



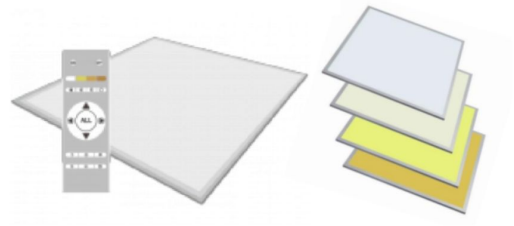
Presents

AZ- LIGHTING SOLUTIONS





AZ-Light

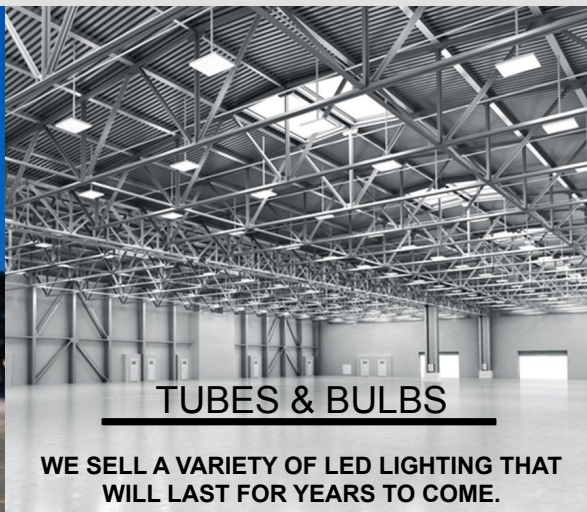


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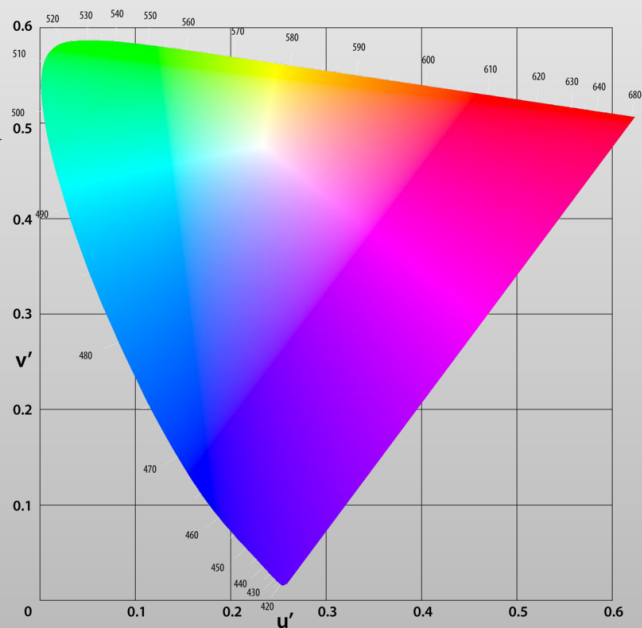
Introduction

AZ New Tech presents **AZ-Light**, a LED Light company that offers a new, innovative, energy efficient, and environmentally friendly LED proprietary technology that comes in a variety of products such as Outdoor fixtures, Indoor fixtures, LED T5 tubes, T8 tubes, U tubes and Filament bulbs as well may be custom designed.



Terminology

- Watt (W) the Wattage of the light is the amount of energy it takes to produce a certain amount of light. The higher the wattage, the brighter the light, but also the more power it uses.
- Kelvin (K) is the physical unit for the color temperature of the emitted light.
- Correlated color temperature (CCT) is a measure of the spectral content of light from a source; how much blue, green, yellow and red there is in it. (420 - 680 nm) 
- Lumen (lm) is the physical unit for the luminous flux of an lamp/light and describes its brightness.
- Tube size: T5 (15.9 mm diameter), T8 (25.4 mm diameter), Currently we do not provide T12 (38.1 mm)
- CRI: The color rendering index, known as the CRI or Ra value, provides information about the quality of the color rendering of a light source.



How does different lights work?

Following slides will provide a quick explanation of how the Old fluorescent tubes perform compared to Modern LED tubes compared to Next Generation of **LED AZ-Lights**.



