



## Fenix E05 Announcement



**Compact and exquisite  
flood light mini flashlight**

**E05**  
Max **30** Lumens



## **E05**

Max **30** Lumens

- ⊙ *Cree XP-G R4 LED, high-intensity and compact*
- ⊙ *Mini lens design, bright and gentle flood light*
- ⊙ *Exquisite and compact, fashionable and portable*
- ⊙ *Revolving single dimmer switch, operated by one hand conveniently*
- ⊙ *Powered by one AAA battery, high efficiency and energy conservation*



**FENIX**

Fenix Flashlight  
Illuminate Your Adventure

**E05**

Max **30** Lumens

Fenix E05 is a portable high-intensity flood beam flashlight for every day carry (EDC). It features light weight and very compact size, with the anti-abrasive finish and water-resistant capability, E05 will be your perfect companion any time and any where. In addition, it offers perfect flood beam for running very long time with easy but reliable operation, all of these delivers best performance at any time and under any circumstances. With these outstanding features, E05 is your best choice for every day carry, collection and sent as a present, etc.



FENIX E05

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**Cree XP-G R4 LED, high-intensity and compact**

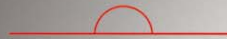


# E05

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180°



**Mini lens design, bright and gentle flood light**

—especially suitable for reading, looking for articles and illuminating the path at close range etc.

A hand is shown holding a small, cylindrical flashlight, which is directed at a stack of books on a shelf. The flashlight's beam illuminates the spines of the books, highlighting their colors and titles. The background is dark, making the illuminated books and the hand holding the flashlight stand out.

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**Exquisite and compact, fashionable and portable**



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**64.5mm**

**Surpass the limit on the volume of flashlight powered by AAA battery, only 64.5 mm in length, 7mm shorter than that of E01.**



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- ⦿ Revolving single dimmer switch, operated by one hand conveniently
- ⦿ Powered by one AAA battery, high efficiency and energy conservation



**Powered by one AAA battery. Runtime reach as long as 3 hours with 30 lumens. It is high efficiency, energy conservation and environmental protection.**



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**Revolving single dimmer switch,  
operated by one hand  
conveniently**



**E05**

Max **30** Lumens

*Other features*



***Rhombic knurling design makes  
it comfortable to hold***



**E05**

Max **30** Lumens

*Other features*



*Large lanyard hole, convenient  
to clip*



**E05**

Max **30** Lumens

*Other features*



*Premium Type III hard-anodized finish,  
anti-abrasive and wear-resistant*

**FENIX**

*Fenix Flashlight  
Illuminate Your Adventure*

**E05**

Max **30** Lumens

*Other features*







**Waterproof to IPX-8**





# E05

Max **30** Lumens

ANSI/FSC	
 OUTPUT	30 LUMENS
 RUNTIME	2h 50min
 DISTANCE	26m
 INTENSITY	177cd
 IMPACT RESISTANT	1.5m
 WATERPROOF	IPX-8, underwater 2m
EXTRA FUNCTION	
ACCESSORIES	a key ring, a spare o-ring



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# FENIX

*Fenix Flashlight  
Illuminate Your Adventure*

**Guide to Choose  
the Right Light**

## Catalog

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## Introduction

In the deepest dark of night, a click is heard. Instantly a concentrated, dazzling beam punches through the pitch black of night, illuminating an entire hillside. The wonders of a modern flashlight.

People have always been fascinated by lighting .....

In earlier times, our ancestors illuminated the darkness with fire, a dangerous and unreliable source of light.

With the birth of the incandescent lamp, people alleviated the problems associated fire. They were now able to bring light along with them, safely and reliably.

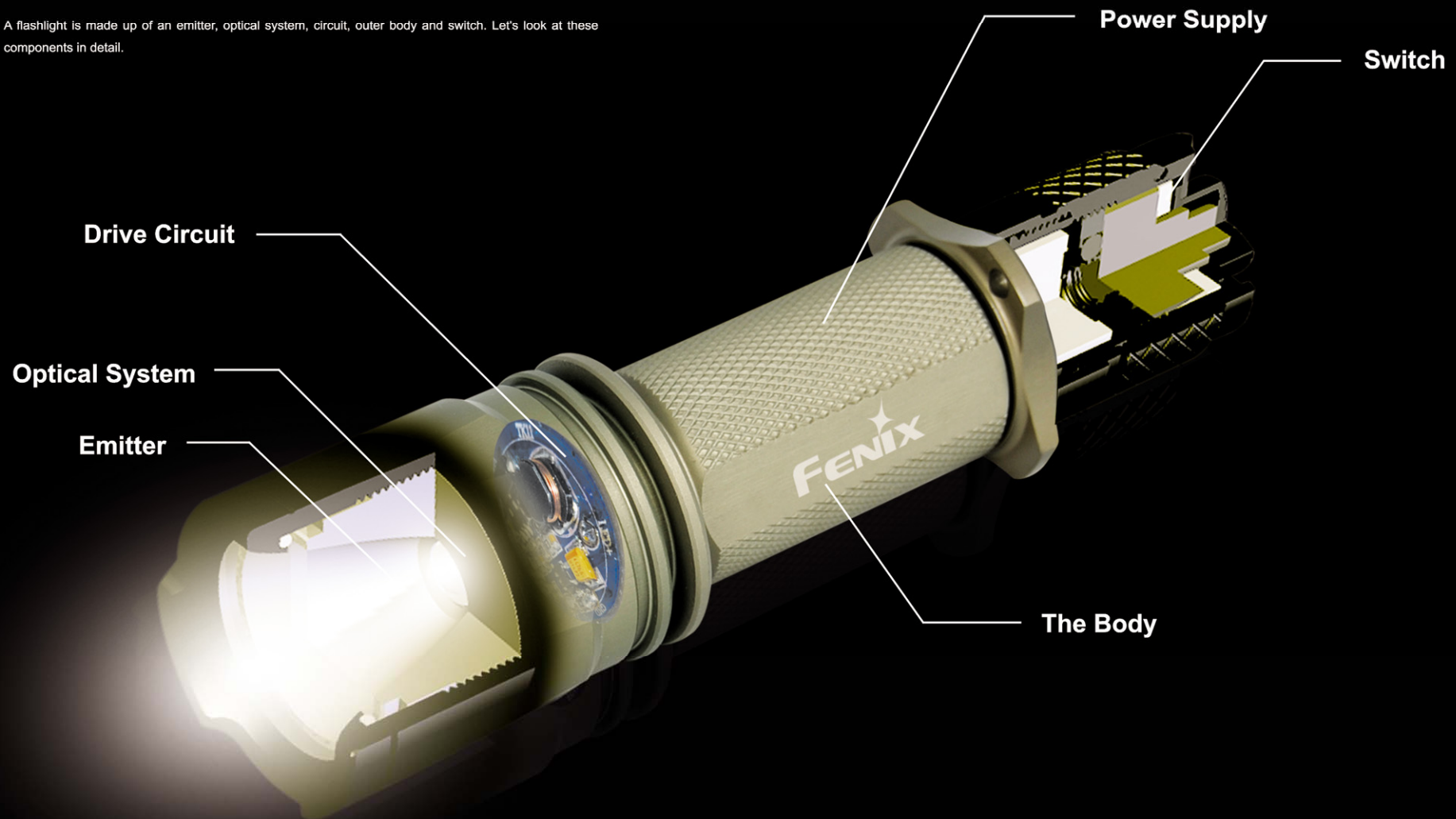
Now, with the inception of the Light Emitting Diode (LED), the output of the modern flashlight has improved ten-fold. Compact lights using the latest LED' s are able to produce much more light than their incandescent precursors.

With so many flashlights on the market, different models and features may seem confusing. How can someone choose the best light that suits their needs? Please refer to the following guide:

## Part One

# Flashlight construction

A flashlight is made up of an emitter, optical system, circuit, outer body and switch. Let's look at these components in detail.



## Part 1 Flashlight construction

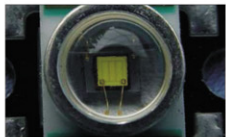
### 1. Emitter

The Emitter is the heart of the flashlight. The emitter is the part of the flashlight that actually produces light. There are three kinds of emitters: Incandescent bulb, Light Emitting Diode (LED), and High Intensity Discharge (HID). As technology progresses, efficiency gains by LEDs have led them to nearly out power even the most efficient of emitter systems, HID. As such, the focus of this article will be dedicated to these advanced, highly efficient LEDs.



