

Procurement of Off-grid Lighting Products – Guidance for Aid Organizations and Governments

This Technical Note provides guidance on procuring off-grid lighting for humanitarian aid. It presents the relevance of the Lighting Global Quality Standards, key technical considerations, and a step-by-step guide for procurement of off-grid lighting products.

Introduction

Aid organizations are responsible for procuring large quantities of off-grid lighting products and have a considerable influence on the off-grid lighting market. As users of these bulk procured products generally do not have the option to select the products purchased on their behalf, it is particularly important for aid organizations to ensure that they choose high quality products that meet the needs of their program beneficiaries. Procuring quality products also helps to develop a common expectation for quality from manufacturers in the off-grid lighting market.

This Note provides technical guidance on important product features and key performance metrics that may be relevant in procuring off-grid lighting products. Humanitarian crises that result from armed conflict, epidemics, famine, natural disasters and other major emergencies are all characterized by different user needs for lighting. There is also often a strong cultural context that must be taken into consideration. It is important for aid organizations to understand both the technical capabilities of off-grid lighting products and the context and needs of the end users in order to determine the most appropriate procurement specifications to meet these needs.

Lighting Global Quality Standards

An initial step organizations can take to procure quality products is to verify that the products have met the [Lighting Global Quality Standards](#). The Quality Standards were developed to protect consumers of off-grid lighting products. They set a baseline level of product quality,

durability, and truth-in-advertising. Manufacturers voluntarily choose to have their products tested against the Standards, and testing is conducted according to the Quality Test Method in International Electrotechnical Commission (IEC) [Technical Specification 62257-9-5](#) at third-party, approved test laboratories using randomly procured samples. Products that meet the Standards based on this testing are subsequently listed on the Lighting Global website as quality-verified products. The test results are also available on the website in the form of a Standardized Specifications Sheet (Specs Sheet). Specs Sheets provide a trusted, third-party resource for directly comparing the performance of products.

Lighting Global quality verification ensures:

Key advertised aspects of the product, including their light output, run time, and power rating, are truthful.

The light(s) maintain at least 85% of their original brightness over 2000 hours of operation.

Products meet reasonable expectations for durability.

Products carry a manufacturer’s warranty of at least one year.

Batteries do not contain cadmium or mercury.

Batteries are protected by an appropriate charge controller and maintain capacity during periods of low use.

Any AC-DC product chargers carry safety approval.

Important technical considerations for aid organizations when procuring off-grid lighting products include durability, battery type, lighting performance, phone charging capability, ease of use, product and packaging size, product distributor, and the potential for product

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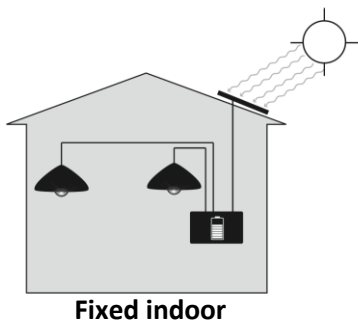
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theft. These technical considerations and their relation to the Lighting Global Quality Standards are discussed in detail below. A step-by-step guide for procurement is provided at the end of this document along with an example specification for procuring an off-grid lighting product.

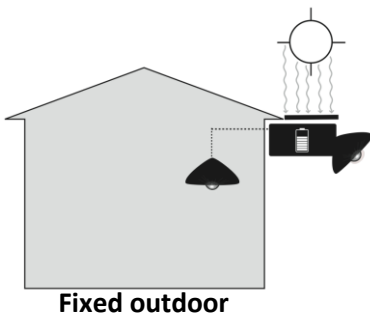
Durability

Under the Lighting Global Quality Standards, there are four types of off-grid lighting products:

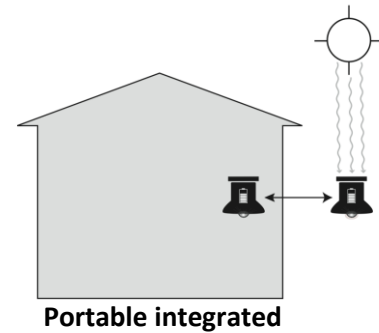
- **Fixed indoor (fixed separate)** – products that are not inherently portable and are intended for used indoors.