(Images of AZ-Light products)

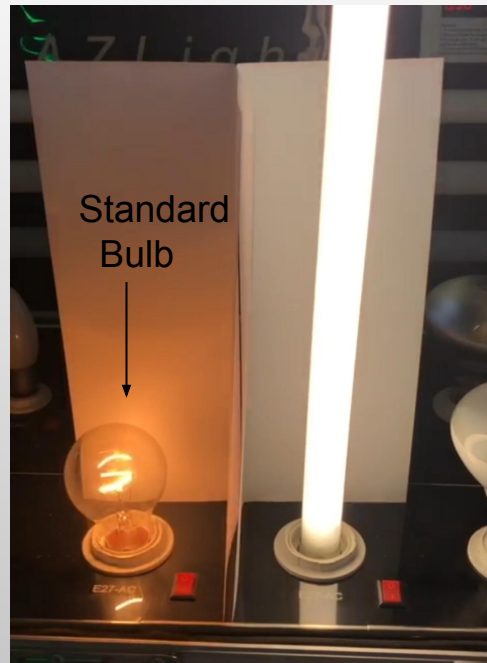


Quick Comparison (T8 tube)

Property	LED Tube	Fluorescent Tube	AZ - Lights
Power-up Delay	immediately 100% light	flickering when switched on	immediately - 0.5s
Beam Direction	directional radiation	360° radiation	directional radiation
Efficiency	90 – 150 lm/W	45 – 100 lm/W	up to 208 lm/W
Color Rendering	up to Ra 95	up to Ra 90	up to Ra +95
Lighting Quality	Less than 10% 120 Hz	120 Hz flickering	0.7% - 3% 120 Hz
Dimmability	dimmable type available	with dimmable ECG only	works with all dimmers
Harmful Substances	no mercury	contains toxic mercury	no mercury & lead
Lifespan	30,000 – 50,000 hours	5,000 – 20,000 hours	80,000 – 150,000 h (20y)
Robustness	resistent polycarbonate	fragile glass	very durable
Costs	higher acquisition costs	low-cost tubes, expensive ECGs	higher acquisition costs
Consumption	23 watt	32 watt	10 watt

Quick Comparison Lumens/watts

	DIMMER  BRIGHTER 			
LUMENS	450	800	1100	1600
Standard Incandescents 	40W	60W	75W	100W
New Halogen Incandescents Save up to 28%* 	29W	43W	53W	72W
CFLs Save up to 75%* 	9W	14W	19W	23W
LEDs Save up to 77%* 	8W	13W	17W	21-W
AZ - LEDs +80 % (up to 208 lm/W)	3-4W	4-5W	5-6W	8-9W



(16 volt) Both lights are conceding on the same circuit, even at low power AZ-light gives high lumens.

Fluorescent tubes/lights

A fluorescent tube is a low weight mercury vapour lamp that contains a noble gas (argon or krypton) that uses fluorescence to deliver visible light. An electric current in the gas energizes mercury vapor which delivers ultraviolet radiation through discharge process which causes a phosphor coating of the lamp inner wall to radiate visible light.



Disadvantages of Fluorescent tubes

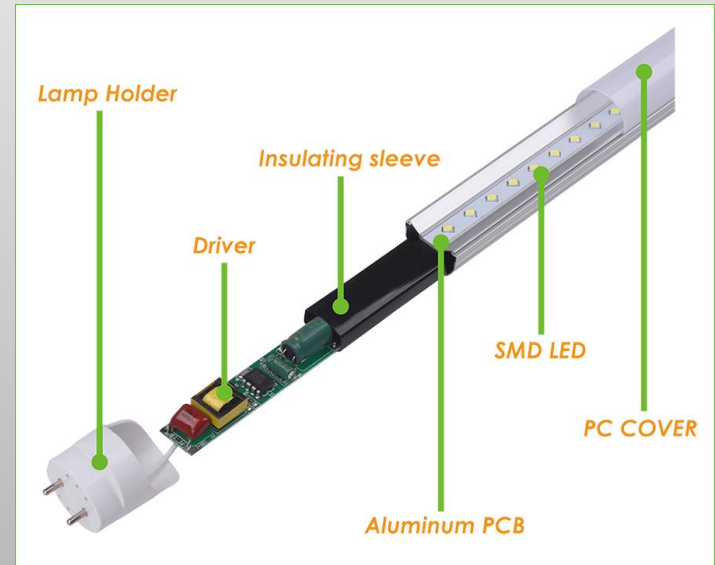
- Higher energy consumption
 - Low lifespan
 - Flickering, can lead to fatigue & headaches
 - Lower rendering index
 - Lower brightness
 - Sensitive handling
 - Toxic waste
 - Poor Visual
 - Long term health effect
- 45 – 100 lm/W (uses more electricity)
5,000 - 20,000 h (more frequent replacement)
110 to 120 (120 Hz) times per second in America,
50 to 60 (60 Hz) times per second in Europe
index of Ra 75 to Ra 85
40% energy transformed into heat instead of light
delicate thin glass shell
mercury vapour & gas
Low light spectral radiation, creates shadows
Mercury emission, proven negative effects