The Incandescent bulb was the earliest emitter used in flashlights, it is still widely used in the market, as many manufacturers have chosen to stay with the traditional light bulb in their products. The Incandescent bulb contains a filament made of tungsten wire, which, when an electrical current is run through the filament, gives off visible light energy as well as significant heat (InfraRed energy). Incandescent

bulbs provide good color rendering and don't cost much to produce, but waste a considerable amount energy through the invisible IR spectrum (heat) and have a short life span. Incandescent bulbs are gradually being replaced by the LED emitter in the hand held lighting market, but are still widely utilized by those who aren't bothered by the high energy consumption and short lifespan. Incandescent lamps still have much to offer in larger applications where size and power sources are not a limitation.



#### LED

The LED (Light Emitting Diode) is a solid state light source capable of producing a large amount of light, while consuming a relatively low amount of energy. Due to its nature of construction, the LED offers excellent reliability. With the rapid development of LED technology and its growing application in the field of portable lighting, the LED is

gradually replacing the incandescent bulb as the mainstream emitter for illumination tools.



#### HID

HID ( High intensity discharge ) , HID lamps work by discharging an electric current between 2 electrodes in a capsule filled with a mixture of metal halide salts and argon, producing an extremely bright light. Compared with traditional incandescent lamps, HID lamps produce more light given the same amount of energy, HID lamps also last longer

and are more shock resistant compared to an incandescent bulb. However, they are much more expensive than both LED's and incandescent lamps (due to the fact that HID lamps need a ballast and other regulation circuitry to start and operate the lamp). Furthermore the ballasts are usually rather bulky, so HID lamps are usually used in larger professional lights where cost isn't a priority.

#### LED Features:

With the LED's advanced features, it is the ideal replacement for traditional light sources.



**Small size:** The LED is a diode that is an electronic chip, mounted in a reflector and held in place by a steel / lead frame, connected to a pair of electrical wires.



**Low energy consumption:** LEDs don't waste energy in the form of non-visible light. Its low energy consumption allows the LED to be very versatile, through current manipulation you can have an LED emit light for more than 100 hours, or dial up the current and have the emitter produce 10 times the light of an equivalent Incandescent bulb.



**Long lifetime:** LEDs have a relatively long operating life, and generally never have to be replaced. Manufacturer ratings of these lifetimes can be upwards to 100,000 hours if driven at manufacturer recommended current and voltage.



**High Flux:** The latest multi-die LEDs are capable of emitting more than 500 Lumens, much brighter than Incandescent bulbs of comparable size and power consumption.



**Low heat production:** Light Emitting Diodes belong to the cold light illuminator class, with their high efficiency and low heat production, LEDs are safer to use in flammable and explosive environments, where specialty flashlights are needed.



**Environment protection:** LEDs are made of innocuous materials, LED production leaves a very small environmental footprint compared to other light sources. LEDs can also be recycled.



**Solid and durable:** LEDs, constructed of solid state components, are resistant to external shock, unlike fluorescent and incandescent bulbs which are fragile and prone to failure when subjected to shock.

**Main LED manufacturers:** In the high-end flashlight market, the most commonly used LEDs are manufactured by Cree, Lumileds, Nichia and SSC (Seoul Semiconductor Corporation). These LEDs have a proven track record and are the finest LEDs on the market today. These advanced LEDs offer long life spans, high flux and unprecedented reliability.



## Part 1 Flashlight construction

### 2. Optical System

The optical system can be considered the core of a flashlight. To an extent, the optic system decides the illuminating capabilities of the flashlight. The main parts of the optical systems are the reflector and lens.



#### 1.Reflector

The reflector is responsible for focusing the light produced by the emitter into a usable beam. Fenix designs reflectors to allow for a useful combination of throw and flood. The resulting beam is focused enough to illuminate farther targets while providing more than enough light to comfortably illuminate the user's peripheral vision. The amount of flood and throw in a beam is decided by the reflector's geometry. Simply speaking, a large diameter reflector that is deeply recessed will produce a more focused beam of light. A focused beam may sound appealing but may not be the ideal beam profile for your needs. A focused beam is ideal for long distance lighting, but a flashlight with more flood in its beam is a much better choice for short distance lighting. (Reading, for instance is much better with a flood beam)

Two types of reflector finishes are available in today's high-end flashlight market, smooth finish and textured finish (orange peel reflector).

#### Smooth Reflector

1. The inner face of the reflector is smooth, just like a mirror
2. Producing a beam with a bright central spot surrounded by a gradually diminishing corona.
3. A reflector with a smooth finish will produce the most focused beam possible

#### Textured Reflector:

- 1.Textured surface, looks very similar to the surface of an orange peel.
- 2.Produces a smoother beam with no shadows in the beam profile
- 3.Slightly shorter throwing distance

Smooth and textured reflectors have their own unique characteristics, if a smooth beam profile is important to your needs, a textured reflector would be best. If you need the most throw in your light, a smooth reflector would fare better.

#### 2.Windows

Optical windows focus or diffuse the beam by refracting the light when it passes through the window. The refraction can be changed to produce a narrow, concentrated beam, or a smooth, flood-like beam. It is hard to sufficiently control the beam with an optical window system while still keeping the beam free of dark spots and rings. Furthermore, the light's tint can be altered, resulting in poorer quality illumination. There are various types of windows used in flashlights, and further development is possible.

## Part 1 Flashlight construction

### 3. Drive Circuit

The LED is a sensitive component that has strict voltage, current and heat dissipation requirements. Therefore, it must utilize a driver circuit to ensure its long term reliability.

An LED flashlight without a drive circuit, or poorly designed drive circuit is prone to be unreliable. If overdriven, the LED's life will be reduced exponentially, possibly to just a few short hours, furthermore the damage sustained to an LED while being overdriven directly translates to lower performance of the emitter.

By driving the LED within its recommended current and voltage boundaries, a properly designed circuit will allow the LED to deliver cutting-edge performance, while retaining its outstanding reliability, a lifetime up to tens of thousands of hours.

The drive circuit is an essential component of the modern LED flashlight; it's also an important measure of quality in a flashlight.

#### 1 . Regulation Circuit's role in the flashlight

Firstly, the driver has to be custom designed to deliver the LED's specific power requirements. If the LED is directly driven (no driver circuit) by the battery, the battery voltage sag will lead to a rapid decline in brightness. A directly driven LED may be bright initially, but within a short time, output will diminish. A comparison to a circuit driven LED will show a significant decline in brightness (sometimes up to 50% or more) Therefore, a constant current driver is the most suitable circuit for LED's. It can adjust for varying voltages generated by the battery and in turn provides an ideal amount of current to drive the LED.

Secondly, the circuit can be programmed to achieve a variety of illumination functions. Circuit design could allow for user-adjustable brightness settings, SOS, Strobe and other such functions.

## 2. Standards to measure a drive circuit

**Reliability:** The driver circuit is a very precise electronic component. The electronic circuit is fragile and subject to a fair amount of impact in a light's lifetime. Once the circuit is damaged, it affects the function of the flashlight. Therefore the reliability and robustness of the circuit should be of utmost concern during circuit design and component selection.

**Efficiency:** The driver circuit consumes energy during its regulatory operation, and therefore, the more efficient the circuit, the longer the run time. Efficient use of battery power is very important for any circuit driven flashlight.

**Function:** An intelligent regulation circuit is able to modulate the amount of current being fed to the emitter. Therefore it's possible to adjust the current sent to the LED, allowing the user of the light to choose the best combination of brightness and runtime that suits their needs. Moreover, through the circuit's control, different signal modes can be achieved (ie. SOS or Strobe).

## 3. The circuit best suited for LED flashlights - constant current circuit

Currently, the most advanced and efficient circuit utilized in modern LED flashlights is the constant-current regulation circuit. It maintains a constant, stable current to the LED even as battery voltage sags. This ensures a constant level of brightness throughout the life of the batteries. A current regulated light allows for the best utilization of available power in the battery, a hallmark of quality lighting instruments

## Part 1 Flashlight construction

### 4. Power Supply

The type of power supply is an important factor one should consider while choosing a flashlight. Choosing a flashlight without a regulation circuit typically means selecting an unreliable light.



#### 1. Types of Batteries

Batteries that are most commonly used in flashlights include: Alkaline batteries, Nickel metal hydride batteries (Ni-MH), Lithium batteries and Lithium ion (Li-Ion) batteries. Batteries can be classified into primary (non-rechargeable) and secondary (rechargeable) types.

**Alkaline batteries:** Alkaline batteries are primary batteries (non-rechargeable). Common sizes include AA (No. 5 batteries), AAA (No. 7 batteries), C (No. 2 batteries) and D (No. 1 batteries). The wide availability of the alkaline cell is its main advantage, they also use a safer chemistry and are lower in cost compared to more exotic battery chemistries. Disadvantages associated with the alkaline cell include its

mediocre capacity and severe voltage sag during high discharge rates.

