

## Lighting Global Solar Home System Kit Testing Policy: Outdoor-rated cables

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### Background

The Lighting Global Quality Standards for Solar Home System Kits include a requirement that “Any outdoor cables must be outdoor-rated and UV-resistant.” This requirement goes beyond the Quality Standards for pico-products (off-grid products with peak power ratings of 10 W or less) and is based on the assumption that larger solar home system kits are expected to last for a longer period of time (10-20 years). Outdoor cables are defined as any cables intended to be used outdoors, such as the cable to the PV module or cables connecting components that are installed outdoors.

Note: This policy does not apply to products with power ratings of 10 W or less.

### Policy

Lighting Global assesses whether a cable is suited for outdoor use based on manufacturer declarations and documentation provided by the manufacturer. Lighting Global also reserves the right to use the Market Check Method Test to verify compliance with this policy.

As part of the testing process, manufacturers are required to sign a declaration form that includes the following statement:

- All cables intended to be used outdoors, such as cables connecting the PV module, are appropriately protected against UV radiation and water ingress.

Manufacturers are also required to provide supporting documentation. Approved documentation includes one or more of the following:

- Certifications indicating that the cable meets relevant PV cable standards, such as UL 4703, TÜV 2 PfG 1169/08.2007, UL 854, IEC 62930, EN 50618, or similar standards
- Certifications indicating that cables have been evaluated for outdoor use and are resistant to damage from sunlight and water exposure
  - The cable is UL listed, and the listing indicates that the cable is suitable for use outdoors.
  - Other listings that indicate the cable is suitable for use outdoors.
- Independent laboratory test results indicating that the cable jacket material is resistant to damage from sunlight and water exposure
  - For sunlight resistance: UL 44 Section 5.15.2, ISO 4892, UL 1581 Section 1200 (XenoTest), HD 605/A1, or similar
  - For water resistance: some form of wet / damp heat testing, such as that described in IEC 60068-2-78, UL 493, ISO 4892, or similar
- Cable specification sheets confirming that the cable jacket material is one of the pre-approved cable jacket material formulations described below.

Lighting Global will determine if the documentation provided by the manufacturer is sufficient to establish approval for a specific cable jacket. Market check testing of cable compliance may be used to verify manufacturer claims at the discretion of Lighting Global.

### **Pre-approved cable jacket materials**

The cable jacket is the outermost layer of material of an insulated wire or multi-conductor cable. The jacket may be separate from individual wire insulations, or it may serve as both the insulation and the outer jacket. The jacket is exposed to sunlight and water when the cable is used outdoors.

Some outdoor cable jacket materials are pre-approved by Lighting Global for use in renewable energy products. When properly manufactured, these cable jacket materials are expected to resist damage from UV and water exposure for an acceptable period of service. The product manufacturer is still responsible, however, for ensuring that the cable will have the necessary performance characteristics for their product.

The renewable energy product manufacturer is responsible for providing Lighting Global with documentation showing the material composition of the cable jacket. This documentation can include material specification sheets from the cable manufacturer, polymer masterbatch information, and/or information detailing the manufacture of the cable jacket. Lighting Global will work with the product manufacturer to determine what materials are necessary to establish that a cable jacket is made from a pre-approved material. Lighting Global will hold all submitted documentation confidential.

Lighting Global recognizes that many jacket materials may be appropriate for use with outdoor renewable energy products. Product manufacturers may submit a jacket material that is not on the pre-approved list for consideration of inclusion. If the jacket material is determined to be acceptable, that material will be added to the list.

**List of pre-approved cable jacket materials and polymer additives. For purposes of this designation, “cable jacket” refers to the outermost layer of material that covers a cable.**

#### **Thermoplastic materials**

- 1) PVC with >2.5% by weight carbon black additive.
- 2) Polyethylene with >2.5% by weight carbon black additive.
- 3) PVC or Polyethylene with an approved UV resistant polymer additive.
- 4) PVC or Polyethylene with independent laboratory test results indicating that the cable jacket material is resistant to damage from sunlight

#### **Thermoset (cross-linked) materials**

- 1) Styrene-butadiene rubber (SBR)
- 2) Silicone rubber
- 3) Ethylene propylene diene monomer (EPDM) rubber

#### **Thermoplastic elastomers (TPE)**

- 1) Thermoplastic elastomers (also called thermoplastic rubbers (TPR))  
[contact Lighting Global for additional information on determining if a specific thermoplastic elastomer qualifies as pre-approved.]

### **Approved UV resistant polymer additives**

- 1) CYASORB UV-531 is an approved UV Light Absorber additive. When used as directed by the additive manufacturer, UV-531 satisfies the UV resistance requirements of this policy.

Product manufacturers may submit a jacket material that is not on the preapproved list for consideration of inclusion. If the jacket material is determined to be acceptable, that material will be added to the list. A manufacturer submission of an additional jacket material must supply the following information:

- A detailed description of the material, including master batch material compositions and additives. Percentage compositions should be listed.
- Information supporting a listing as UV resistant and/or outdoor rated. This information can include technical test data, academic research, industry white papers, or other specific technical information describing the outdoor durability of a polymer jacket material. A manufacturer statement of UV resistance/outdoor durability will not be sufficient to list a material as pre-approved.
- Lighting Global will assess a manufacturer submission and may require additional detail before a decision to grant pre-approval is made. Lighting Global may or may not approve a submission at its sole discretion.

### **Market Check Method (MCM) Testing**

Lighting Global reserves the right to perform MCM testing on outdoor cables that have previously met this standard. This testing may include any procedure, or an equivalent procedure, mentioned above.