Typical LED tubes/lights

The modern LED variants in principle is a normal LED illuminant, the light-emitting diode is a semiconductor component. The LED chip emits photons, which we perceive as visible light. An LED tube contains a carrier board on which a large number of LEDs are soldered in a row. Furthermore, there is a power supply for generating the low voltage as well as an LED driver in the tubular housing. The improved lighting is less harmful both to the environment and for the user as well has a better effectiveness providing longer lasting LEDs (30,000 – 50,000 h).

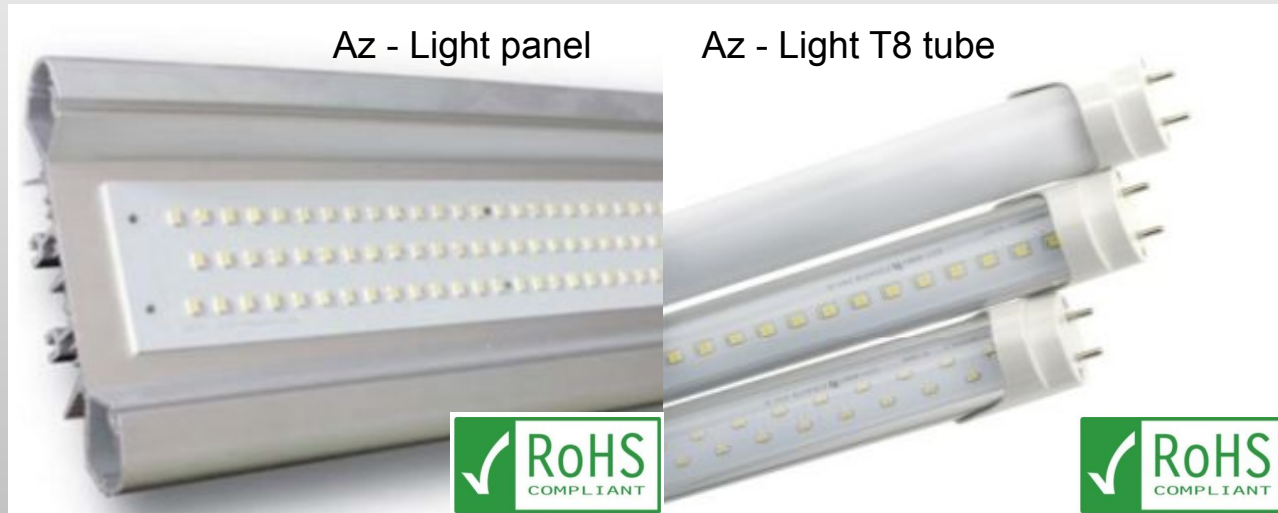
LED tubes have almost only advantages compared to fluorescent tubes. After being switched on, these tubes light up immediately with their full light output without flickering. The environmental balance is also very positive due to the absence of mercury and the savings of 40 – 60% in energy consumption. The higher acquisition costs are quickly amortized due to the high efficiency and the long lifespan.

But what is the next generation of lighting technologies?
What can be improved from typical LED lights?



AZ-Light

AZ-Light utilize a new, innovative, energy efficient, and environmentally friendly LED “PCB” technology. You can see in the images below the AZ-LED “printed circuit board”. The special technology allows the light to operate at a much cooler temperature making it one of the most efficient lighting technology on today's market! The 2.0 version will have a chipless inner component.



All of our LED products utilize this technology as well we service and provide other products; linear high bay lighting, panel lights, halogen replacements, floodlights, strip lighting, light tower 10ft/20ft, color lighting, dimmers, drivers, complete fixtures and more.

AZ - Light 10.0 W T8 tube Specs

AZ-Light T8 tube specifications and benefits (cutting edge Solid State Light)

- Low flicker (0.7%-3%) and no humming - Improved health benefits
- Low power consumption, 93 kWh/year, only 10.6 W vs FLS tube: 280 kWh/year, 32 W
- High efficacy – up to 208.0 Lumen Per Watt (Lm/W)
- Extra savings by low heat generation, due to high efficiency
- Save on reducing AC units load by: to remove extra heat generated by Fluorescent T8/T5 tubes, as much as 22 W per tube, 88W per panel (4x tubes per panel)
- Life span according to Anaheim Lab tests: +117,000 h (inhouse testing: 80,000 - 150,000 h)
- Maintenance free, with up to 20 years of life span (45 years in office space 9h/day)
- No ultraviolet or infrared radiation, also No mercury or lead
- Great CCT - that mimic natural sunlight, less blue (from 2,200 to 6,500 Kelvin) & CRI: Ra +95
- High durability, impact resistant, available to withstand strong shock absorption and vibrations.

