



Integrated Water Protection Assessment

Version 3.1

July 2026

Water protection of modern off-grid lighting products is a key determinant of long-term durability and consumer satisfaction. There are two strategies for protecting products from water: product design and user behavior. The framework outlined in the Quality Standards¹ for assessing the degree of water protection accounts for both using a three-level system of assessment. Each of the levels considers different aspects of water protection.

The procedures used to assess a product are defined by IEC/TS 62257-9-5. The findings of the assessments will place the product (or part of a product) into one of five protection categories: *No protection, occasional rain, frequent rain, permanent rooftop installation for PV modules, or permanent outdoor exposure.*

The three levels of assessment are **enclosure-only level of water protection, technical level of water protection, and overall level of water protection**:

- 1) Enclosure only: The enclosure meets the IP Ratings listed in the table below (and additional requirements for fixed outdoor products—see note in the item below).

Water Protection Category	Equivalent IP Code
no protection	IPX0
Protection from occasional rain	IPX1
Protection from frequent rain	IPX3
Permanent rooftop installation for PV modules	Modified IPX4
Protection from permanent outdoor exposure	IPX5

- 2) Technical level of water protection assessment: This approach involves considering the totality of the product's design and construction as it relates to protection from water (as opposed to the IP rating framework, which only deals with the enclosure). This approach involves a design-review and inspection process, and may include physical testing.

¹ VeraSol began referencing *IEC TS 62257-9-8: Integrated systems – Requirements for stand-alone renewable energy products with power ratings less than or equal to 350 W* in place of the Lighting Global Quality Standards in 2020. See <https://verasol.org/updates/transition-to-iec-ts-62257-9-8> for detailed transition information. See the [Change Log for Quality Standards](#) for details on new requirements and the differences between the Standards.

The company is responsible for providing information about product design and manufacture that is part of a water protection strategy. This information is used by the testing laboratory to establish a Technical level of water protection for the product. Companies that successfully demonstrate additional water protection may have the water protection category of the product increased by one (1) level above their equivalent IP rating. For example, a product may move from “no protection” to “occasional rain” or from “occasional rain” to “frequent rain,” or from “frequent rain” to “permanent outdoor exposure.”

- 3) Overall level of water protection assessment (including consumer instructions and labels): This pathway relies on a well-informed end-user to protect a product from water exposure. If there is adequate labelling and information provided to the consumer, the equivalent level of water protection can be increased by one level (e.g., from “no protection” to “occasional rain” or from “occasional rain” to “frequent rain”). The option is not applicable to levels above “frequent rain” (i.e., it cannot be used to achieve “permanent outdoor exposure” equivalency). The messages must include appropriate information about protecting the product from exposure to water. The specific wording and design of the label is the responsibility of the company but is subject to the requirements of IEC TS 62257-9-8 (detailed below).

Technical Level of Water Protection Assessment Details

VeraSol recognizes that it is important not to constrain innovation, and that the IP rating system does not specifically measure the effect of potentially harmful water ingress on the test product. The process for an alternative assessment of water protection includes the following steps:

1. The company provides details on their approach to water protection to VeraSol (to be held in confidence).
2. VeraSol obtains randomly selected samples of the product for inspection.
3. The design approach and an inspection of the product samples (which may include an IP code assessment) inform the test laboratory, who makes an assessment.
4. The test laboratory may ask the company for more information.
5. A judgment will be reached based on the available evidence.

The technical level of water protection assessment does not prescribe specific technical solutions for protecting a product from water exposure damage. Companies are free to develop and implement water protection strategies that best suit their individual product designs. As a result, the data application for a technical level of water protection assessment does not follow a standard format and will vary according to the designs and technologies involved. The company is expected to work with the testing laboratory to provide necessary relevant information and respond to laboratory inquiries during the assessment process. The relevant technical information in the application from the company will include all of the following that apply (from IEC/TS 62257-9-5 Annex V):

- a) Written descriptions of the product design elements and materials that will protect the circuit elements from water exposure damage.
- b) Photographs or video clips showing the relevant design features.
- c) Specification sheets for materials used for protection.

d) Written descriptions of protection for each circuit element in V.5.3.4.2:

- Printed circuit boards
- Electronic component solder joints
- Wire-to-board solder joints
- Wire-to-board connectors
- Wire-to-battery-terminal solder joints
- Wire-to-battery-terminal connectors
- LEDs
- switches

e) Written descriptions of relevant manufacturing processes employed for circuit element protection.

f) Written descriptions of quality control processes relevant to circuit element protection.

g) Descriptions of tests performed by the company to demonstrate protection of circuit elements from damage caused by water exposure.

If a polymer coating (conformal coating or encapsulant) is used to achieve the required water protection, the following information is additionally required:

- a) A material specification sheet or other documentation indicating that the conformal coating or encapsulant is intended and appropriate for electrical or electronic protection;
- h) A description of the coating coverage area. The coverage area shall include the circuit elements listed above unless the company provides other product design information or field/experiential information that supports a credible water protection strategy for these uncoated circuit elements;
- i) Either or both of the following:
 - 1) A description or indication of a board cleaning procedure prior to the application of the coating;
 - 2) Information suggesting the coating, as applied, will adhere properly to the substrate;
- j) A description of the coating application procedure;
- k) A description of the coating inspection procedure.