**Nickel metal hydride batteries (NiMH):** Nickel metal hydride batteries are secondary batteries, which means they're rechargeable. Common sizes include AA (No. 5 batteries) and AAA (No. 7 batteries). The NiMH chemistry is generally safe and is capable of large capacities. Furthermore, the NiMH chemistry is well suited for high current discharges. Though the initial investment for NiMH is higher than alkaline, the costs can generally be offset after a few recharging cycles.

**Lithium batteries:** Lithium batteries are primary batteries (non-rechargeable). Common sizes include CR123A and CR2. Modern lithium batteries are safe to use. The main advantage of the lithium chemistry is the energy density, which is the highest of all comparable primary batteries. This means per unit volume, lithium batteries can pack more power versus other cell chemistries. Further, lithium batteries have a higher voltage, are capable of operating at extremely low temperatures and offer excellent performance. The main disadvantages of lithium batteries are affordability and availability.

**Lithium ion batteries:** Lithium ion batteries are also secondary batteries (rechargeable). Common sizes include 16340, 18650 and 17670. They have high energy density, high operating voltage and since they're rechargeable, low operating costs. Since even protected Lithium-ion batteries have been known to vent with flame, they aren't considered completely safe. Protected Li-Ion batteries should only be used by people with extensive knowledge/experience with this chemistry.



#### 2. Categorizes based on cell chemistry.

Based on the types of batteries they utilize, flashlights can be generally grouped into the following three categories:

**Flashlights that use common, everyday batteries:** This type of flashlight usually uses AA or AAA sized alkaline batteries and are readily compatible with nickel metal hydride batteries. They have low operating costs, and offer great performance (especially when using Ni-MH). These lights are a great choice for outdoorsmen and general civilian use.

**Flashlights that use Lithium batteries:** Flashlights that use CR123 batteries are geared for maximum performance, with cost only a secondary consideration. Although more expensive to run, these lights offer incredible performance, additionally lithium batteries do very well in freezing conditions.

**Flashlights that use Lithium-ion batteries:** This type of flashlight is suitable for people who possess more technical knowledge about cell chemistries and understand the inherent risks involved with Li-Ion batteries. These lights are performance oriented and are best suited for regular use (security & first responder applications). These professionals need cutting-edge performance from their lights, but can't afford to constantly feed them expensive lithium cells.

## Part 1 Flashlight construction

### 5. The Body

Most flashlight bodies are made from metal and composite plastics. Of the available metals, aluminum alloy is the preferred choice as it is easy to machine and finish. Also, aluminum is a conductor of heat, which is especially important for LED lights.



1. Metal material Metals are solid and durable. They easily conduct and disperse heat. Metals such as stainless steel, titanium, aluminum and others can be used for flashlights;

Aluminum is light weighted, corrosion resistant and easy to machine metal. It's also an excellent conductor of heat and electricity. Stainless Steel is tougher, and more durable than aluminum but weighs three times more. Steel is also more expensive, and its heat conductivity properties are far behind that of aluminum alloy. Titanium is slightly heavier than aluminum, but is incredibly corrosion resistant. Unfortunately, titanium isn't a great choice of metal when it comes to flashlight construction, it's poor thermal conduction is a liability with LED lights. Titanium is also expensive and difficult to machine. Overall, aluminum offers the best combination of durability, cost, corrosion-resistance and thermal conductivity for a flashlight body.

#### 2. Composite Plastics / Polymer

Plastics are light weighted, moldable and easy to dye. It's no surprise plastic flashlights vary greatly in appearance. However, plastic is a poor conductor of heat, which limits the output of LEDs in plastic bodied lights. Meanwhile, plastics may grow brittle or even crack as the material ages. Generally speaking, plastic flashlights from reputable brands feature better material quality.

#### 3. The surface treatment of aluminum alloy

In order to make aluminum alloy more resistant to abrasion and corrosion, lights are often surface treated as below. Fortunately surface treatments also improve the aesthetics of the light:

Toner treatment / painting: easy to apply and affordable, but not durable. It can improve aesthetics, but won't protect the product and will eventually wear off.

Anodized (Type II Anodize): one of the more common surface treatments for aluminum lights, different colors are possible. Anodizing provides a surface finish that protects.

Hard anodized (Type III Anodize): Hard anodize is only used on the surface of high end aluminum flashlights. Hard anodizing offers excellent wear and corrosion resistance, protecting flashlights against wear for years. Although hard anodized lights offer unmatched durability, aesthetics may be not perfect as there may be color differences or lines on the surface. Also, lights that are hard anodized are also difficult to dye a specific color. Due to the nature of the anodizing process, sharp edges and corners aren't completely protected by the anodizing and more susceptible to abrasion and corrosion. However, this treatment protects the overall flashlight from wear, and is highly recommended by flashlight users.

## Part 1 Flashlight construction

### 6. Switch

The easy operation of a flashlight depends on its switch. Generally speaking, there are four kinds of flashlight switches:

1. Sliding switch - a switch usually used for traditional flashlights, simple and very easy to operate but due to the sliding nature, not waterproof.
2. Tail button switch - widely used on small-sized flashlights, easy to operate, and allows users to use a more tactical grip. Tail button switches are waterproof, despite being more complex in design than the sliding switch.
3. Rotary switch - also known as the twisty. The simplest and most reliable waterproof switch, but more cumbersome than the button switch.
4. Button switch on the bezel - widely used on large flashlights for better balance. Easy to operate but complicates the light's structure. Furthermore, these types of switches are more prone to failure when submersed in water compared to the tail button switch.





## Part 2

# Choosing the right flashlight for the outdoors

Outdoor activities vary greatly, and so do their requirements for illumination tools. For example, searching for someone/something in the great outdoors requires a light capable of spotting something in the distance, this calls for a focused, bright, long-ranged beam. Diving requires lights which are extremely waterproof and intense enough to punch through murky waters. Hiking requires lights capable of long runtimes, and perhaps a broader beam to more easily navigate obstacles. Different outdoor activities call for different lighting needs. We will talk about how to choose a suitable flashlight for the outdoors in the following sections:



## Part 2 Choosing the right flashlight for the outdoors

### 1. Characteristics of outdoor flashlights

#### 1. Reliability

Outdoor sports may require light at any time. Many outdoor activities are dangerous in nature, having a light fail when you need it most is unacceptable. Thus, a reliable flashlight is a crucial piece of equipment when outdoors.



#### 2. Waterproof

Weather can change at anytime, when in nature, shelter isn't readily available, so your equipment should be sealed from the outside environment. Flashlights that are certified to the IPX-8 standard (flashlight works even when submerged under 2 meters of water), would work flawlessly, even while it's pouring outside.



#### 3. Compact size

In the rugged outdoors, space for gear is a premium. Flashlights should be compact and light weight, if it's too heavy, it probably won't go with you.



#### 4. Efficient

It's a hassle to haul around extra batteries while experiencing the great outdoors. It's much more convenient to carry a flashlight which can run dozens of hours in low mode. Modern lights are able to produce a useful beam for hundred of hours on one set of batteries, that's the entire night, for multiple nights.



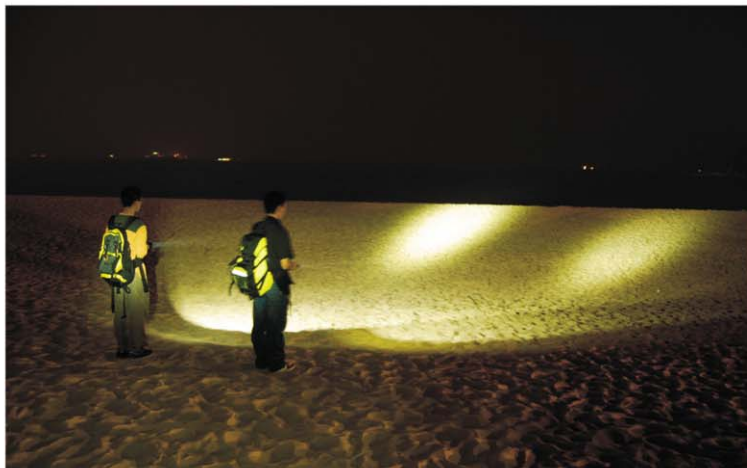
5. Bright beam.

The outdoor environment is ever changing, but nightfall is always a given. Sometimes spotting something far away is needed. So a flashlight capable of producing a very bright beam is a must for the outdoors, especially when in unfamiliar surroundings.



