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**GS-5**

**GREEN SEAL™ ENVIRONMENTAL STANDARD FOR**  
**ENERGY EFFICIENT LIGHTING**  
**COMPACT FLUORESCENT LIGHTS**

**SECOND EDITION**  
**DECEMBER 9, 1997**

Green Seal, Inc. • 1001 Connecticut Ave. NW, Ste 872 • Washington, DC USA 20036-5525  
(202) 872-6400 • FAX (202) 872-4324 • [www.greenseal.org](http://www.greenseal.org)

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THE MARK OF ENVIRONMENTAL RESPONSIBILITY

## **GREEN SEAL**

Green Seal is a non-profit organization devoted to environmental standard setting, product certification, and public education. Green Seal's mission is to work towards environmental sustainability by identifying and promoting environmentally responsible products, purchasing, and production. Through its standard setting, certification and education programs, Green Seal:

- identifies products that are designed and manufactured in an environmentally responsible manner;
- offers scientific analyses to help consumers make educated purchasing decisions regarding environmental impacts;
- ensures consumers that any product bearing the Green Seal Certification Mark has earned the right to use it; and
- encourages manufacturers to develop new products that are significantly less damaging to the environment than their predecessors.

The intent of Green Seal's environmental requirements is to reduce, to the extent technologically and economically feasible, the environmental impacts associated with the manufacture, use and disposal of products. Set on a category-by-category basis, Environmental Standards focus on significant opportunities to reduce a product's environmental impacts.

Green Seal offers certification to all products covered by its Standards. Manufacturers may submit their products for evaluation by Green Seal. Those which comply with Green Seal's requirements may be authorized to use the Green Seal Certification Mark on products and in product advertising. Manufacturers authorized to use the Green Seal Certification Mark on their product are subject to an ongoing program of testing, inspection, and enforcement.

For additional information on Green Seal or any of its programs, contact:

Green Seal  
1001 Connecticut Avenue, NW, Suite 827  
Washington, DC 20036-5525  
(202) 872-6400  
[www.greenseal.org](http://www.greenseal.org)

## FOREWORD

**A. Certification.** This Environmental Standard contains the basic requirements for certain products (as defined in the Scope section below) to be certified by Green Seal and for their manufacturers to receive authorization to use the Green Seal Certification Mark on products and their packaging, and in product advertising. The requirements are based on an assessment of the environmental impacts of product manufacture, use, and disposal and reflect information and advice obtained from industry, trade associations, users, government officials, environmental and other public interest organizations, and others with relevant expertise. These requirements are subject to revision as further experience and investigation may show is necessary or desirable.

**B. Compliance with the Standard.** Compliance with this Standard is one of the conditions of certification of a product by Green Seal.

**C. Compliance with Government Rules.** In order to be authorized to use the Green Seal Certification Mark, the manufacturer of the certified product must disclose all governmental allegations or determinations of violation of federal, state, or local environmental laws or regulations with respect to facilities in which the product is manufactured. Certification will be denied any product manufactured in violation of environmental laws or regulations if, in Green Seal's judgment, such violations indicate that the environmental impacts of the product significantly exceed those contemplated in the setting of the standard.

**D. Limitations on Purpose of Standard.** Green Seal's Standards provide basic criteria to promote environmental quality. Provisions for product safety have not been included in this Standard because government agencies and other national standard-setting organizations establish and enforce safety requirements.

**E. Substantially Equivalent Products.** Products that are substantially similar to those covered by this standard in terms of function and environmental impact may be evaluated and certified by Green Seal against the intent of the requirements of this standard.

**F. Unanticipated Environmental Impacts.** A product which complies with this Standard will not necessarily be certified by Green Seal if, when examined and tested, it is found to have other features which significantly increase its impact on the environment. In such a situation, Green Seal will ordinarily amend its standards to account for the unanticipated environmental impacts.

**G. Certification Agreement and Green Seal Rules.** In order to be authorized to apply the Green Seal Certification Mark to a product or its packaging, or to use the Green Seal Certification Mark in product advertising, the manufacturer of the product must (1) undergo an initial product evaluation to determine that the product complies with Green Seal's requirements, (2) sign a Green Seal Certification Agreement that, among other things, defines how and where the Green Seal may be used, (3) pay fees to cover the costs of testing and monitoring, (4) agree to an ongoing program of factory inspections and product testing, and (5) comply with the requirements found in the most recent version of "Rules Governing the Use of the Green Seal Certification Mark."

**H. Disclaimer of Liability.** Green Seal, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. Green Seal shall not incur any obligations or liability for damages, including consequential damages, arising out of or in connection with the

interpretation of, reliance upon, or any other use of this Standard.

**I. Care in Testing.** Many tests required by Green Seal's Standards involve safety considerations. Adequate safeguards for personnel and property should be employed in conducting such tests.

**J. Referenced Standards.** Standards referenced in this document may have been superseded by a later edition, and it is intended that the most recent edition of all referenced standards be used in determining compliance of a product with this standard.

**K. Labeling Requirements.** This standard neither modifies nor supersedes government labeling requirements. Labeling language which varies in form from the requirements of this section may be used with the written approval of Green Seal.