Consumer Labels and/or Instructions details

This path to compliance involves giving the end-user the information they will need to protect the lamp from water using appropriate warning labels and/or other information. The approval of specific labeling and/or instructions rests solely with VeraSol. If it is approved, the assessed level of water protection is increased by one level, but not above frequent rain. In other words, consumer labels cannot be used to raise the overall level of protection to permanent outdoor exposure, since consumer action cannot prevent exposure for products that are left outside full-time.

The overall requirement is that the communication strategy should be designed and implemented so that a typical user understands both the degree of protection from water for the product and what they should do to maintain the product in an instance of water exposure.

Further, no contradictory information (i.e., that the product is resistant to water or is waterproof) should be included in the packaging or any marketing materials in other media. This includes all written, graphical, internet, and spoken information.

The general design requirements are as follows:

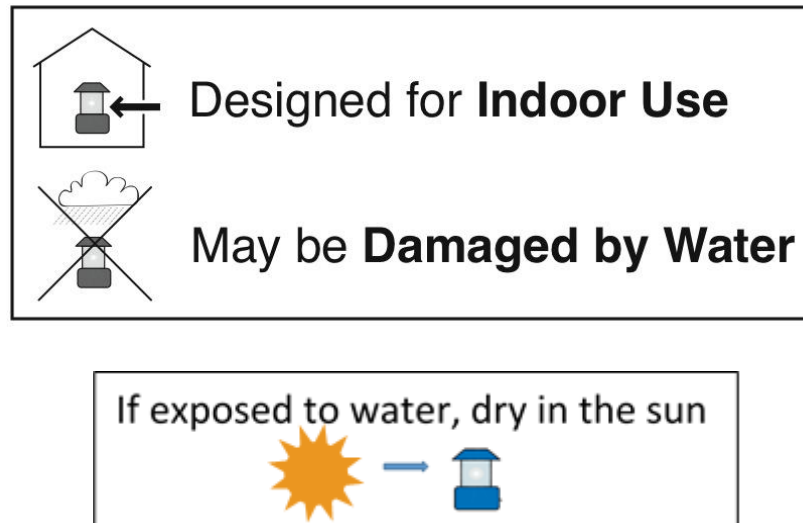
1. The basic, unambiguous messages shall accurately describe:
 - a. the degree of protection the product is afforded by its enclosure and other systems (e.g., “designed for indoor use” or “should not be exposed to rain”) AND
 - b. steps a consumer should take to drain or dry the product if it does get wet.
2. The labels or instructions must have at least the same style and prominence as the other messages on the packaging or in the users’ instructions. The following requirements shall be followed:
 - a. The instructions or label shall be placed in at least one prominent location on the box, in the users’ manual, or on other information inside the package, such as the warranty card.
 - b. The instructions or label shall include both graphical and text elements.
 - c. The text and graphic elements shall be simple and understandable.
 - d. The instructions or label shall be in an appropriate language for the intended market. It is strongly recommended to include one label in English (or the “official” language of the country, e.g. French or Hindi in many areas) and another in a regionally common language (as appropriate).
 - e. Use sufficient contrast between the text and graphics and the background to be clearly legible.
 - f. The label or instructions shall be sized such that:
 - i. The font has a cap height of at least 2.2 mm. The cap height is the height of flat capital letters such as X or H, measured from the baseline. (Typically, this corresponds to a font size of about 9-10 points, depending on the font.)
 - ii. The graphic elements are clearly visible.

Recommended consumer label placement:

Consider placing a label on the outside of the package in at least one prominent location. The bottom of the box is not prominent. This is not a requirement but is strongly suggested to appropriately inform consumers before the sale.

Example Label:

An example label is below; we encourage each company to design their own label but it is OK to use the one provided here.



Compliance Options for Each Protection Category

Occasional Rain

Any one of the following:

1. Enclosure only: IPX1 enclosure
2. Technical Equivalent: Technical level of water protection assessment indicates the product is protected from occasional rain
3. Appropriate consumer label

Frequent Rain

Any one of the following:

1. Enclosure only: IPX3 enclosure
2. Technical Equivalent: Technical level of water protection assessment indicates the product is protected from frequent rain + IPX1 enclosure
3. Appropriate consumer label + IPX1 enclosure
4. Appropriate consumer label + Technical level of water protection assessment indicates the product is protected from occasional rain

Permanent Rooftop Installation for PV Modules

Either of the following:

1. Enclosure only: modified IPX4 enclosure
2. IEC 61215-1 and IEC 61215-2
3. Technical Equivalent: Technical level of water protection assessment indicates circuits are protected from condensing environments with appropriate coatings, layout, manufacturing processes, etc.

Permanent Outdoor Exposure

Either of the following:

1. Enclosure only: IPX5 enclosure
2. Technical Equivalent: IPX3 enclosure + system-level assessment indicates circuits are protected from condensing environments with appropriate coatings, layout, manufacturing processes, etc.

About VeraSol

An evolution of Lighting Global Quality Assurance, the VeraSol program supports high-performing, durable off-grid products that expand access to modern energy services. VeraSol builds upon the strong foundation for quality assurance laid by the World Bank Group and expands its services to encompass off-grid appliances, productive use equipment, and component-based solar home systems. Like Lighting Global Quality Assurance, the VeraSol program is managed by CLASP in collaboration with the Schatz Energy Research Center at Cal Poly Humboldt. Foundational support is provided by the World Bank Group's Lighting Global program, UKaid, IKEA Foundation, Good Energies Foundation, and others.

Please visit VeraSol.org for more information.