



ENERGY STAR® Program Requirements for Exit Signs

Final Draft - Eligibility Criteria – Version 3.0

Below is the **Final Draft** product specification (Version 3.0) for ENERGY STAR qualified exit signs. A product must meet all of the identified criteria to earn the ENERGY STAR.

1) **Definitions:** Below are the definitions of relevant terms in this document.

A. **Exit Sign:** A sign that is permanently fixed in place and used to identify a means of egress. For the purposes of ENERGY STAR, an exit sign must have an illuminated, legally-required legend. Exit signs that are required by section 7.10.4 of the Life Safety Code to remain illuminated via an emergency power source upon failure of the normal power supply must be designed to comply with this requirement.

Note: As with the Draft 2 specification, the above definition of an exit sign does not require the inclusion of an integral light source. Throughout this revision process, EPA has received comments both supporting and disagreeing with this decision. Since publishing the Draft 2 specification, EPA has conducted additional research on the ability of ambient light to sufficiently charge photoluminescent exit signs, including speaking with several facility managers of commercial buildings. EPA is satisfied that it is neither common practice nor financially feasible to install a dedicated charging light source to illuminate the face of a photoluminescent exit sign with 5 foot-candles of light. Since it has been indicated to EPA that photoluminescent exit signs are commonly installed as stand-alone products (without a separate light source), it would not be appropriate for the ENERGY STAR specification to impose this restriction on the categorization of what constitutes a product model.

One comment received on the Draft 2 specification objects to the removal of the restriction that ENERGY STAR qualified exit signs may not have a transparent or mirrored background. Since this Final Draft specification no longer addresses analytical measurements of luminance, such as contrast, it is not appropriate for the prohibition of transparent or mirrored backgrounds to appear within this document.

One comment suggested that the definition of an exit sign in this specification include the requirement that the sign comply with the Life Safety Code. EPA would like to remind stakeholders that this ENERGY STAR specification lays out criteria manufacturers must meet when designing and producing energy-efficient exit signs. Since the Life Safety Code addresses installation and maintenance, requiring a sign to comply in full with the Life Safety Code is not appropriate here. The intent of the above reference to section 7.10.4 is to specifically address the design of ENERGY STAR qualified signs so that they are compatible with an appropriate emergency power source, if so required by the Life Safety Code.

B. **Legally Required Legend:** The words “EXIT”, “TO EXIT”, “STAIR”, “TO STAIR”, “STAIRS”, “TO STAIRS”, “FIRE ESCAPE”, “TO FIRE ESCAPE”, “FIRE EXIT”, and “TO FIRE EXIT”. This definition will also encompass other combinations of letters and symbols if and when these signs may be listed in accordance with UL 924.

C. **Exit Sign Model:** For the purposes of ENERGY STAR, an exit sign model is an exit sign in the configuration that is actually packaged and sold to end users under a unique model number or name. For exit sign models with an individual rechargeable battery, the battery charger shall be included as part of the exit sign model and shall be tested and qualified as a single product.

D. **Input Power Demand:** The amount of active power required to continuously illuminate an exit sign model, measured in watts (W). For exit sign models with rechargeable batteries, input power demand shall be measured with batteries at full charge.

E. **Power Factor:** A measurement that determines how effectively power drawn by the equipment is converted into actual usable power by an electric component. Power Factor is the ratio between active (useful) power, measured in watts, and apparent power, measured in volt-amperes.

F. **Lagging Power Factor:** With an inductive load, the current lags the applied voltage in a clockwise direction represented on a vector diagram, and is said to be a lagging power factor.

G. **Leading Power Factor:** With a capacitive load, the current leads the applied voltage in a clockwise direction represented on a vector diagram, and is said to be a leading power factor.

H. **NFPA 101, Life Safety Code:** The National Fire Protection Association (United States) (NFPA) develops NFPA 101, Life Safety Code. The Code addresses those construction, protection, and occupancy features necessary to minimize danger to life from fire, including smoke, fumes, or panic. Many states and localities adopt this Life Safety Code into their own Building Code standards.