## GREEN SEAL ENVIRONMENTAL STANDARD FOR ENERGY EFFICIENT LIGHTING – COMPACT FLUORESCENT LIGHTS (GS-5)

### 1.0 SCOPE

This Standard establishes environmental requirements for the following energy efficient lighting products:

- 1.1 Compact Fluorescent lamps.
- 1.2 E26 medium screw ballast adaptors
- 1.3 E26 medium screw fluorescent self-ballasted lamps.
- 1.4 E26 medium screw lampholder conversion kits.

### 2.0 DEFINITIONS

For the purposed of this Standard, the following definitions apply.

- 2.1 **Compact fluorescent lamp:** A fluorescent lamp of a small, compact shape with a single base which performs the entire mechanical support function.
- 2.2 **Ballast adaptor:** An electronic magnetic ballast unit which contains all elements that are necessary for starting and stable operation of the lamp, with an integral socket for a compact fluorescent lamp.
- 2.3 **Fluorescent self-ballasted lamp:** A compact fluorescent electric lamp unit that incorporates, permanently enclosed, all elements that are necessary for starting and stable operation of the lamp, and which does not include any replaceable or interchangeable parts. The unit including all elements is discarded at the end of the lamp life.
- 2.4 **Conversion kit:** A set of field-installed components which converts a portable luminaire (fixture) to a permanently installed ballast adaptor, or remote ballast and socket adaptor, with a replaceable compact fluorescent lamp.
- 2.5 **System efficacy:** The quotient of the lamp lumen output divided by the power input to the ballast, measured in lumens per watt (a measure of system efficiency).
- 2.6 **Lamp efficacy:** The quotient of the lamp lumen output divided by the power input to the lamp, measured in lumens per watt (a measure of lamp efficiency).

### 3.0 PRODUCT-SPECIFIC ENVIRONMENTAL PERFORMANCE REQUIREMENTS

#### 3.1 Efficacy.

**3.1.1** Lumen output shall be measured in accordance with American National Standard Institute (ANSI) C78.375-1991, *Fluorescent Lamps – Guide for Electrical Measurement*.<sup>1</sup>

**3.1.2** Input power to self-ballasted fluorescent lamps shall be measured in accordance with ANSI C78.375-1991, *Fluorescent Lamps – Guide for Electrical Measurement*, measuring true RMS voltage within 1% error, over the frequency range of the measured product.

**3.1.3** Input power to a compact fluorescent lamp sold in combination with a ballast adaptor shall be measured with the supplied ballast, rather than a reference ballast, as required by IES LM-41-85, *IES Approved Method for Photometric Testing of Indoor Fluorescent Luminaries*.<sup>2</sup>

**3.1.4** Ballast factor, as measured in accordance with ANSI C82.2, *Methods of Measurements for Fluorescent Lamp Ballasts*, shall be included in the rated efficacy of ballast adaptor and conversion kit units.

**3.1.5** Efficacy shall be determined with lumen measurements of the lamp in base-up orientation.

**3.1.6** Products shall meet the following minimum average efficacies.

##### 3.1.6.1 Compact Fluorescent Lamps

<u>Lamp Wattage</u>	<u>Lamp Efficacy (on reference ballast)</u>
<7 watt	40 lumens/watt
7-9 watt	50 lumens/watt
>9-13 watt	55 lumens/watt
>13-18 watt	60 lumens/watt
>18 watt	62 lumens/watt

##### 3.1.6.2 Self-Ballasted Lamps, and Lamp and Ballast when supplied together

<sup>1</sup> ANSI publications can be obtained from American National Standards Institute, Inc., 11 West 42<sup>nd</sup> Street, New York, NY 10036 (212-642-4980)

<sup>2</sup> IES publications can be obtained from Illuminating Engineering Society of North America, 120 Wall Street, Floor 17, New York, NY 10005-4001 (212-705-7925).

<u>Lamp Wattage</u>	<u>System Efficacy</u>
<10 watt	40 lumens/watt
10-15 watt	45 lumens/watt
>15 watt	55 lumens/watt

### 3.2 Product Life Span

**3.2.1 Self-ballasted and Compact Fluorescent Lamps.** The average minimum rated product life span shall be 8,000 hours at 3 hours per start as measured in accordance with IES LM-40-1987, *IES Approved Method for Life Performance Testing of Fluorescent Lamps*.

**3.2.2 Ballast Adaptors.** In units packaged with replaceable lamps, the ballast shall be tested to assure an average minimum rating of 1 lamp life cycle of 8,000 hours, with on going testing to confirm a life expectancy of an average minimum of 4 lamp life cycles, in accordance with IES LM-40-1987.

**3.3 Mercury.** Compact Fluorescent lamps and fluorescent self-ballasted lamps shall contain a maximum average of 10 milligrams of mercury.

**3.4 Radioisotopes.** Fluorescent self-ballasted lamps, ballasts, conversion kits, and ballast adaptors shall contain radioisotopes, or require lamps which contain radioisotopes.