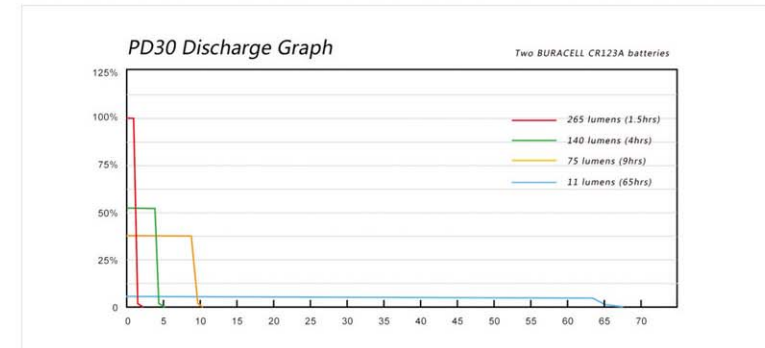
6. Various output levels

Modern flashlights are available with multiple output levels, this allows users to choose the more suitable combination of brightness and runtime for any given task. New developments in lighting technology have made it possible for a single flashlight capable of producing an incredibly bright light or running for dozens of hours. Safety functions have also been derived from this technique, many lights are capable of becoming a distress beacon, producing an SOS signal.



7. Current regulated brightness

With traditional unregulated flashlights, brightness will gradually decrease over the life of the batteries. After the first few minutes of operation an unregulated flashlight drops drastically from its initial brightness. Many users opt to replace their batteries with fresh ones when their lights dim, knowing there is still some energy left in the half-drained battery. Constant current regulation allows users to avoid waste. Unlike traditional flashlights, output will not dim over the life of the batteries. Beam brightness doesn't fade as battery power diminishes; this effectively allows the entire life of the batteries to power the light at full throttle.



8. Universally Available Batteries Batteries used for outdoor illumination tools should be widely available. They should be available across all continents, the last thing you'd want to do while traveling in rural places is trying to locate expensive lithium batteries, a rarity in most countries. Further, outdoor enthusiasts will want to standardize on one type of battery among their gear, from their GPS unit to their flashlight. Usually AA-sized cells will fit the bill.



## Part 2 Choosing the right flashlight for the outdoors

### 2. Flashlight choosing based on purposes

What we spoke about above are the common features of outdoor flashlights, we will talk now about the main features of flashlights for different kinds of outdoor sports.

#### 1. Hiking

When hiking, we need a flashlight that is light in weight to minimize fatigue during long periods of use, has the capability to run for an extended period without a battery change, and delivers a good combination of flood beam for close distance lighting with focused beam for a little more reach when needed. A flashlight capable of throwing a very bright, far reaching beam has a relatively short battery life, therefore, this type of light is not ideal for hiking, except for the hiking team leader who needs a high intensity, long distance beam to investigate the trail ahead.



#### 2. Camping

Generally speaking, a flashlight with a high intensity beam isn't required for camping. A good flood beam to illuminate a wide area and long runtime are far more useful. A light that can run for an entire night on one set of batteries is ideal, and this type of light is also relatively inexpensive.



#### 3. Biking at night

High speed biking at night requires a flashlight with a high output and wide flood beam to light up the trail. This type of beam, combined with a long duration of more than four hours is ideal for the adventure cyclist. A larger flashlight can be used to deliver the desired performance, provided that the chosen light provides easy operation and straightforward mounting, with sufficient space available on the cycle.



#### 4. Hunting

A flashlight for hunting needs a very high brightness, tightly focused beam in order to spot quarry at a long distance. As the light will be used intermittently, a long runtime isn't necessary, but the light has to be built to a high standard to withstand the recoil of the rifle. A flashlight which can accept a red filter accessory is preferred by many hunters.



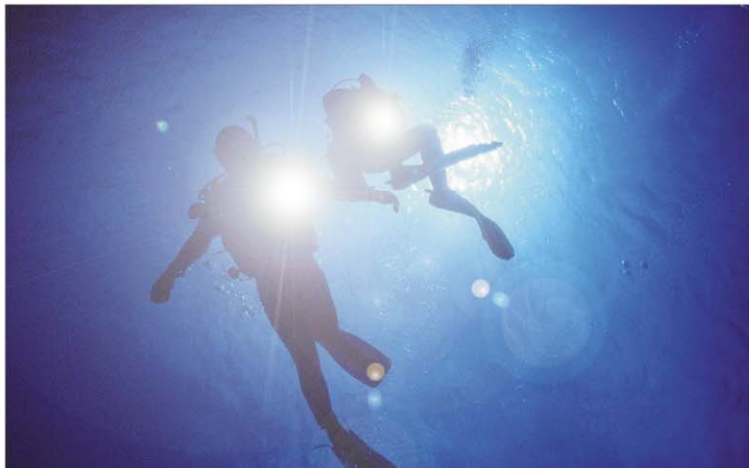
### 5. Searching

Searching requires the highest brightness and longest effective beam length. This results in a larger flashlight with greater weight, but these factors are secondary to the performance of the flashlight.



### 6. Diving

A diving flashlight needs to be waterproof, utterly reliable, and of high brightness. Battery life should be sufficient to exceed the planned diving duration. Weight and size are not such an important factor due to the buoyancy provided by the water, in fact a larger size is preferred as this factor will make the light easier to handle under water. The switch, of course should be waterproof. Normally, a pushbutton switch is not waterproof to sufficient depth, therefore a rotary switch or toggle switch would be the better choice for diving. Meanwhile, the flashlight must be securely attached to the wrist with the supplied lanyard so as not to be dropped and possibly lost.



### 7. Caving

Caving provides an extreme environment for a flashlight, with the low reflectivity of dark rocks providing very little reflected. A versatile flashlight with both very high and low output settings is a versatile choice for caving, low output protecting night vision and offering long battery life when needed, high output able to throw across larger caverns and provide more overall light when needed. Caves are hard and often wet environments, so the flashlight has to be waterproof, as well as sturdy and durable in order to meet any crisis situation that may develop. It must be able to withstand the impact and drop onto rocks without damage.



### 8.EDC

EDC (Every Day Carry), refers to a flashlight that is carried all the time. Such a flashlight is usually a small and light micro backup flashlight such as a keychain light. Small size and weight are important for a flashlight intended for EDC, as it will be carried often, so must be inconspicuous and convenient to carry until needed. In some emergency situations, often the small torch that is with you all the time can even save your life. The EDC flashlight is more restricted by power constraints, generally having either high-brightness with a short battery life, or long battery life with low-brightness, and it will have limited functions, such as a high and low brightness setting that you can choose according to your needs. Your best choice is a low-brightness EDC with a long battery life, as such a light will deliver a long illumination period in an emergency.



## Part 2 Choosing the right flashlight for the outdoors

### 3. Details of the Flashlight

#### 1. Details of the Flashlight

White LED, Neutral white LED or Warm white LED ? Usually LED's are Cool white, (color temperature is about 6500k), Neutral white (color temperature is about 4000k) or warm white (color temperature is below 3000k) Since we have several color types, what are the factors to consider when it comes to choosing between them The different LED colour temperatures each deliver their own rendering of color when the flashlight beam strikes its target. If the sunshine index is 100%, then the index of a high-quality white-light LED is normally around 75% (high color temperature, cool white colour, has relatively low color-rendering index), while the good-quality neutral white and warm white LED can raise the color-rendering index to more than 80%, delivering a more natural rendering of colour, much closer to that of sunlight.

What does that mean? In the outdoors, high-brightness can make it easy to determine the outline of an object, but for the judging of fine details and textures, we need better color-rendering. In other words in order to see the outline of objects, just judging from brightness, regardless of heat source which with 100% color-rendering or monochromatic light which with no color at all, light that is the same line. To determine the color of objects, details and levels, the light source of 75% color requires a higher brightness (without regard to visual interference and adaptation, then about 135%) to achieve a sufficient of 100% of the details of light source color effects, Therefore, we hope to obtain better color-rendering .

The light-emitting principle of white LED is E-ray send through chips, and then issues a yellow light from phosphor excitation, mixed white light, the yellow light thrown by phosphor excitation is relatively high, meanwhile the Blue-ray is a monochromatic light, so to enhance the color, we need to increase the proportion of yellow light. From this point, the more warm, the better for coloring, the more suitable for outdoor sports. One more thing, the lower color temperature warm light is, the longer wavelength will be, and the stronger penetration in the rain and fog weather .

But on the other hand, the efficiency of fluorescence excitation is relatively low, warm white LED brightness will be lower, while light color looks relatively pale yellow, will be as low-power incandescent stained objects to be irradiated, so above all, it is more appreciate to select neutral white light LED flashlight when in outdoor, we not only have good color and penetration, but also can avoid a serious lowering of the brightness and coloring phenomenon.