I. **NRTL:** Nationally Recognized Testing Laboratory Program, which is a part of OSHA's Directorate of Technical Support.

J. **OSHA:** Occupational Safety & Health Administration.

K. **UL 924:** The Standard for Safety for Emergency Lighting and Power Equipment, developed by Underwriters Laboratories.

Note: EPA received a comment suggesting that the above definitions make reference to specific codes or standards, rather than defining the administrative entity. EPA concurs and has made this change universally.

- 2) **Qualifying Products:** In order to qualify as ENERGY STAR, an exit sign must meet the definition in Section 1A and the specifications in Table 1 below. In addition, EPA requires that each model be listed in accordance with UL 924, and installed in accordance with applicable building codes and standards, such as the Life Safety Code. Further information about listing to UL 924 may be found under Section 3.A. in Test Procedure. This specification does not apply to exit sign retrofit kits.

Note: Listing in accordance with UL 924 must be completed by an organization recognized by the Occupational Safety & Health Administration (OSHA) as a Nationally Recognized Testing Laboratory (NRTL). A list of OSHA NRTL's may be found at: <http://www.osha.gov/dts/otpca/nrtl/index.html>.

A. **Specifications for Qualifying Products:**

Luminescence Depreciation: For electrically-powered exit signs, partner must include a statement in product materials that acknowledges luminescence depreciation of the light source over time, and explains that code requirements for average luminescence may not be maintained without lamp replacement at targeted intervals during the lifetime of the exit sign. The following statement shall be included, "The light source in this sign will depreciate, which can lead to a light output level that is below current building code requirements. The light source (lamps) should be replaced at regular intervals, and when they are no longer functioning, to assure safety and visibility in the event of an emergency." This statement must appear in the user manual or installation instructions.

Note: One manufacturer suggested that a standard statement of luminescence depreciation creates an atmosphere of uncertainty for the end user, and that addressing luminescence depreciation is beyond the mission of ENERGY STAR. However, the majority of comments EPA received from industry indicate that a standard statement of luminescence depreciation is preferred by manufacturers. EPA has retained the luminescence requirement in this Final Draft.

**Table 1: Product Specifications
For ENERGY STAR Qualified Exit Signs (Version 3.0)**

Energy-Efficiency Characteristics	Performance Specification
Input power demand	5 watts or less per sign
Power factor (for electrically-powered, internally-illuminated signs only)	Any leading power factor is satisfactory. A lagging power factor not less than 0.7 is satisfactory.
Reliability Characteristics	Specification
Manufacturer warranty for defects in materials and manufacturing	Replacement of defective parts for 5 years from date of purchase
Product Listing	Listed in accordance with UL 924

Note: EPA received several comments from industry indicating that there is a correlation between lowered energy consumption and product reliability. It was affirmed that an input power demand of 3 watts or less per sign was too low to allow proper design for long life. Conversely, it was also suggested that 3 watts is an acceptable limit of energy consumption and within the range of available technology. To resolve these conflicting comments, EPA conducted further analysis of the energy savings and pollution prevention of a 3-watt specification versus a 5-watt specification. Research indicates that setting such an aggressive 3-watt criterion may in fact, lead to low program participation, and may not serve the overall goals of ENERGY STAR. For these reasons, the Final Draft Version 3.0 specification requires that ENERGY STAR qualified exit signs consume no more than 5 watts per sign. Please note that the existing Version 2.0 criteria permit 5 watts per face; therefore, the Version 3.0 specification will still represent an overall reduction in energy consumption of qualified signs.

EPA received support on the power factor limits in the Draft 2 specification, and did not receive additional suggestions for imposing a leading power factor limit. Therefore, this Final Draft retains the requirement that a qualified exit sign may not have a lagging power factor less than 0.7.

As with the Draft 2 specification, this Final Draft does not contain criteria that specify analytical measurements of luminance for qualified signs. As evidenced by the differing treatment of this concept in various drafts, EPA has heard very strong viewpoints advocating both the inclusion and exclusion of analytical measurements of luminance. Some manufacturers of electrically-powered signs have questioned the safety and effectiveness of signs that cannot meet a specific, measurable luminance standard. Conversely, manufacturers of self-luminous and photoluminescent exit signs attest that UL 924 should be referenced as the authoritative standard to which an exit sign should be tested. They affirm that successful performance of signs to one of the observation visibility tests in UL 924 is a sufficient measure of the exit sign's effectiveness in emergency situations.