## 4.0 PRODUCT-SPECIFIC PERFORMANCE REQUIREMENTS

**4.1 Color Rendering Index.** Lamps shall have a color rendering of no less than 80, as measured in accordance with IES 16-1984, *Colorimetry of Light Source*.

**4.2 Color Temperature.** The correlated color temperature of lamps shall be determined in accordance with IES LM-16-1984, and reported pursuant to section 7.1.1.5

**4.3 Operating Temperature and Starting Characteristics.** Lamps shall start in a smooth manner within 4 seconds at their minimum rated operating temperature.

**4.3.1** The Ballast adaptor shall be rated to start and operate in conjunction with the ballast's intended compact fluorescent lamps.

**4.4 Safety.** Ballast adaptors and self-ballasted compact fluorescent lamps must meet the minimum safety requirements as evidence by third party certification such as Underwriters Laboratories (UL) listing or its equivalent.

**4.5 Power Quality Designation.** The product's power factor and total current harmonic distortion shall be tested measuring true rms voltage to an accuracy of 1%. Products meeting the following characteristics will be designated as Class A.

**4.5.1 Power Factor.** Power factor shall be greater than 0.0, leading or lagging for Class A products.

**4.5.2 Harmonic Distortion.** Total current harmonic distortion in triplens shall be less than 33% for Class A products.

## **5.0 PACKAGING REQUIREMENTS**

### **5.1 Toxics in Packaging.**

**5.1.1** Packaging must not contain inks, dyes, pigments, stabilizers, or any other additives to which any lead, cadmium, mercury or hexavalent chromium has been introduced.

**5.1.2** The sum of the concentration levels of lead, cadmium, mercury, and hexavalent chromium present in any package, or packaging ink, dye, pigment, stabilizer or additive component must not exceed 100 parts per million by weight.

## **6.0 LABELING REQUIREMENTS**

**6.1** The Green Seal Certification Mark shall appear on the packaging and may appear on the product itself.

**6.2** Each package or products shall be marked to identify the products manufacturing location, and date (month and year) of manufacture or packaging.

**6.3** The Green Seal Certification mark shall not be used in conjunction with any modifying terms, phrases, or graphic images that might mislead consumers as to the extent or nature of the certification.

**6.4** Wherever it appears, the certification mark must include phrase "Certified Lighting Product" and a control number assigned to that product by Green Seal.

**6.5** Whenever the certification mark appears on a package or product, the product or package must contain a description of the basis for the certification. The description shall be in a location, style, and typeface that are easily readable by the consumer. Unless otherwise approved in writing by Green Seal, the description shall read as follows:

This product meets Green Seal Environmental Standards for energy efficiency and product performance.

## 7.0 PRODUCT INFORMATION LABELING REQUIRMENTS

**7.1** Compact fluorescent lamps, self-ballasted lamps, ballast/lamp systems, conversion kits.

**7.1.1 Primary Packaging Information.** The following shall be displayed on the front face (the package side intended to face forward in merchandising) or adjacent side panels (not top, bottom, back or flaps) of the individual product sales packaging.

**7.1.1.1** Total input watt rating, as specified in section 3.1.2.

**7.1.1.2** Average initial lumen output, as specified in section 3.1.1.

**7.1.1.3** Average rated life, as specified in section 3.2.

**7.1.1.4** Comparison to nearest incandescent lamp wattage with equivalent lumen output within 10% maximum deviation (soft white, 750-1000 hour, A-19 or A-21 lamp as appropriate).

**7.1.1.5** Correlated color temperature, if not 2,600-3,100K, as specified in section 4.2.

**7.1.2 Other packaging information.** The following information shall be displayed on the individual product sales packaging.

**7.1.2.1 Energy Cost Savings.** Average annual energy cost savings listed at 750 hours per year at \$0.08 per kilowatt-hour as compared to nearest equivalent lamp under section 7.2.1.4.

**7.2 Ballast Adaptors.**

**7.2.1 Primary Packaging Information.** The following information shall be displayed on the front face (the package side intended to face forward in merchandising) or adjacent side panels (not top, bottom, back or flaps) of the individual product sales packaging.

**7.2.1.1** Total input watt rating, as specified in section 3.1.

**7.2.1.2** Average rated life, as specified in section 3.2.

**7.3 Applications Information.** The following information (or equivalent language) on the recommended use of the product shall be displayed on the individual product sales packaging, if applicable.

**7.3.1** “Possible dimension fit problem with some common luminaries.”

**7.3.2** “Possible interference with remote controlled electronic appliances.”

**7.3.3** “Reduction in light output at reduced operating temperatures.”

**7.3.4** “Do not operate on conventional dimming switches.”

**7.3.5** “Minimum operating temperature of XX°F (YY°C)”, as specified in section 4.3.

**7.3.6** “Reduced mechanical stability possible with freestanding luminaries.”<sup>3</sup>

**7.3.7** Replacement parts listing.

**7.4 Power Quality Voluntary Information.** Manufacturers, at their discretion, may add to the product or package description “Class A” for products designated Class A as per section 4.6.

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<sup>3</sup> Refer to ANSI C78.5-1991, *Fluorescent self-ballasted lamps-performance guide*, for guidance.