AZ - Light Energy Savings



Typical T8
4000K (4ft)

Both lights are tested at: 126 volts

35.6 W power
usage

AZ-light T8
4000K (4ft)

10.3 W power
usage

A 25.3 W, 221 kWh/year, \$42
difference for the same
brightness!



Cost (kWh = Power(W) × Time(hrs) ÷ 1,000)

The most recent reports from the [EIA](#) "U.S. Energy Information Administration", average electric price a business customer in the United States pays for electricity is (\$0.12) **11.57** cents per kWh.

Product	AZ-Light T8 10W, 4000K	Fluorescent T8 32W, 4000 K
Cost per 1 kilowatt Hour (EIA)	\$0.12	\$0.12
Watts drawn per fixture (four 4ft tube)	10W x 4 = 40W	36W(FLS, ballast, driver)x4 =144W
Watts drawn per fixture kWh/day	0.96 kWh (\$0.11)	3.46 kWh (\$0.41)
Watts drawn per fixture kWh/month	28.8 kWh (\$3.45)	103.68 kWh (\$12.44)
Watts drawn per fixture kWh/year	350.4 kWh (\$42.05)	1,261.44 kWh (\$151.37)

Savings: 2.50 kWh per day \$0.30 per day	Savings: 74.88 kWh per month \$8.98 per month	Savings: 911.04 kWh per year \$109.32
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Total Savings

Lifespan comparison

FLS tube:	5,000 h	-	<u>20,000 h</u>	(5.8 replacements)
LED tube:	30,000 h	-	<u>50,000 h</u>	(2.3 replacements)
AZ tube:	80,000 h	-	<u>117,000 h</u>	

117,000 hrs Energy Consumption

FLS tube, 32 W:	$32\text{W} \times 117,000 \text{ h} \div 1000 = 3,744 \text{ kWh}$
LED tube, 23 W:	$23\text{W} \times 117,000 \text{ h} \div 1000 = 2,691 \text{ kWh}$
AZ tube, 10 W:	$10\text{W} \times 117,000 \text{ h} \div 1000 = 1,170 \text{ kWh}$

AZ-Light is on average **69%** more efficient than a Fluorescent low power tube
56% more efficient than a Typical LED low power tube

Electricity cost Savings

Switching from **Fluorescent** to AZ-Light = Total savings per individual light tube **\$308**
Switching from **Typical LED** to AZ-Light = Total savings per individual light tube **\$182**

AZ-Light T8 LED tube

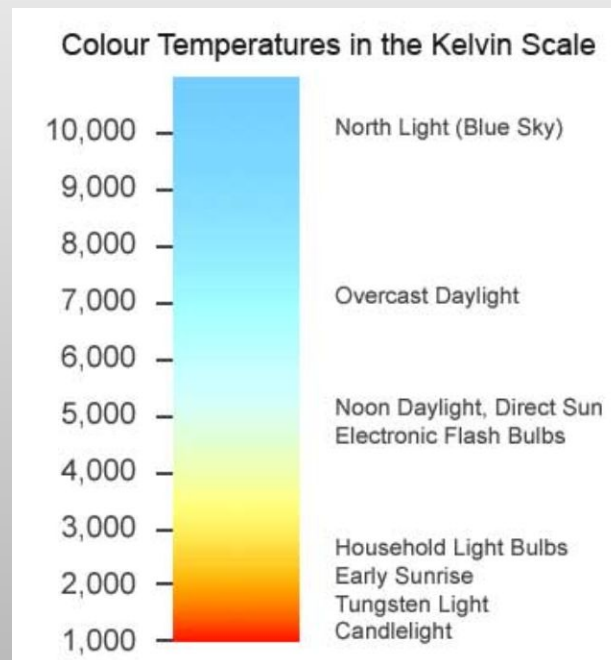


Flicker & Spectral Issue

The biggest issue of old-fashioned fluorescent lighting and some LED lights is they cause flicker giving adults, children & pets headaches and discomfort. How often a light/ tube flashes is caused by how regularly the voltage fluctuates, which is typically 110 to 120 times per second in North America, 50 to 60 times per second in Europe.