#### 2. Is it better to use a whiter LED?

Generally, customers prefer the whitest LED for their flashlight, but for practical use, the LED producing a more yellow light, closer to daylight, is much better in color rendering and depth perception when compared to a white LED of the same brightness. Therefore an LED of equal brightness to the white LED, but producing more yellow light is superior in most situations.

#### 3. Is the LED's Wattage important?

Generally the brightness of an incandescent light is in direct proportion to its power consumption. Many people apply the same general principle to LEDs, they have an impression that LED's of a higher power rating will be brighter in the same way as a higher wattage bulb will be brighter than a lower rated bulb. But in fact, the LED is very different from the incandescent light. An efficient 3 watt LED can offer the same brightness as an inefficient 5 watt LED, while delivering a much longer run time. Therefore it may be better to use lower rated LED. Most premium light manufacturers rate the brightness of their lights with a lumen measurement, which takes into account the total amount of light a flashlight emits, a much more accurate measure of performance than 'candlepower' which only measures the intensity of the light.

#### 4. Output Adjustment

There are three questions to ask for mode adjustment:

Single output or Multiple outputs? The single output flashlight is relatively inexpensive and offers an easy user interface. However, a flashlight with multiple outputs can be incredibly versatile, able to be used in different environments by choosing the best output for the task at hand. A single output light is ideal if you need a small, inexpensive light, but it may not be able to handle many lighting applications. If a versatile light appeals to you, a flashlight with multiple outputs is the better choice. Although inherently more complicated, multi-mode lights can be as durable and reliable as their single stage counterparts.

Step wise or infinitely variable adjustment

Step wise adjustments offer fixed output modes, while infinitely variable adjustment features totally variable brightness adjustment. Although an infinitely variable light may seem better than one that has step wise adjustments, practically speaking, mode adjustment may be a better choice. For instance, a light capable of infinite brightness levels won't allow the user to accurately gauge the brightness and more importantly, the runtime. Step wise adjustments allow the user to know the runtime of a given level. However, for some special applications, there is a need for an intricately adjustable light (Professional photography), this is where infinitely variable lights hold their place.

Several modes or fewer modes? Multi-mode lights seem ideal, a tool that's capable in any situation, but a tool such as a flashlight that has many modes may become cumbersome, complicating the user interface. It's best to choose a light most suited for that activity. For example, if you go camping, hiking, caving or geocaching a light with several output modes and an SOS mode would be ideal. If self defense is your main concern a flashlight only capable of producing a very bright beam and a disorienting strobe would be ideal.

5. Spot or Flood? A common conception is a tight, long-range beam trumps anything else, and a focused beam actually produces more light than a flood beam. This is a common misconception. Brightness, is decided by luminous flux, or how many lumens the light emits. A focused beam flashlight can appear much brighter than a flood beam flashlight even if they have the same luminous flux and are emitting the same amount of lumens. Many people prefer a flood light and claim it's vastly more useful than a spot beam. Users should choose a light that produces a beam that best suits their tasks.

A Focused beam flashlight throws its beam over a longer distance than a flood beam, this is useful for when you need to spot something from a distance.



# FENIX Parameter List of Our Partial Products

Camping and mountain climbing call for a different type of beam, focused lights create an extremely bright spot with a sharp transition between the corona and spot, the intensity of the focused spot also causes glare. A beam that produces a flood is much better suited during these activities.

Hiking and mountain biking at night requires a compromise between throw and flood. Generally, a light capable of producing a 10-15 degree beam profile is ideal when compromising between throw and flood. It allows the best of both worlds, being able to see what's ahead of you while lighting up the trail.

In general, a flashlight with a balanced beam producing both adequate throw and flood is recommended, this type of beam is the most versatile and should fit the needs of most users.

6. Does LED flashlight definitely have a long life-span? Normally, we believe the life of a high quality LED can be 50,000 to 100,000 hours, so all manufacturers continually announce that an LED flashlight has a life of 100,000 hours. Realistically, in order to sustain a long life span for an LED flashlight, there are many conditions we need to consider.

Design life: Only high quality LED's design life can reach up to more than 50,000 hours; Some defective LEDs may just run a few thousand hours or an even shorter time.

Performance environment: LED life is very much tied to the LED's electrical environment. Only if a professional manufacturer strictly designs their product according to specific operating parameters of the LED, can the LED retain a long service life. Should the LED be supplied with more than its max electric current, or be fitted with bad heat sinking, drawing insufficient heat away from the light chip due to poor design/manufacture, the LED's life will shorten sharply to several hundreds hours, or even to just several hours!

Electric circuit quality: An LED flashlight needs an electrical circuit, commonly known as a driver. Strictly speaking, all LED flashlights should have a drive circuit for best performance and long LED life. Once the drive circuit broken, the LED flashlight will no longer function properly. Therefore, the quality of design and components of the drive circuit both determine the life-span of an LED flashlight.

Mechanical quality: The Flashlight is a type of illumination machine after all, so problems with mechanical parts can immediately prevent the light from functioning. A high-quality flashlight must have excellent mechanical reliability through the use of high quality components throughout its construction.

### 7. Flashlights in low temperatures

Most types of batteries cannot perform very well in a low temperature environment, so how are we going to cope with this situation? Firstly, primary (non rechargeable) lithium batteries are better than other battery types at low temperatures. Therefore we'd better choose this kind of battery for our flashlight. Secondly by choosing a small flashlight, the heat from flashlights LED emitter will improve the running temperature of the flashlight. Thirdly, some large-size professional lights use a separated power supply which can be kept in a pocket to raise its temperature, thus improving performance. Fourthly, use high-efficiency light and carry spare batteries.

This guide will help you to choose the right flashlight. If you have any questions or suggestions, please feel free to E-mail Fenix. We will be happy to reply to you at our earliest opportunity.

Thanks!

The Fenixlight Team.

Model	LED	Max output	Max runtime	Adjusting	Waterproof	Spec	Weight	Battery	Apply Situations
MC10	Oslam	125 Lm	65 hrs/5 Lm	5 output levels	IPX-8	99*21.5mm	53.5g	1*AA	Camping, Hiking, Caving
HL20	Cree R2	105 Lm	56 hrs/4 Lm	4 output levels	IPX-8	-	49.5g	1*AA	Camping, Hiking, Caving
HP15	Cree Q5	180 Lm	105 hrs/5 Lm	7 output levels	IPX-8	-	70g	2*AA	Camping, Hiking, Caving
HP10	Cree Q5	225 Lm	210 hrs/7 Lm	7 output levels	IPX-8	-	117g	4*AA	Camping, Hiking, Caving
TA21	Cree Q5	225 Lm	170 hrs/4 Lm	12 output levels	IPX-8	168*39mm	168g	2*CR123A/1*18650	Tactical use, Hunting

TK40	Cree MC-E	630 Lm	150 hrs/13 Lm	8 output levels	IPX-8	208*62mm	284g	8*AA	Searching
TK30	Cree MC-E	630 Lm	90 hrs/12 Lm	6 output levels	IPX-8	225*21.5mm	215g	4*CR123A/2*18650	Searching, Hunting
TK20	Cree Neutral White (Q2)	150 Lm	11 hrs/4.5 Lm	2 output levels	IPX-8	159*34mm	152g	2*AA	Camping, hiking
TK12	Cree R2	240 Lm	120 hrs/5 Lm	6 output levels	IPX-8	137.5*34mm	119g	2*CR123A/1*18650	Tactical use, Hunting
TK11	Cree R5	285 Lm	14 hrs/60 Lm	2 output levels	IPX-8	135*34mm	152g	2*CR123A/1*18650	Tactical use, Hunting

PD30	Cree R2	235 Lm	65 hrs/10 Lm	6 output levels	IPX-8	118*21.5mm	53g	2*CR123A	EDC, camping, biking
PD20	Cree R2	190 Lm	35 hrs/9 Lm	6 output levels	IPX-8	78.5*21.5mm	39g	1*CR123A	EDC, camping, biking
PD10	Cree R2	190 Lm	64 hrs/6 Lm	3 output levels	IPX-8	73*19mm	24g	1*CR123A	EDC, camping, biking
LD20	Cree R4	205 Lm	71 hrs/9 Lm	6 output levels	IPX-8	150*21.5mm	60g	2*AA	EDC, camping, biking
LD10	Cree R4	132 Lm	34 hrs/9 Lm	6 output levels	IPX-8	100*21.5mm	54g	1*AA	EDC, camping, biking
LD05	Cree R2	100 Lm	23 hrs/4 Lm	3 output levels	IPX-8	149.5*14mm	44.5g	2*AAA	EDC, camping
LD01	Cree R2	85 Lm	11 hrs/9 Lm	3 output levels	IPX-8	75*14mm	14g	1*AAA	EDC, present
E20	Cree Q2	109 Lm	3.3 hrs/109 Lm	1 output levels	IPX-8	153*25mm	75g	2*AA	EDC, camping, biking
E01	Nichia	10 Lm	21 hrs/10 Lm	1 output levels	IPX-8	71*14mm	14g	1*AAA	EDC, present