EPA shares industry concern about the effectiveness of qualified exit signs, and has devoted considerable time and effort to resolving the singular issue of whether or not to include analytical visibility standards in this specification. Since publication of the Draft 2, Version 3.0 specification, EPA has continued to speak with building managers, fire officials, and representatives of NFPA, and has failed to obtain sufficient support to develop explicit criteria or test standards that specify the safety performance of an exit sign beyond the detailed test procedure outlined in UL 924. Until such evidence is presented, EPA will continue to reference UL 924 as the method to determine that a qualified exit sign meets minimum safety standards. EPA will defer to the experts at NFPA and will accept their decision to permit installation and use of signs listed to UL 924.

In this Final Draft specification, EPA has retained the requirement that qualified exit signs have a five-year manufacturer warranty. Discussions with industry indicate that a five-year warranty is more than sufficient to ensure a reliable, high-quality exit sign, and EPA has only received one comment in opposition to this requirement.

- 3) **Test Procedure:** Manufacturers are required to perform tests to determine if an exit sign product model meets the product specifications in Section 2, Table 1. Section A below provides further explanation about the requirement that signs be listed in accordance with UL 924. To determine if the product model meets the energy-efficiency performance specifications in Section 2, Table 1, all

performance measurements and calculations must be completed as described Sections B and C. Section B explains the general test conditions for ENERGY STAR qualified exit signs, and Section C outlines the specific procedures for measurement and calculation of the product specifications in EPA.

A: Listing in Accordance with UL 924: Must be completed by an organization recognized by the Occupational Safety & Health Administration (OSHA) as a Nationally Recognized Testing Laboratory (NRTL). A list of OSHA NRTL's may be found at: <http://www.osha.gov/dts/otpca/nrtl/index.html>.

Note: EPA includes this requirement because listing in accordance with UL 924 indicates that a variety of safety and performance characteristics not otherwise addressed in this specification have indeed been assessed for the product model. On a Qualified Product Information (QPI) form, partners will be asked to certify that the reported exit sign model is listed in accordance with UL 924.

B. Test Conditions to Determine Whether Product Meets Energy-Efficiency Performance

Specifications in Section 2, Table 1:

This section is only applicable to internally-illuminated, electrically-powered products.

All voltages shall be provided within $\pm 0.5\%$ by a constant voltage power supply.

Prior to input power measurements, the exit sign model shall be operated at the rated input voltage for a period of 100 hours at 25 deg. C \pm 10 deg. C. In addition, the exit sign model with an internal battery shall be operated from the battery for one-and-one-half¹ hours, the minimum period of emergency operation specified in NFPA's "Life Safety Code," and then recharged for the period specified by the sign manufacturer.

All of the light sources in the exit sign model must produce light throughout the first 100 hours of operation, before any measurements are taken, in order to meet the requirements of this specification. Measurements should be recorded at 25 deg. C \pm 10 deg. C.

Note: One comment received from industry suggested the inclusion of criteria to specify ambient temperature conditions in the Test Conditions. EPA concurs that this adds clarity and has included this additional guidance in section B above.

C. Measurement and Calculation of Product Specifications in Section 2, Table 1:

This section is only applicable to internally-illuminated, electrically-powered products.

1. Input power demand measurement

The input power demand of the exit sign model in its entirety shall be measured with an appropriate True RMS Watt Meter at the rated input voltage which represents normal operation. For an exit sign model that includes a battery, the battery circuit shall be connected and the battery fully charged before any measurements are made.