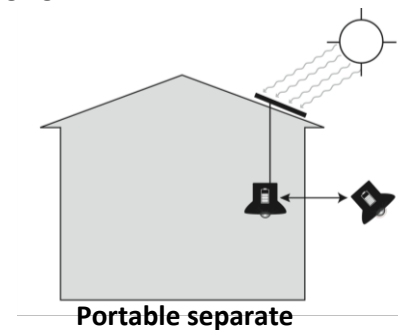
- **Fixed outdoor (fixed integrated)** – products that are not inherently portable and are charged with an integrated solar module or designed to be left outdoors to charge.



- **Portable integrated** – products that are portable and charged with an integrated (inbuilt) solar module or designed to be left outdoors to charge.



- **Portable separate** – products that are portable and charged with a solar module with a cable of at least 3 m, which allows the light point and battery to remain indoors while the product is charging.



Under the Standards, each type of product has specific durability requirements. Individual solar modules, cables, and other parts of the product must also meet specific durability requirements. The full durability requirements are described as follows:

- Protection from ingress of solid objects
 - All solar modules must be protected from small particles and insects, i.e. Ingress Protection (IP) rating 3X¹ (IP3X)

¹ The letter “X” in the IP rating may be replaced by any number between 0 and 9

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- Products must be protected from small fingers reaching hazardous parts (IP2X)
- Fixed outdoor products must be protected from dust, sand and dirt (IP5X)
- Protection from water ingress
 - All solar modules must withstand splashing water (modified IPX4)
 - Fixed outdoor products must be protected from a jet of water
 - Portable integrated products must be protected from spraying water (a heavy rain), or be protected from dripping water AND carry an appropriate warning label
 - Portable separate products must be protected from dripping water (a light rain) or carry an appropriate warning label
 - Fixed indoor products are not required to be protected from water
- All portable products must withstand a 1 meter (m) drop test
- All switches, connectors and moving parts must withstand usage over 1000 cycles of use
- All cables must withstand a strain relief test
- All internal electronics and solder joints are examined for defects and workmanship quality

By procuring a Lighting Global quality-verified product, aid organizations can be assured that the product has been tested to meet these requirements.

Other durability considerations and recommendations for aid organizations include –

- If the products will be predominantly used outdoors, it is important that they have been designed to be water resistant.
- If the products will be air lifted and dropped at their destination, products that have passed the

1 m drop test are recommended. All quality-verified portable products have passed the drop test. Proper packaging may make airdropping of other products feasible.

- If dust, sand and dirt that have the potential to damage products are of particular concern in the distribution area, an IP5X rating may be required to ensure it is dust proof.

Aid organizations may have additional durability requirements for products likely to be exposed to conditions beyond those defined by the Lighting Global Quality Standards. Where this is the case, labs in the Lighting Global network may potentially test to these additional durability requirements when requested.

Batteries

There are four main types of batteries used in off-grid lighting products –

- **Lithium batteries**, including **Lithium-ion (Li-ion) batteries** and **Lithium Iron Phosphate (LiFePO4) batteries**, offer a number of advantages over other types of batteries used in off-grid lighting products, including higher energy density (smaller size) and longer lifetime². **Li-ion batteries**, however, can potentially present a safety hazard if overcharged, overheated, or short-circuited. Venting of electrolyte, catching fire or explosion are possible consequences. To ensure this does

not occur, the product must have appropriate built-in protection circuitry.²

LiFePO4 batteries are a more recent technology and have become very common in off-grid lighting products. They typically offer a longer lifetime than most other lithium battery chemistries and are much more stable, which greatly reduces the dangers associated with fire and explosion.²

- **Nickel metal-hydride (NiMH) batteries** were more common in off-grid lighting products until the recent emergence of lithium batteries. NiMH batteries are reasonably durable and typically available in standard AA and AAA battery sizes. The main disadvantages of NiMH batteries are that they suffer from high self-discharge when not being used and experience a memory effect whereby they gradually lose their maximum energy capacity if they are repeatedly recharged after being only partially discharged. However, when properly sourced, NiMH batteries can have low self-discharge and low memory effect performance.

Lithium and NiMH batteries do not contain toxic materials such as cadmium and lead.