# **Fenix Implements ANSI Standard**

**(Refers to ANSI/NEMA FL-1 Standard)**

**Fenixlight Limited**

**ANSI/NEMA FL-1 standard**



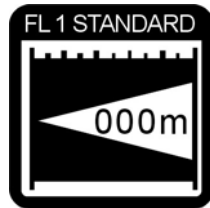
## ANSI/NEMA FL-1 Standard



OUTPUT



RUNTIME



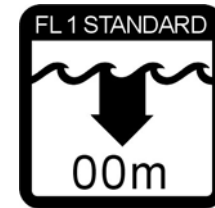
DISTANCE



INTENSITY



IMPACT  
RESISTANT



WATER  
RESISTANT

ANSI/NEMA FL-1 standard

## Catalogue

- .The brief introduction of ANSI/NEMA FL1-2009 Standard**
- .Why was it created?**
- .Who approved the standard?**
- .What does it mean to consumers and distributors?**
- .The descriptions of the contents and the icons**
- .How will Fenix use it?**

## □.The brief introduction to the ANSI/NEMA FL 1-2009 Standard

- American National Standards Institute (ANSI for short) is established in 1918. It is a non-profit non governmental standards institute.
- ANSI is one of the five permanent members in International Standardization Organization (ISO for short) as well as one of the four permanent members in International Electrotechnical Commission (IEC for short). It takes part in 79% activities of ISO/TC and 89% activities of IEC/TC. ANSI is the member of COPANT and PASC respectively.
- ANSI is the potential national standards institute. And actually it has turned into the national standards center. Various standardizing activities have connections with it. In the meanwhile, the ANSI Standard is voluntarily adopted.

### **ANSI/NEMA FL-1 standard**

## .Why was it created?

- For a long time, there have been no standardized tests or uniform rating systems for consumers to judge the flashlight performance.
- Without any uniform rating systems, it frustrates the manufacturers who work hard to make high quality lighting tools.
- The establishment of ANSI/NEMA FL 1-2009 Standard can help consumers to compare the flashlight performance.
- The standard will provide a hand for consumers to rate and compare the claims on the packages for each manufacturer's products.
- Distributors and consumers are more informed. Therefore, it is much easier for them to make the best choices for their needs.

### **ANSI/NEMA FL-1 standard**

## **.Who approved the standard?**

- American National Standards Institute (ANSI for short)
- National Electrical Manufacturers Association (NEMA for short)
- Representatives from 14 illuminating companies, such as Princeton, Surefire, Petzl, Streamlight, Black Diamond and Duracell, etc.
- Representatives from flashlight users and flashaholics

**ANSI/NEMA FL-1 standard**

## **.What does it mean to consumers and distributors?**

- The ANSI Standard can help the consumers know about the technical parameters of flashlights rapidly which are beneficial for the consumers to make a comprehensive comparison to various flashlights.
- It can provide a hand for distributors and end users to know more about the products and make the best choices for their needs.
- It evens the playing field for those manufacturers that participate.
- It's important to know that adherence to these standards and reporting results is strictly voluntary.
- Many leading flashlight manufacturers are adopting the standard.

**ANSI/NEMA FL-1 standard**

## □ .The descriptions of test contents and icons

The testing contents of ANSI Standard include light output, runtime, beam distance, peak beam intensity, impact resistance and water resistance.



**ANSI/NEMA FL-1 standard**

### **1.Output:**

- A measurement of the total quantity of emitted overall light energy as measured by integrating the entire angular output of the portable light source. The result is reported in lumen.
- Purpose: To provide a procedure for the measurement of the quantity of overall light energy emitted by the device.
- Power resource: All tests are conducted with fresh batteries or fully charged batteries/energy storage devices. 12V DC devices that are only tethered shall be powered with 13.8V DC using a power supply. Batteries used for testing and claim substantiation shall be of the same type and/or brand as those offered for sale with the product. If the product is sold without batteries and a light output claim is made, a specific battery type and chemistry shall be recommended with the package. The batteries recommended by the manufacturer are to be used for testing.

Procedures:

Devices are to be mounted or held against an external port adapter or placed inside the sphere. Exposure should be set to produce test equipment manufacturer's detector saturation level.

Results:

Light output is the average lumen value of the 3 samples.

**ANSI/NEMA FL-1 standard**



## □.The descriptions of testing contents and icons



### **2.Runtime:**

□ The duration of time from the initial light output value (that's 30 seconds after the light is turned on with fresh batteries ) until the light output drops to 10% of the initial value.

#### □ Purpose:

To determine the amount of time elapsed (under continuous operation) at which the device's light output reaches a level when users will commonly replace the batteries.

#### □ Conditions:

If the device offers multiple output levels, the runtime will be measured at the maximum level or as otherwise identified.

#### □ Procedures:

The initial reading is taken at 30s of continuous operation when using a luxmeter, ensure that the light is operated continuously without any off time.

## □.The descriptions of test contents and icons



**ANSI/NEMA FL-1 standard**

### **3.Beam Distance:**

- The distance from device at which the light beam is 0.25 lux.

Results are reported in meters.

- Purpose:

To provide a procedure to determine the maximum distance at which the devices is capable of producing 0.25 lux of light within 30s to 2 min of operation.

- Procedure:

Place the luxmeter at a test distance of either 2 or 10 or 30 meters from the lens of the device to be tested. Use the luxmeter to identify the brightest point of the beam pattern and record the highest indicated value.

## □. **The descriptions of test contents and icons**

□ Final calculation:

To determine the beam distance, the Inverse Square Law formula is used:

$$\sqrt{(\text{peak beam intensity (cd)} / 0.25 (\text{lux}))} = \text{Max Beam Distance (m)}$$

**ANSI/NEMA FL-1 standard**

## □.The descriptions of test contents and icons



### 4.Peak Beam Intensity:

□ Peak beam intensity is the maximum luminous intensity typically along the central axis of a cone of light. The value is reported in candela and does not change with distance.

#### □ Purpose:

To provide a procedure to determine the peak beam intensity, reported in units of candela, of the device's beam pattern within 30s to 2 min of operation.

#### □Procedure:

Place the luxmeter at a test distance of either 2 or 10 or 30 meters from the lens of the device to be tested. Use the luxmeter to identify the brightest point of the beam pattern and record the highest indicated value. Results are reported in candela.

Measurements shall be taken 30s to 2 min of turning on the device.

#### □Final Calculations:

Surface light intensity (lux) x distance (m)<sup>2</sup> = peak beam intensity (cd)

**ANSI/NEMA FL-1 standard**

## □.The descriptions of test contents and icons



**ANSI/NEMA FL-1 standard**

### **5.Impact Resistance:**

□ The degree to which a portable light resists damage when dropped on a solid surface. Dropped samples must not exhibit any cracks or breaks, and must remain fully functional in order to pass the impact resistance test.

#### □ Purpose:

To ensure the structural integrity of hand-held/portable lighting devices under specified impact conditions. The test procedure provide specifications and methods that will ensure products meet a minimum standards of reliability as a result of impact testing. Drop test should be priority to any other reliabilities tests.

#### □ Drop Test:

Products are dropped with all intended additions: batteries ,elastic, tethers, hand straps, etc. Drop height for product samples shall be 1m minimum. When measured, all the requirements listed below must be passed:

□ Each sample is dropped 6 times using impact orientations that approximated cube. Samples must be marked prior to the drop test in a manner that can assure that all 6 drop orientations are tested. Each sample must be released on each orientation of the approximated cube. Samples should be in the “off” position with batteries in place.

□ Passing Criteria:

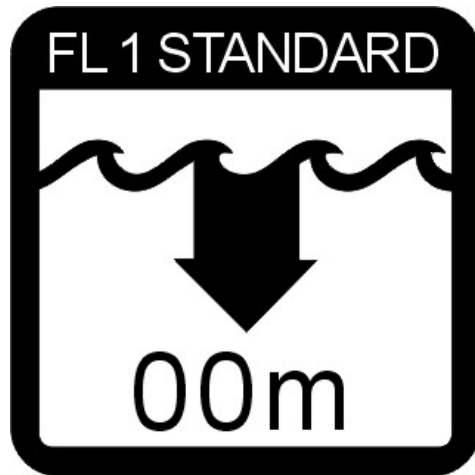
Dropped samples must not exhibit any cracks or breaks visible with normal vision. The product must remain fully functional. Some reassembly is allowed provided that is done without any tool or replacement components. Cosmetic defects such as scuffs, scratches, rubs, abrasion will not be considered reasons for failure.

