ballast test procedures in Appendix Q to Subpart B of 10 CFR 430.

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Energy Independence and Security Act of 2007 Required DOE to amend the fluorescent lamp ballast test procedures to address standby and off modes by March 31, 2009. (42 U.S.C. 6295(gg)(2)(B)(ii))

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Interpretation of Active Mode

EPCA Definition of “Active Mode” (42 U.S.C. 6295(gg)(1)(A)(i))

DOE must interpret the definition of “active mode” in the context of fluorescent lamp ballasts to clarify the definitions of “off mode” and “standby mode” which both use the term “active mode.”

“[T]he condition in which an energy-using product–

- (I) is connected to a main power source;
- (II) has been activated; and
- (III) provides 1 or more main functions.”

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Interpretation of Active Mode

DOE Interpretation of “Active Mode” For Fluorescent Lamp Ballasts

- A ballast is in “active mode” if it is operating one or more fluorescent lamps.
- To account for both dimmable and non-dimmable ballasts, DOE defines active mode as when the lamp-and-ballast system exhibits any non-zero level of light output.
- Therefore “active mode” exists when light output is greater than zero percent.

The diagram illustrates the electrical connection between a Mains power source, a Ballast, and two fluorescent Lamps. The Mains supply Input Power to the Ballast. The Ballast then provides Regulated Current to two Lamps. Each Lamp is shown with Lumen Output, indicating that the system is in active mode.

Issue 1: DOE invites comment on this interpretation of the “active mode” for fluorescent lamp ballasts.

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Interpretation of Standby Mode

EPCA Definition of “Standby Mode” (42 U.S.C. 6295(gg)(1)(A)(iii))

“[T]he condition in which an energy-using product–

- (I) is connected to a main power source; and
- (II) offers 1 or more of the following user-oriented or protective functions:
 - (aa) To facilitate the activation or deactivation of other functions (including active mode) by remote switch (including remote control), internal sensor, or timer.
 - (bb) Continuous functions, including information or status displays (including clocks) or sensor-based functions.”

DOE is focusing on two aspects of the EPCA definition:

- Connection to a main power source
- Activation or deactivation of other functions by remote switch or internal sensor

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Interpretation of Standby Mode


DOE Interpretation of “Standby Mode” for Fluorescent Lamp Ballasts

- Most ballasts are turned off via switches that disconnect main power, so they do not enter standby mode.
- Standby mode only applies to ballasts with a lighting control interface.
 - At zero light output, the ballast consumes energy while waiting for instruction from the lighting control system.

The diagram illustrates the power and control flow for a fluorescent lamp ballast. On the left, a circle labeled 'Mains' provides 'Input Power' to a central box labeled 'Ballast'. Below the ballast, a 'Control Signal' (represented by an oval) provides 'Control Signal Power' to the ballast. From the right side of the ballast, two lines labeled 'No Regulated Current' lead to two separate boxes labeled 'Lamp'. Both lamps are also labeled 'No Lumen Output', indicating they are not producing light.

Issue 2: DOE invites comment on this interpretation of the term “standby mode” for fluorescent lamp ballasts.

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Interpretation of Off Mode

EPCA Definition of “Off Mode” (42 U.S.C. 6295(gg)(1)(A)(ii))

“[T]he condition in which an energy-using product–
(I) is connected to a main power source; and
(II) is not providing any standby or active mode function.”

EISA directs DOE to address “off mode” in this test procedure.
(42 U.S.C. 6295(gg)(2))

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Interpretation of Off Mode

DOE Interpretation of “Off Mode” for Fluorescent Lamp Ballasts

- **Off mode does not apply to fluorescent lamp ballasts.**
 - A ballast in a system producing any amount of light output is in Active Mode.
 - At zero light output, a ballast connected to a main power source while waiting for lighting control instructions is considered to be in Standby Mode.
 - If a ballast is not operating the lamp to produce light and not in standby mode, the ballast must be disconnected from the main power source, which doesn't meet the criteria of Off Mode.
- **Thus, DOE proposes not to incorporate a test method for off mode energy consumption.**

Issue 3: DOE invites comment on this interpretation of the term “off mode” for fluorescent lamp ballasts.

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Scope of Applicability

Covered Ballasts

- DOE is considering “standby mode” as only applicable to ballasts that incorporate a lighting control interface.
- Although DOE does not currently cover many fluorescent lamp ballasts that have a lighting control interface (like T8 ballasts or dimming ballasts), DOE has the authority to cover these ballasts in the ballast energy conservation standards rulemaking initiated on January 22, 2008. (73 FR 3653)

Issue 4: DOE invites comment on its interpretation of which ballasts are covered by the standby mode test procedure.

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Scope of Applicability

Effective Date

- The fluorescent lamp ballast standby and off mode test procedure final rule EISA deadline is March 31, 2009. (42 U.S.C. 6295(gg)(2)(B)(ii))
- The final rule will become effective 30 days after its publication.
- The standby test procedure final rule will ***not*** change how manufacturers measure and establish compliance with existing energy conservation standards.
- If new standby mode energy conservation standards are adopted, these standards will not be effective until 5 years after the effective date of the previous amended rule but not within 3 years after the publication of the fluorescent ballast energy conservation standards rulemaking final rule in June 2011. (42 U.S.C. 6295(g)(4)(C))

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Scope of Applicability

Active Mode Test Procedure for Fluorescent Lamp Ballasts

- DOE is planning to initiate a test procedure rulemaking in 2009 to review and possibly amend the active mode efficiency measurement of ballasts.
- In the fluorescent lamp ballast active mode test procedure rulemaking, DOE will consider updating the references to industry standards so that they harmonize with the referenced standards in today's proposed standby mode test procedure.