- **Sealed lead acid (SLA) batteries** are an established technology and are relatively inexpensive compared to lithium and NiMH batteries. As such, they tend to be used in products that require greater energy storage capacity. Of particular note, however, is a problem identified by Lighting Global concerning storage of SLA batteries. Self-discharge can occur during shipping and

warehousing and while products are sitting on store shelves. If care is not taken to prevent this self-discharge and limit a product's time in the supply chain, the battery may be damaged and suffer permanent capacity loss by the time the product reaches the end-user. This damage will result in decreased run time or, in severe cases, an unusable product.³

Battery Testing

Lighting Global carries out several tests on batteries used in off-grid lighting products to ensure that batteries are durable and are protected by an appropriate control circuit. Tests are conducted to verify that appropriate deep discharge and overcharge protection are employed in all quality-verified products. Additionally, battery durability testing is conducted to simulate the battery's typical daily use and accelerate the ageing mechanisms that occur during storage. This allows batteries that age prematurely to be identified during testing, ensuring that quality-verified products only contain robust batteries.

Some product distributors provide specifications that include the expected life span of the product. Given that the battery is often the product component that is most prone to failure, in many cases this expected life span will in fact be the battery life span. These claims may not be easily verifiable, however, because of the nature and complexity of battery testing (and the diverse conditions under which the batteries will be used). For this reason, Lighting Global has chosen to test product batteries for safety and early failure, rather than life span, to identify "bad" batteries used in off-grid lighting products.

² For more information on lithium batteries and battery (cycle) lifetimes refer to the [Lighting Global Technical Note on Lithium-ion Batteries](#)

³ For more information on SLA batteries refer to the [Lighting Global Technical Note on Shipping and Storage of Sealed Lead-Acid Batteries](#)

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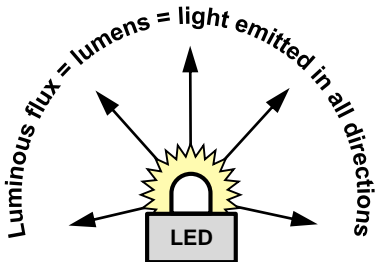
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Lighting Performance

Three important lighting characteristics of off-grid lighting products measured by Lighting Global are **luminous flux**, **illuminance**, and **correlated color temperature (CCT)**. These measurements are available for each quality-verified product on its Specs Sheet and are explained briefly below.

Lighting needs of end users vary according to local conditions. While it is true that, in general, people prefer more light to less (and thus a higher lumen output), other lighting features, such as portability, run time, or high/low light settings may play an equal role in the selection of the light source.

Luminous flux



Lighting Global's primary metric for comparing the light output of different off-grid lighting products is luminous flux. Luminous flux, measured in lumens (lm), is a measure of the total light output of a light source in all directions. Off-grid lighting products can be directly compared using their lumen outputs.

Lighting Global measures each product's lumen output to verify that the advertised product specifications are accurate. The resulting values are listed on the Lighting Global website and Specs Sheets. Some products have multiple brightness settings and the lumen outputs for two or more settings are often listed in the product's Specs Sheet.

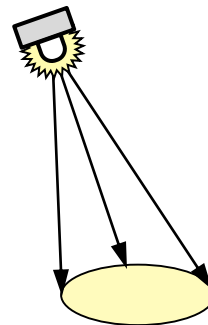
For reference, lumen output values for some common light sources are provided in Figure 1.

<u>Lumen output examples</u>	
Standard candle	= 12 lumens
Kerosene wick lantern	= 8 - 40 lumens
Pressurized kerosene lamp	= 330 – 1000 lumens
60 watt GLS incandescent	= 900 lumens
23 watt compact fluorescent	= 1000 lumens

**Lighting Global quality-verified product
lumen output values as of February 2015**
range = 17 – 800 lm
average = 170 lm
median = 120 lm

Figure 1. Lumen output values for common light sources.

Illuminance



**Illuminance = lux
= light incident on
a surface**

Note: **Lux** is what you measure with an illuminance meter; **this is NOT luminous flux (lumens)**

Illuminance is the amount of light incident on a surface, measured in lumens per meter squared (lm/m^2), the unit of which is lux ($1 \text{ lm}/\text{m}^2 = 1 \text{ lux}$). This measurement is dependent on the product's lumen output, the measurement distance, product orientation, product optics, room dimensions, wall color, and objects in the room. For example, moving a light closer to the surface will increase the illuminance on that surface, and a product with a wide light distribution will light a room

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differently than a product with a narrowly focused light distribution. These factors present a degree of complexity when attempting to compare products using lux values. Nonetheless, there is value to using illuminance measurements and Lighting Global has developed a standard testing metric to make these comparisons.