□ Impact Resistance Rating:

Test samples must pass a drop test from a minimum of 1m in order for the impact resistance claim to be made. Rating in excess of 1m shall be reported with values rounded down to the nearest whole meter.

**ANSI/NEMA FL-1 standard**

## □.The descriptions of test contents and icons



**ANSI/NEMA FL-1 standard**

### **6. Water Resistance:**

#### □ Purpose:

To test whether the flashlight water resistance can satisfy the lowest requirements for the reliability.

#### □ Procedure:

All test samples shall function normally immediately after the test and 30 min after the test. Water ingress is allowed as long as the above conditions are met.

□ Water Resistance: There are three tests that measure water resistance:

Resistance to Temporary Immersion in Water

Resistance to Continuous Immersion in Water

Resistance to Splashing Water

## □. How will Fenix use it?

### **1. Fenix will strictly adhere to the ANSI Standard to measure the various fundamental features of its products.**

To follow the industrial development tendency, Fenix will spare no efforts to provide more reliable products and perfect services. The consumers can better evaluate, compare and choose their satisfying products provided that they know about the output, beam distance, impact resistance, water resistance and the runtime. In order to meet its target, Fenix is the first one to participate in the ANSI/NEMA FL1-2009 Standard in China. It is going to adhere to the Standard strictly as well as gradually implements the ANSI/NEMA FL1-2009 Standard in its products.

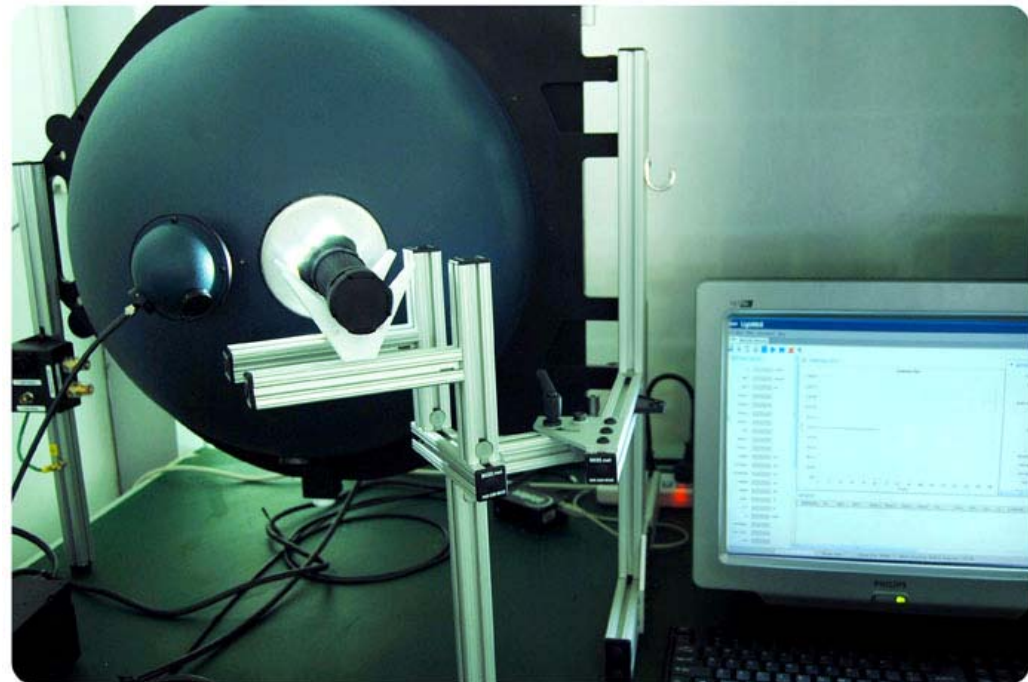
For instance, the ANSI Standard has been introduced to E21, LD25, LD40 and HP20. The later other products will also be line with the ANSI Standard.

**ANSI/NEMA FL-1 standard**



**A. In line with the ANSI Standard, Fenix tests the output and runtime.**

Output Test: Devices are to be mounted or held against an external port adapter or placed inside the sphere. Exposure should be set to produce test equipment manufacturer's detector saturation level. Light output is the average lumen value of the 3 samples.

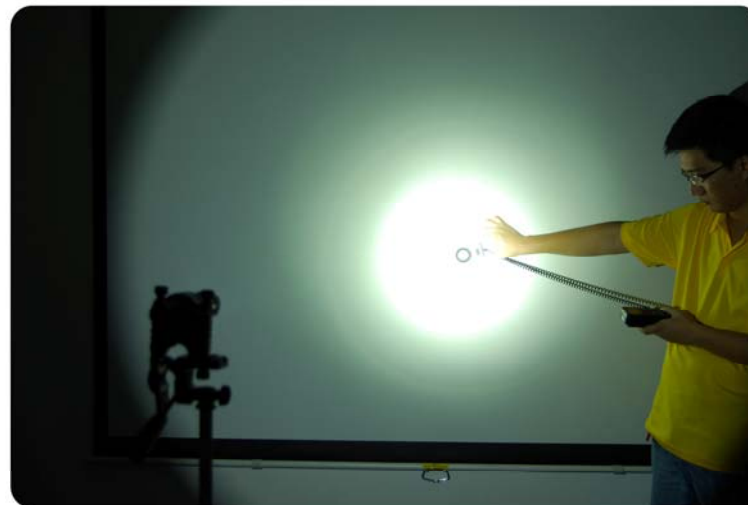


Runtime Test: The duration of time from the initial output value ( that's 30 seconds after the light is turned on with fresh batteries) until the light output drops to 10% of the initial value.

Ensure that the light is operated continuously without any off time.

**ANSI/NEMA FL-1 standard**

**B. According to the ANSI Standard, Fenix tests the beam distance.**



Using the luxmeter to test the beam distance

Beam Distance Test: To place the luxmeter at a test distance of either 2 or 10 or 30 meters from the lens of the device to be tested. Use the luxmeter to identify the brightest point of the beam pattern and record the highest indicated in value.

To determine the beam distance, the Inverse Square Law formula is used:

$$\sqrt{(\text{peak beam intensity (cd)} / 0.25 \text{ (lux)})} = \text{Max Beam Distance (m)}$$

**ANSI/NEMA FL-1 standard**

**C. Fenix tests the peak beam intensity, abiding by the ANSI Standard.**



Using the luxmeter to  
test the peak beam  
intensity

Peak Beam Intensity test: Place the luxmeter at a test distance of either 2 or 10 or 30 meters from the lens of the device to be tested. Use the luxmeter to identify the brightest point of the beam pattern and record the highest indicated value. Results are reported in candela.

Measurements shall be taken 30s to 2 min of turning on the device.

**ANSI/NEMA FL-1 standard**

**D. Fenix tests the impact resistance according to the ANSI Standard.**



**Impact Resistance Test:**

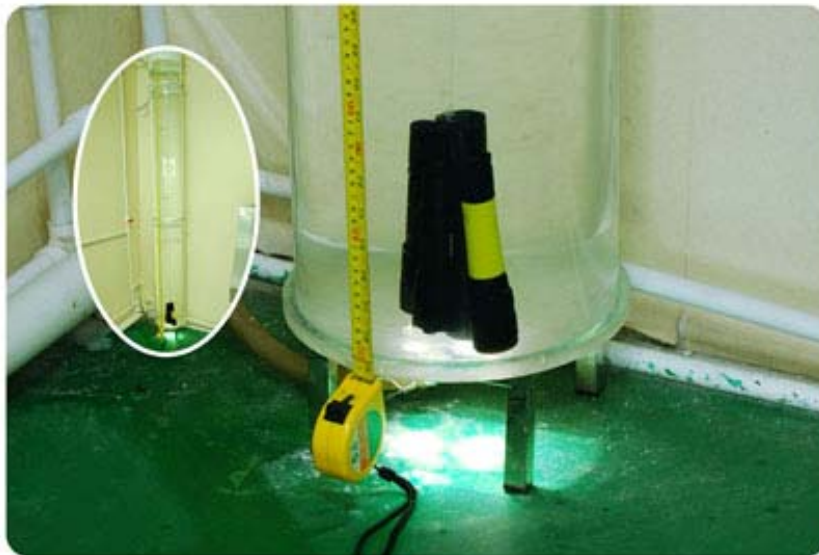
Samples should be in the “off” position with batteries in place. Each sample is dropped 6 times using impact orientations that approximate a cube. Each sample must be released on each orientation of the approximated cube.

Test samples must pass a drop test from a minimum of 1m in order for the impact resistance claim to be made.

