GC-12

GREEN SEAL™ ENVIRONMENTAL CRITERIA FOR

OCCUPANCY SENSORS

FIRST EDITION

FEBRUARY 14, 1997

THE MARK OF ENVIRONMENTAL RESPONSIBILITY

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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.

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Occupancy Sensors (GC-12)

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1. **Scope** – This criteria document establishes environmental and performance requirements for the sensors and switching devices used in both small, confined spaces and large, open areas. These devices, listed below, are generically referred to as "motion sensors," "occupancy sensors" or "sensors."

   1.1 Passive infrared sensors and sensor/switch combinations
   1.2 Passive infrared sensors and daylight sensor/switch combinations
   1.3 Passive infrared sensor and daylight sensor wall switches
   1.4 Passive infrared wall switches
   1.5 Ultrasonic sensors and sensor/switch combinations
   1.6 Ultrasonic wall switches
   1.7 Dual technology or hybrid sensors
   1.8 Microwave and audiophonic sensors

2. **Definitions** – For the purpose of this criteria document, the following definitions apply.

   2.1 **Audio Sensors:** Devices utilizing a microphone or other audio detectors to "listen" for room occupancy.

   2.2 **Coverage Area:** The sensor's maximum area of detection, defined here as the limits at which the sensor can detect the motion of a person walking at the speed of one foot per second (1 ft/s), under stated normal operating conditions at maximum sensor sensitivity setting.

   2.3 **Deactivation Warning Signal:** A visual or audio warning signal that alerts occupant(s) to switching action.

   2.4 **Desktop Activity:** Typical physical movements by a person sitting at a desk, for example, answering the phone or turning the pages of a document.

   2.5 **Dual Technology or Hybrid Sensors:** Sensors that combine more than one sensing technology. The combination of more than one sensor technologies is designed to eliminate false triggering.

   2.6 **False Triggering:** Sensors signaling occupancy because of indications other than occupant movements, including, but not limited to, computer equipment, printing or copying equipment exhaust, heating or ventilation air movements, or movements caused by heating or ventilation actions.

   2.7 **Field of View:** The angle of detection of a sensor relative to its mounting point. For wall mounted sensors, the field of view describes the horizontal angle (up to 180) that a sensor can "see." For ceiling mounted sensors, it is the vertical angle (whose apex is the sensor) that a sensor can "see."

   2.8 **Manual/Automatic Controls:** Manual-on control units need to be turned on in order to activate the sensor/switching functions, and can

also be turned off. Automatic-on units function without any manual input.

2.9 **Microwave Sensors:** [Reserved].

2.10 **Passive Infrared (PIR) Sensors:** Devices that are capable of detecting infrared radiation from humans. These infrared motion or occupancy sensors detect the motion of infrared radiation within a space.

2.11 **Sensitivity/Range:** The extent to which the sensor can detect occupant motion within a space.

2.12 **Sensitivity Adjustments:** Controls that allow the user to fine-tune the sensor to motions in the monitored space to eliminate false triggering.

2.13 **Sensors and Sensor/Switch Combinations:** Combinations of one or more wall and/or ceiling mounted sensors connected to a separate control unit or module. The control unit is capable of receiving signals from the sensor(s) and signaling the switch/relay to turn on or off other equipment such as lights and/or heating/air-conditioning/ventilation systems.

2.14 **Time Delay Period:** The amount of time that elapses with no motion detected before switching by the control unit.

2.15 **Ultrasonic (US) Sensors:** Devices containing both an ultrasound generator and receiver designed to detect motion within a space. The ultrasound generator emits sound waves beyond human hearing range (25 kHz to 40 kHz). Motion in the monitored space causes a change in the reflected frequency returning to the receiver.

2.16 **Wall Switches:** Wall switches or wall switch occupancy sensors are devices designed to replace wall-mount, standard light switches or dimmers. Both sensor and control modules are contained in the same housing, sized to fit in a standard wall box.

3. Environmental and Performance Requirements

3.1 Requirements for All Sensors

3.1.1 Compatibility

a. Fluorescent Lamps and Ballasts Compatibility: In addition to incandescent and magnetically-ballasted fluorescent lamps, wall switch sensors and sensor/switch combinations must be able to switch electronically-ballasted fluorescent lamps.

b. Other Equipment/Control Systems Compatibility: [Reserved].