Lighting Global measures and reports the **total surface area (m²) that a product can light with an illumination > 50 lux.**⁴ For self-standing products, or those supplied with a stand, this measurement is made with the product sitting on the measurement surface. For products that are not self-standing the test is performed by hanging the product 0.75 m above the surface. This measurement essentially lets the user know the area over which the product can provide adequate task lighting. For reference, if a product is measured to light an area of 0.1 m² with an illumination > 50 lux, this means it can provide adequate task lighting for an area approximately the size of two sheets of A4 paper. Generally speaking, higher lumen output products are capable of lighting a larger area, and products that light a larger area will usually provide better task lighting.

Correlated color temperature

Correlated color temperature (CCT) describes how the color of light appears from a light source and is measured in Kelvins (K). The higher the CCT, the cooler and bluer a white light source will look - the lower it is, the warmer and more yellow it will appear (Figure 2). In residential and commercial applications, lighting designers select color temperatures based on the mood or atmosphere they wish to set. In an off-grid environment, color temperature is typically a secondary concern to the light's lumen output and runtime. Some

⁴ Note that some older product Specs Sheets may report the total surface area (m²) that a product can light with an illumination > 25 lux. If you are considering one of these

products, though not all, with high color temperatures (>6000 K) may seem uncomfortably 'blue' and will generally have a poor color rendering index (CRI) below 60. While these products will still produce useful light, they may not provide their users with the quality of light available from other similar products.

For more technical details on these lighting concepts, please refer to the [Lighting Global Technical Note on Light Emitting Diode \(LED\) Lighting Basics](#).

Light output assessment

It is good practice to physically inspect a product sample before making a bulk purchase. This is particularly true for assessing lighting performance. While performance numbers are essential to making informed decisions, there remains no substitute for experiencing the light output of a product in person.



Figure 2. Correlated color temperature light examples.

Ambient and task lighting

Off-grid lighting products can be broadly characterized as either ambient lights or task lights. Ambient lights are typically hung from a ceiling and are used to light an entire room. In contrast, task lights are often self-standing, or supplied with a stand, and can be placed on

products and want to know the area with an illumination >50 lux, contact [Lighting Global](#).

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a table or the ground to be used for detailed tasks like reading and sewing. Many products can serve dual purposes and are able to be hung from a ceiling as an ambient light OR placed on a table or ground to do task work.

Off-grid lighting expectations

Field studies were carried out by Lighting Africa and Lighting Asia with off-grid lighting consumers in Africa and Asia to determine the minimum light levels that would meet their expectations. Battery powered lighting test devices, similar to many off-grid lighting products, were designed for the studies and used with focus groups to gauge consumer opinions under simulated real world conditions. As light levels were increased from low to high, the participants were asked to indicate the minimum level of light that they would be satisfied with for room/ambient lighting and task lighting applications.

The results of the testing found that **25 lumens** and **50 lux** met the majority of test group participants' *minimum* expectations for ambient and task lighting, respectively.

Most commercial standards in industrialized countries recommend illumination levels for ambient and task lighting in the 100 – 500 lux range. The levels recommended for off-grid lighting are well below these levels and reflect the economic challenges present in developing countries. As the purchasing power of many off-grid people is limited and lighting products are designed to be affordable, the light levels in spaces illuminated by off-grid lighting products are generally well below the light levels typically found in higher income regions with grid access.

⁵ Maintaining means that lights deliver at least 70% of their initial output.

Other Lighting Global lighting measurements

Lighting Global measures the product's **solar run time**, which is the number of hours that all of the product's light points can be run while maintaining their level of light output⁵ after being charged over a typical sunny day (a solar day⁶). Lighting Global carried out studies in Africa and India that identified that the most common amount of time that consumers used off-grid lighting products was between 4 and 6 hours a day.

Using the measured solar run time and lumen output, Lighting Global calculates and reports the **total lighting service** of products. Total lighting service, measured in lumen-hours (lm-h) per solar day, indicates the total amount of light the product can produce when charged over a solar day. For example, a product with a total lighting service of 1000 lm-h that has a lumen output of 100 lm can produce 100 lm of light for a period of 10 hours.

The UN's Sustainable Energy for All (SE4ALL) initiative defines Energy Access Tiers that allow different levels of energy access to be determined. To achieve each Tier of energy access, a minimum level of service must be met.