2. Power factor measurement

At the time of testing for input power demand, the magnitude and waveform of the voltage and current and measurement between them shall also be measured, calculated, and reported. Testing results shall include:

- Active power measured in watts
- Apparent power based on the formula (rms volt-amperes)
- Power factor based on the formula:

¹ As in current *Life Safety Code*, 7.9.2.1.

$$\text{Power factor} = \frac{\text{Active power (watts)}}{\text{Total apparent power (rms volt-amperes)}}$$

- Indication of whether the power factor is leading or lagging

D: Submittal of Qualified Product Data to EPA: Partners are required to self-certify those product models that meet the ENERGY STAR guidelines and report information to EPA on a Qualified Product Information form.

Note: Once the Version 3.0 specification has been finalized, EPA will create an updated QPI form that manufacturers will use to report qualified product data. EPA recognizes that testing each product model and/or configuration can be expensive and time-consuming. In cases where the energy demand of a model or model series is identical, EPA is open to suggestions from industry on a protocol for testing and reporting selected models in a worst case scenario.

- 4) **Effective Date**: The date that manufacturers may begin to qualify products as ENERGY STAR under the Version 3.0 specification will be defined as the *effective date* of the agreement. The ENERGY STAR Exit Sign (Version 3.0) specification shall go into effect on **August 1, 2004**. Any previously executed agreement on the subject of ENERGY STAR labeled exit signs shall be terminated effective July 31, 2004.

Note: EPA recognizes that manufacturers will need some lead time to: (1) identify power factors of currently qualified units to determine which will meet the new specification; (2) make changes to existing units; and (3) produce new product literature, installation documents, and/or packaging. Recommendations from industry have suggested a range of effective dates, from immediate implementation to one year from the date of publication. Considering the Final Draft specification very closely resembles the Draft 2 version, EPA has determined that August 1, 2004 is an appropriate effective date.

- A. Qualifying and Labeling Products under the Version 3.0 Specification: All products, including models originally qualified under Version 2.0, with a **date of manufacture** after **August 1, 2004**, must meet Version 3.0 requirements in order to bear the ENERGY STAR label on the product or in product literature. The date of manufacture is specific to each unit, and is the date on which a unit is considered to be completely assembled.

Note: Immediately prior to August 1, 2004, EPA will edit the Web list of ENERGY STAR qualified exit signs. Product models that were originally qualified under the Version 2.0 specification will be removed from the list. If a product model meets the Version 3.0 specification, the partner will need to submit its testing results to EPA on a new QPI form or via an on-line submittal process in order for the product to remain on the list of qualified exit sign models. The models for which EPA does not receive updated QPI forms or Internet submittals will be removed from the list.

One industry representative suggested that a frequency of re-verification to the requirements be included in the specification. EPA feels that this is not necessary as all existing qualified products must undergo a similar re-verification in order to be considered ENERGY STAR qualified after August 1, 2004. With the elimination of grandfathering, products bearing the ENERGY STAR mark indefinitely is no longer a concern.

- B. Elimination of Automatic Grandfathering: Under Version 3.0, EPA has made a significant change with regard to product qualification and labeling during specification transitions. **ENERGY STAR qualification under Version 2.0 is not automatically granted for the life of the product model**. To earn the ENERGY STAR label, a product model must meet the ENERGY STAR specification in effect on the date of manufacture.

Note: EPA has made this important programmatic change for two reasons:

- 1. To deliver on expectations about ENERGY STAR by ensuring that the products perform at levels promised by the program.*
- 2. To ensure that ENERGY STAR's ability to differentiate more efficient products is not undermined by high percentages of labeled products qualifying at less stringent performance levels.*

- 5) **Future Specification Revisions:** EPA reserves the right to change the specification should technological and/or market changes affect its usefulness to consumers, industry, or the environment.

Similarly, EPA reserves the right to reconsider and revise the specification at any time that changes to UL 924, the Life Safety Code, or other important codes or standards alter the ability of certain exit signs to achieve a set level of performance, or when evidence suggests the need for a more stringent test procedure or set of eligibility criteria. In keeping with current policy, revisions to the specification are arrived at through industry discussions.

Note: One comment received from industry suggested that the Draft 2 specification did not adequately address the possibility of changes to UL 924. EPA has amended the wording in section 5 above to clarify that this specification may be reconsidered at any time EPA deems appropriate.