3.1.2 **Daylight-Level Equipped Sensors:** Sensors and wall switches equipped with daylight or light level sensors must provide users with override capabilities.

3.1.3 **Failure Mode:** Wall switches and wall or ceiling mount sensors

must be designed so that the equipment they control remains on in case of sensor failure.

3.1.4 **Indicators:** Wall switches and wall or ceiling mount sensors must be equipped with either an audio or a visual indicator to alert occupants whenever sensors are on. Manual-on units must also provide an audio or visual deactivation warning signal prior to switching.

3.1.5 **Manual Controls:** Wall switches must provide user with manual control capabilities.

3.1.6 **Minimum Load:** Wall switches and control units for sensors/switches combinations must be rated for 120, 240 or 277 volts operation, and have a minimum load rating of 600 W @ 120 V, or 1200 W @ 277 V.

3.1.7 **Safety:** Wall switch sensors and sensor/switch combinations must meet the minimum safety requirements as evidenced by third-party certification, such as Underwriters Laboratory (UL) listing, or equivalent.

3.1.8 **Timer Settings:** Wall switch sensors and sensor/switch combinations must offer the user the ability to adjust the time delay period. At a minimum, the switch must offer users the ability to set the unit for time delay periods from 30 seconds to 15 minutes.

3.1.9 **Warranty:** The sensor manufacturer must provide a repair or replacement warranty covering a minimum period of three years after installation.

3.2 Requirements for Passive Infrared Sensors

3.2.1 **Coverage:** In addition to meeting the requirements for all sensors outlined in section 3.1 above, passive infrared (PIR) wall switches and sensors/switches combination must meet the following detection and coverage requirements without false triggering:

Sensor Type	Typical Mounting Height (ft.)	Minimum Field of View (°)	Minimum Detection Zone for Desktop Activity (ft2)	Minimum Coverage Area (ft2)
Wall Switches	3 to 4	150	150	300
Wall Mount	8	110	300	900
Ceiling Mount	8 to 10	135	400	1200
Hallway	8 to 10	120	NA	90 linear ft

3.3 Requirements for Ultrasonic Sensors

3.3.1 **Coverage:** In addition to meeting the requirements for all

sensors outlined in section 3.1 above, ultrasonic (US) wall switches and sensors/switches combination must meet the following coverage requirements without false triggering:

Sensor Type	Typical Mounting Height (ft.)	Minimum Coverage Area (ft2)
Wall Switches	3 to 4	300
Wall Mount	8	900
Ceiling Mount	8 to 10	1200
Hallway	8 to 10	90 linear ft

3.4 Requirements for Dual Technology Sensors

3.4.1 **Coverage:** In addition to meeting the requirements for all sensors outlined in section 3.1 above, dual technology sensor/switch combination must meet the following coverage requirements without false triggering:

Sensor Type	Typical Mounting Height (ft.)	Minimum Coverage Area (ft2)
Wall Switches	3 to 4	1000
Wall Mount	8	1200
Ceiling Mount	8 to 10	1800
Hallway	8 to 10	90 linear ft

3.5 Requirements for Audio and/or Microwave Sensors

4. [Reserved]
5. Packaging Requirements

4.1 **Toxics in Packaging:** packaging must not contain inks, dyes, stabilizers or other additives to which any cadmium, hexavalent chromium, lead or mercury has been introduced. The sum of the concentration levels of cadmium, hexavalent chromium, lead or mercury present in any packaging must not exceed 100 parts per million (PPM) by weight.

6. Product Information Requirements

5.1 **Application Information:** Manufacturers must provide, either on product packaging or in accompanying literature, information on installation, adjustments and appropriate uses such as locations and sensor types. In addition, manufacturers must alert users to any possible incompatibilities with specific ballast types or switching equipment.

Appendix A: Labeling Requirements for Certification by Green Seal

Unless otherwise approved in writing by Green Seal the following labeling requirements shall apply.

1. The Green Seal Certification Mark must appear on the product or its packaging.
2. 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.
3. Whenever the Green Seal Certification Mark appears on a package, the package must contain a description of the basis for 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:

   "Meets Green Seal Criteria for Performance and Packaging "