Aid organizations may wish to provide a Tier 1 level of energy access to their program beneficiaries. To achieve Tier 1 energy access for a household of five, a product or combination of products that can provide 1000 lm-h of lighting service and 3 Watt-hours of mobile phone charging capacity per day is required.

For reference, solar run time and total lighting service figures of Lighting Global quality-verified products are provided below (Figure 3).

⁶ This is defined as a day with 5 kWh/m² of solar radiation.

Light Global quality-verified products

Solar run time on the product's highest setting

range = 0.8 to 11 hours

average = 5.5 hours

median = 5.4 hours

Total lighting service

range = 68 to 3120 lm-h

average = 876 lm-h

median = 562 lm-h

Figure 3. Lighting Global quality-verified product measurements as of February 2015.

Lighting use and portability

It is important to consider the intended use and portability of the light to suit the context and needs of the users. Some products are designed to provide portable lighting while others are designed to provide fixed source lighting. Some products may have a fixed main battery and lighting unit but also include a portable re-chargeable flashlight. In some aid contexts, a portable flashlight may be a particularly useful type of light for users. The focus and distance of the light beam may also be useful considerations.

Mobile Phone Charging Capabilities

Mobile communications are critical in many aid contexts and many off-grid lighting products have mobile phone charging capabilities. Currently Lighting Global reports if a product offers mobile phone charging and tests to ensure the product will charge a basic mobile phone.

It is important to note that when a mobile phone is charged with an off-grid lighting product, it uses energy from the product's battery and reduces the lighting run time available from the product.

There are some off-grid solar products on the market that are intended to be used solely for mobile charging. These products are not currently evaluated by Lighting Global.

Ease of Use

The Lighting Global Quality Standards do not specify ease of use requirements for products. However, some aid organizations may wish to consider these requirements in their procurement –

- It is helpful to evaluate the product's ease of use by obtaining a sample from the vendor. The sample should include a copy of the product's instruction manual, preferably written in an appropriate local language, for evaluation.
- Installation should essentially be plug-and-play and require minimal effort and knowledge – The product should also require as little maintenance as possible.
- It may be useful for products to include indicator lights that provide information about parameters such as when the battery is being charged and/or when the charge is complete.
- It may be useful in some contexts for the product to charge not only from the sun but also from standard AC electrical outlets. It should be noted that relatively few available products provide this option.

Product Size and Packaging

The Lighting Global Quality Standards do not specify size and packaging requirements for products. However, some aid organizations may wish to consider these requirements in their procurement –

- If the off-grid lighting product is likely to be packaged together with other relief items for distribution, it may be useful to consider how these items will be packaged together. For example, some aid organizations distribute buckets with relief items such as hygiene kits, clothes, kitchen sets, mosquito nets and soap (Figure 4). If the product is to be included in a bucket, it may be useful to consider the size of the bucket, the size of the product in its packaging and whether it will fit in the bucket.



Figure 4. Distribution of aid materials in buckets

- The size and weight of the product may also be relevant if the target beneficiaries are children. A smaller-sized, lighter product may be more appropriate for children.
- The transportation of the products to the destination area is another important consideration. It may be useful to specify packaging and delivery requirements. For example, the type of cartons the products

should be packed in and the type of pallets the products should be transported in. It may also be useful to request from the distributor information on how many packaged products will be provided in each pallet or shipping container used for transportation.

- Consideration should also be given to the transportation of batteries. Some aid organizations may have guidelines on the type of batteries they would like to use and have battery safety and transport requirements. Additionally, some transport companies may not be familiar with shipping certain types of batteries, such as lithium batteries and sealed lead acid batteries, and consequently may not ship some batteries or may require guidance in meeting shipping requirements for them.

Product Distributor and Warranty

Aid organizations may wish to consider the following product distributor and warranty considerations in their procurement of off-grid lighting products –

- The readiness of the distributor to provide shipment of specific quantities at short notice.
- The location of product warehouses and the shipping time to the relief area.
- Warranty and after-sales service – The distributor should be able to provide a simple and accessible warranty procedure for aid beneficiaries and have the capacity to actually service the distribution area, either by having a presence there or through local partnerships. Spare parts, technical support and repair services should also be accessible by aid beneficiaries. The vast majority of off-grid lighting products do not contain batteries that can be easily replaced after their end of life with

off-the-shelf batteries. As such, after-sales service is especially important if the products are intended to be used in the long term.