Dropped samples must not exhibit any cracks or breaks visible with normal vision. Cosmetic defects such as scuffs, scratches, burs, abrasion will not be considered reasons for failure.

**ANSI/NEMA FL-1 standard**

**E. With the ANSI Standard , Fenix tests the water resistance.**



**Water Resistance Test:**

All test samples shall function normally immediately after the test and 30 min after the test. Water ingress is allowed as long as the above conditions are met.

**ANSI/NEMA FL-1 standard**

## **2. Fenix carries out other tests.**

Besides the ANSI Standard, according to the consumers' various real using conditions, Fenix performs other tests set by itself, such as the salt spray test, bending test, vibration test, ultraviolet radiation test, etc. Only the products which completely meet the ANSI Standard and its internal standards can be the qualified Fenix products.

**ANSI/NEMA FL-1 standard**

## **A. Shakeout Test**



**Shakeout test: To provide a procedure to determine the scratch-resistant and wear-resistant abilities of the surface of flashlight.**

**ANSI/NEMA FL-1 standard**

## B. Bending Test



**Bending test: mainly use to test the bending degree and the strength of wires.**

**ANSI/NEMA FL-1 standard**



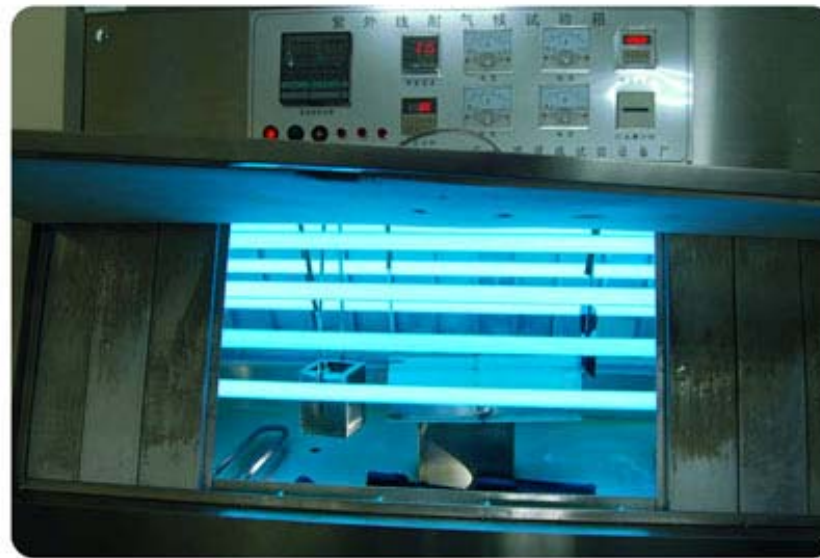
### C. Salty Spray Test



**Salty spray test: mainly use to test the corrosion-resistant ability.**

**ANSI/NEMA FL-1 standard**

## **D. Ultraviolet Radiation Test**



**Ultraviolet radiation test: mainly use to test the changes of flashlight after it goes through the ultraviolet test.**

**ANSI/NEMA FL-1 standard**

## E. Environmental Test



**The environmental test includes the high temperature test and low temperature test, which are used to test the high-temperature-resistant and the low-temperature-resistant abilities respectively.**

**ANSI/NEMA FL-1 standard**

## F. Vibration Test



**Vibration test: To provide a procedure to determine the anti-vibration ability.**

**ANSI/NEMA FL-1 standard**

## G. Switch Test



**Switch test: To provide a procedure to determine the lifespan of the switch and the resistivity.**

**ANSI/NEMA FL-1 standard**

## H. Temperature Test

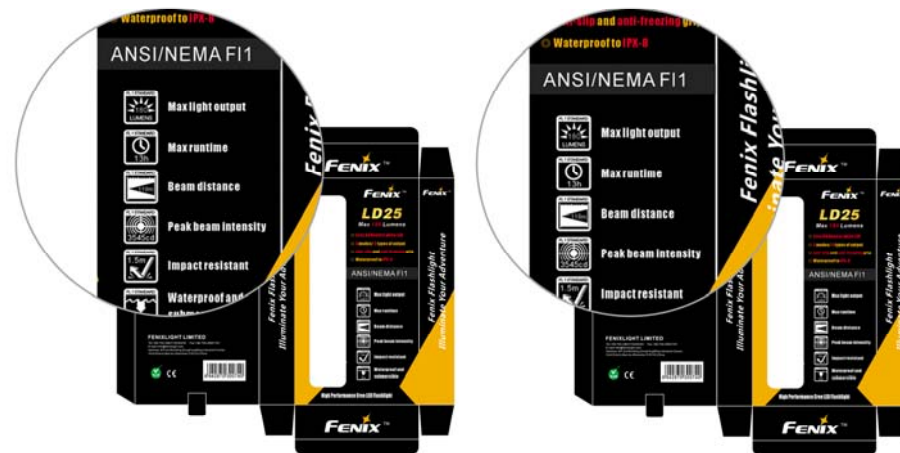


**Temperature test:** To provide a procedure to determine the conditions of the heat generation and the heat dissipation and the relevant temperatures, etc.

**ANSI/NEMA FL-1 standard**

### 3. Fenix has introduced the ANSI Standard to its product packages.

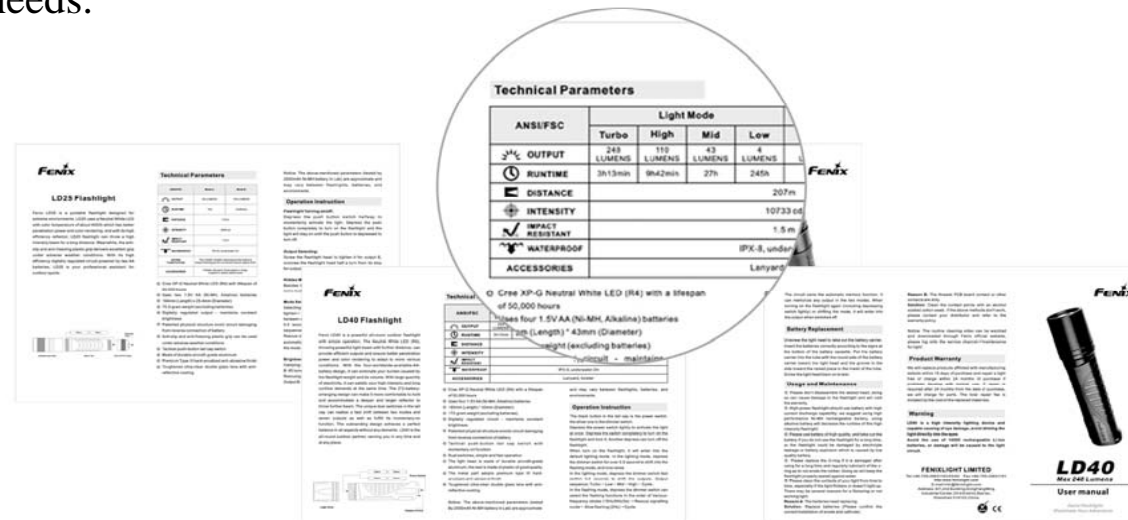
Fenix has introduced the ANSI Standard to its new products. All technical parameters of the products, such as E21, LD25, LD40 and HP20, are in line with the ANSI Standard. The output and the runtime become much more accurate and scientific. The later products will be in line with the standard gradually and meet the international needs.



**ANSI/NEMA FL-1 standard**

## 4. Fenix has introduced the standard to the product manuals.

Fenix has made some modifications to the new product manuals. E21, LD25, LD40 and HP20 are in line with the standard. The modifications help the consumers much easier to identify, compare and rate the flashlights. Fenix will gradually introduce the ANSI Standard to its later products to meet the international needs.





## **5. The description of the flashlight test**

- All tests are conducted with fresh batteries or fully charged batteries /energy storage devices. 12V DC devices that are only tethered shall be powered with 13.8V DC using a power supply.
- Peak beam intensity and beam distance are both measured by the same test.
- To provide a procedure to determine the peak beam intensity, reported in units of candela, of the device at which the light beam is 0.25 lux within 30 seconds to 2 minutes of operation.
- Batteries used for testing and claim substantiation shall be of the same type and/or brand as those offered for sale with the product.

**ANSI/NEMA FL-1 standard**

- If the product is sold without batteries and a peak beam intensity claim is made, a specific battery type and chemistry shall be recommended with the package.
- Lab conditions shall be a controlled temperature of  $21 \pm 2$  °C and a relative humidity of  $50 \pm 40\%$ . The lab environment must minimize any redirecting of light that would affect the measurement outcome.
- If the device offers multiple focusing or adjustable beam angle, the peak beam intensity will be measured at the maximum level or as otherwise identified.

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