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Standby Mode Overview

Standby Mode Overview for Fluorescent Lamp Ballasts

- Only applies to ballasts that are part of a lighting control system.
- In standby mode, the ballast produces zero light output, yet consumes energy while awaiting a control signal.

Standby Power = Input Power + Control Signal Power

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Standby Mode Overview

Method for Measurement of Standby Power

1. Send a signal to the ballast instructing it to have zero light output.
2. Measure the input power to the ballast (in watts) in accordance with ANSI Standard C82.2-2002, section 13.
3. Measure the alternating current (AC), direct current (DC), or power line carrier (PLC) control signal using the appropriate method.
 - DOE estimates that control systems using wireless signals supply less than 1.0 watts of power to the ballast, so wireless control signal power is not measured.

Standby Power = Input Power + Control Signal Power

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Standby Mode Overview

**Proposed Definition and Standby Mode Measurement for:
Alternating Current Control Signal**

AC control signal: “an alternating current (AC) signal that is supplied to the ballast using additional wiring for the purpose of controlling the ballast and putting the ballast in standby mode.”

- Measure the AC control signal power (watts), using a wattmeter (W), connected to the ballast in accordance with the circuit below.

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Standby Mode Overview

**Proposed Definition and Standby Mode Measurement for:
Direct Current Control Signal**

DC control signal: “a direct current (DC) signal that is supplied to the ballast using additional wiring for the purpose of controlling the ballast and putting the ballast in standby mode.”

- Measure the DC control signal voltage, using a voltmeter (V), and current, using an ammeter (A), connected to the ballast in accordance with the circuit below.

DC Control Signal Power = DC Control Signal Voltage * DC Control Signal Current

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Standby Mode Overview

Proposed Definition and Standby Mode Measurement for: Power Line Carrier (PLC) Control Signal

PLC control signal: “a power line carrier (PLC) signal that is supplied to the ballast using the input ballast wiring for the purpose of controlling the ballast and putting the ballast in standby mode.”

- Measure the PLC control signal power (watts), using a wattmeter (W), connected to the ballast in accordance with the circuit below.
- The wattmeter must have a frequency response that is at least 10 times higher than the PLC being measured in order to measure the PLC signal correctly. The wattmeter must also be high-pass filtered to filter out power at 60 Hertz.

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Standby Mode Overview

Proposed Definition and Standby Mode Measurement for: Wireless Control Signal

Wireless control signal: “a wireless signal that is radiated to and received by the ballast for the purpose of controlling the ballast and putting the ballast in standby mode.”

- Wireless control signal power is not measured because DOE estimates that the power supplied to a ballast using a wireless signal is much less than 1.0 watt.

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Standby Mode Overview

Method for Measurement of Control Signal Power in Standby Mode

Issue 5: DOE invites comment on the proposed definitions of “AC control signal,” “DC control signal,” “PLC control signal,” and “wireless control signal.”

Issue 6: DOE invites comment on the proposed methods for measuring the power consumed by the control signal system while the ballast is in standby mode.

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New Test Conditions

New Test Conditions for Measuring Standby Mode Power

- Current fluorescent lamp ballast active mode power test procedure references ANSI C82.2-1984 for test conditions.
- The proposed standby mode power test procedure references ANSI C82.2-2002 (current version) for test conditions.
- DOE will consider updating the ANSI references in the active mode power test procedure during a rulemaking scheduled to begin in 2009.

Issue 7: DOE invites comment on this method of handling the different test conditions associated with the existing and proposed new test procedure.

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Test Procedure Measurements and Burden

Test Procedure Measurements

- DOE intends to study how best to use the discrete measurements of main input power and control signal power in a separate rulemaking.
- Measurements will be used in the energy conservation standards analysis for fluorescent lamp ballasts.

Issue 8: DOE invites comment on approaches to combining the measurements of main input power and control signal power into one metric.

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Test Procedure Measurements and Burden

Burden of Regulations

- The test procedure should measure power in an accurate and repeatable manner.
- The test procedure should not be unduly burdensome on manufacturers to conduct.

Issue 9: DOE invites comment on the issue of burden, including whether there are ways that DOE could maintain accuracy and repeatability while reducing the burden.

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Closing

How to Submit Comments...

- Public Meeting – oral comments will be captured in the transcript and become part of the public record.
- Written comments – NOPR comment period open until **April 6, 2009**. Reference docket #: EERE-2008-BT-TP-0007 and/or RIN #: 1904-AB77
 - Web: <http://www.regulations.gov>. Follow the instructions for submitting comments.
 - Email: Ballasts_Standby.Rulemaking@hq.doe.gov. Include the docket number EERE-2008-BT-TP-0007 and/or RIN 1904-AB77 in the subject line of the message.
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