- Warranty length – All Lighting Global quality-verified products carry a manufacturer's warranty of at least one year. Aid organizations may have additional warranty requirements beyond this. A number of solar off-grid lighting products have warranties that exceed the one year minimum requirement. All batteries can be damaged if they are stored in a discharged state, which may occur if they are stored for too long before being used. As such it is important to know the date that the products were manufactured before procuring them.

Security

Security and specifically theft of off-grid lighting products and solar modules is a key consideration in many aid contexts. It is important to consider users' needs and the expected use of the lighting product against the security situation when deciding on a product to procure. For example, in some contexts it may be more appropriate to procure products designed for fixed installation rather than portable products. Alternatively, in some cases it may be more appropriate to procure products that have an integrated solar module built into them and can be easily transported by the owner. Where products include separate solar modules, modules that can be fixed or locked to roofs may provide some protection from theft.

A Step by Step Guide for Procurement of Quality Off-grid Lighting Products

Step 1: Vendor Notification of Adoption of Lighting Global Quality Standards

If your organization has previously purchased off-grid lighting products, you may wish to release a public notice informing potential vendors of your decision to adopt the Lighting Global Quality Standards. A template statement can be downloaded from the Lighting Global website [here](#) and customized by adding your organization's letterhead and logo.

If you have an existing supplier of off-grid lighting products but their products have not been quality-verified, they may arrange for their products to be tested by [contacting Lighting Global](#). The quality verification process takes several months, and the manufacturer is responsible for paying the testing costs. As such, it is advisable to publish notice of your decision to shift to quality-verified products well in advance.

Step 2: Bidding Process

In preparing a RFP or RFQ for the procurement of off-grid lighting products, consider the context of the humanitarian crisis or situation, the potential users' needs and the technical specifications that would best meet these needs.

Template product specification options that should be considered for inclusion in a RFP or RFQ for an off-grid lighting product are provided in Appendix A. An example procurement specification for an off-grid lighting product is provided in Appendix B.

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Step 3: Check Claims

Check the products bid against the list of quality-verified products on the Lighting Global website [here](#) to ensure they are current quality-verified products and check that the manufacturer's advertised product specifications match the verified specifications listed on the product's Specs Sheet.

Lighting Global may be in a position to offer limited advice related to product procurement. The contact email address is info@lightingglobal.org.

Conclusion

Lighting Global supports the off-grid lighting market through testing and verifying off-grid lighting products against the Lighting Global Quality Standards. Aid organizations may ensure that they procure quality off-grid lighting products by procuring Lighting Global quality-verified products. In addition to procuring quality products, aid organizations should also consider the product durability, battery type, lighting performance, phone charging capability, ease of use, product and packaging size, product distributor, and the potential for product theft. This Tech Note has discussed these technical considerations and attempted to provide useful guidance to aid organizations on the procurement of off-grid lighting products for humanitarian aid.

Acknowledgments

Lighting Global thanks the team led by Richenda van Leeuwen at the United Nations Foundation for their support of our efforts to engage with stakeholders from the humanitarian sector. We also thank three expert reviewers for their input on a prior draft of this Technical Note.

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Appendix A – Template Procurement Specification Options for an Off-grid Lighting Product

Specification Category	Details
Current Lighting Global quality-verified product	Specify that the product must be a current Lighting Global quality-verified product. This guarantees that it has been tested to meet the Lighting Global Quality Standards within the past two years. A copy of the product's Verification Letter can be requested as evidence of current quality verification.
Type of product	<p>Specify the type of product required based on the anticipated needs of the users and the context, i.e. –</p> <ul style="list-style-type: none">• Fixed indoor product – e.g. for relatively stable situations, or for a fixed installation such as for a clinic or community area.• Fixed outdoor product – e.g. for a fixed outdoor area, such as for shop fronts or near toilets.• Portable product with a separate solar module – e.g. for areas where separate solar modules can be fixed securely but the light must be portable.• Portable product with an integrated (inbuilt) solar module – e.g. for areas where a separate solar module cannot be fixed securely and may be at risk of theft. <p>Additional requirements such as battery characteristics and additional water resistance above the levels required by the Lighting Global Quality Standards can also be included here.</p>

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Specification Category	Details
Lighting characteristics	<p>Specify the lighting characteristics required including –</p> <ul style="list-style-type: none">• Number of light points• Type of lighting provided – ambient lighting, task lighting, or a combination of both• Number of light settings and lumen output (lm) of each light point at each setting• Correlated color temperature (K) – or more generally, warm white or cool white lighting• Solar run time (h) – the number of hours that all light points can be run and provide usable light⁷ after being charged over a typical sunny day (a solar day⁸)• Total lighting service (lm-h) per solar day• The total surface area (m²) that a product can light with an illumination > 50 lux – either while sitting on a surface or hanging 0.75 m above a surface
Mobile phone charging	<p>Specify if mobile charging capability is required and request information on the types of connections/phones that can be charged</p>
Ease of use	<p>Specify ease of use requirements including –</p> <ul style="list-style-type: none">• The language of the product manual and what it should contain (easy to follow photos, pictures, etc.)• A picture of the product and a copy of the product manual to be sent by email• A sample of the product to be couriered to your procurement office within a certain number of days• Installation and maintenance should require minimal effort and knowledge or the product should be maintenance-free• Product indicator lights required – e.g. for battery charging and end of charge• AC charging where required. Note: very few products available provide this option

⁷ Light output at least 70% of the initial output

⁸ A day with 5 kWh/m² of solar radiation

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Specification Category	Details
Size and packaging	<p>Specify size and packaging requirements including –</p> <ul style="list-style-type: none">• The maximum product size and weight – e.g. if it needs to fit a bucket, or will be predominantly used by children, etc.• The packaging and delivery requirements – e.g. the type of cartons it should be packed in and the type of pallets it should be transported in
Distributor and warranty	<p>Specify distributor and warranty requirements including –</p> <ul style="list-style-type: none">• The delivery time required for a specific quantity from the placement of the order• A statement from the distributor on their capabilities to handle warranty issues and after-sales service in the context of the humanitarian crisis, that includes how a user can access the warranty and the process involved• Additional warranty requirements if the warranty required is greater than the minimum one year warranty all Lighting Global quality-verified products must have• The date/s of manufacture of the products

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Appendix B – An Example Procurement Specification for an Off-grid Lighting Product (Not a Recommendation)

NOTE: The table below provides an example product specification. This is not a recommendation but an example of how a specification may be described. Organizations are encouraged to tailor their requirements to the individual needs of the people and context where the products will be deployed.

Specification Category	Minimum Requirements
Current Lighting Global quality-verified product	<ul style="list-style-type: none">• The product must be a current Lighting Global quality-verified product. A copy of the product's Verification Letter is required as evidence of quality verification
Type of product	<ul style="list-style-type: none">• The product must be a portable product with an integrated (inbuilt) solar module• The product must use a lithium battery
Lighting characteristics	<ul style="list-style-type: none">• Number of light points: 1• Type of lighting provided: ambient lighting (i.e. not task lighting)• 2 or more light settings with the brightest setting having a lumen output of at least 60 lm• Warm white color temperature• Solar run time: at least 4 hours on its brightest setting (i.e. number of hours that all light points can be run and provide usable light⁹ after being charged over a typical sunny day [a solar day¹⁰])• Total lighting service per solar day: at least 240 lm-h• The total surface area (m²) that a product can light with an illumination > 50 lux while hanging 0.75 m above the surface: at least 0.2 m²
Mobile phone charging	<ul style="list-style-type: none">• Mobile phone charging capability is required – a Nokia and micro-USB phone connection must be included

⁹ Light output at least 70% of the initial output

¹⁰ A day with 5 kWh/m² of solar radiation

Procurement of Off-grid Lighting Products – Guidance for Aid Organizations

Issue 20 March 2015

Specification Category	Minimum Requirements
Ease of use	<ul style="list-style-type: none">• The product manual should be in English and contain easy to follow instructions in picture form• A picture of the product and a copy of the product manual must be provided via email• A sample of the product must be couriered to us and received within 14 days• Installation and maintenance should require minimal effort and knowledge – The product should be maintenance-free• Product indicator lights are required indicating when the battery is being charged and when the charging is complete
Size and packaging	<ul style="list-style-type: none">• The maximum product dimensions are 31cm X 21cm X 21 cm• The maximum product weight is 3 kg• To be packed in a carton box• Delivery with EUR-pallet
Distributor and warranty	<ul style="list-style-type: none">• The estimated delivery time for 10,000 units from placement of order must be 14 days• A statement must be provided detailing your capability to handle warranty issues and after-sales service in the context of the typhoon relief situation in the Philippines. This must include how users will access the warranty and the process involved• The date/s of manufacture of the units must be provided