Many regard LED lighting to be an improvement but because LED light is so concentrated and has high blue content at higher CCT, it can cause severe glare, resulting in pupillary constriction in the eyes. Blue light scatters more in the human eye than the longer wavelengths of yellow and red, and sufficient levels can damage the retina. This can cause problems seeing clearly, similar to a TV or computer screen.

AZ Lights produce light with extremely low measurable flicker, 0.7% - 3%. [See test results on slide 21](#)



Flicker Issue Study by “ **nature portfolio** ”

A study published in “Nature” on Feb. 3, 2015 (<https://www.nature.com/articles/srep07861>)

Found that: humans perceive flicker artifacts at 50 - 300 Hz and maximal flicker fusion threshold for humans is approximately 50/100 – 60/120 Hz

These primary perceptual findings have been incorporated into international standards for display ergonomics and lighting technologies...

Flicker Issue:

- The immediate result of a few seconds' exposure, such as epileptic seizures, and those that are the less obvious result of long-term exposure, such as malaise, headaches and impaired visual performance.
- Flicker increases neural processing load and can induce fatigue, nausea, epilepsy and harm brain activity.

“IEEE Standard PAR1789” Study



Studie found at <https://ieeexplore.ieee.org/document/5618050>

(166 paper citation, 33 references)

Name: LED lighting flicker and potential health concerns

Authors: **Arnold Wilkins** Dept. of Psychology University of Essex; UK
Jennifer Veitch National Research Council Canada Ottawa; Canada
Brad Lehman Dept. Elect. & Comp. Eng. Northeastern University; USA

“The IEEE Standards Working Group, IEEE PAR1789 “Recommending practices for modulating current in High Brightness LEDs for mitigating health risks to viewers” has been formed to advise the lighting industry, ANSI/NEMA, IEC, EnergyStar and other standards groups about the emerging concern of flicker in LED lighting. This paper introduces power electronic designers for LED lighting to health concerns relating to flicker, demonstrates that existing technologies in LED lighting sometimes provide flicker at frequencies that may induce biological human response, and discusses a few methods to consider when trying to mitigate unintentional biological effects of LED lighting.”

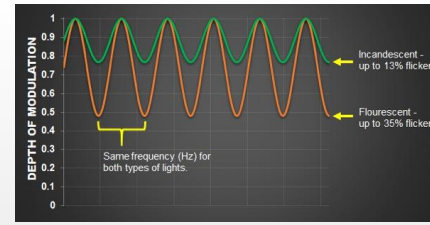
Conclusion of Study

IEEE Standard PAR1789: The negative health effects from flickering lights:

- Flicker: a rapid and repeated change over time in the brightness of light.
- Modulation: a measure of light variation that is often applied to periodic oscillations.
- Summary of Biological Effects: The risks include seizures, and less specific neurological symptoms including malaise and headache.
- Seizures can be triggered by flicker in individuals with no previous history or diagnosis of epilepsy.
- Less obvious biological effects occur from flicker that is invisible and/or after exposure of several minutes. Invisible flicker health effects have been reported to include headaches and eye-strain.

AZ-Light: T8/T5 tubes and bulbs are Low Flicker 0.7% - 3%
and DO NOT trigger the effects listed above.

Types of flicker and influence Effects



Source of flicker: Malfunctioning fluorescent lighting, Large 50Hz component

Results - Epileptiform EEG in patients with photosensitive epilepsy. By: Binnie et al., 1979

Source of flicker: Normally functioning fluorescent lighting (50Hz ballast) 100Hz (small 50Hz component)

Results - Headache and eye strain. By: Double-masked study, Wilkins et al., 1989

Source of flicker: Normally functioning fluorescent lighting (50Hz ballast) 32% modulation.

Results - Reduced speed of visual search. By: Two masked studies (Jaen et al.,) 1989

Source of flicker: Normally functioning fluorescent lighting (60Hz ballast)

120Hz Results - Reduced visual performance. By: Veitch and McColl, 1995

Source of flicker: Normally functioning fluorescent lighting (50Hz ballast) 100Hz (minimal 50Hz component).

Results - Increased heart rate in agoraphobic individuals. By: Hazell and Wilkins, 1990

Source of flicker: Normally functioning fluorescent lighting (50Hz ballast) 100Hz

Results - Inconsistent changes in plasma corticosterone levels in captive starlings. By: Maddocks et al., 2001

Flicker Comparison Test

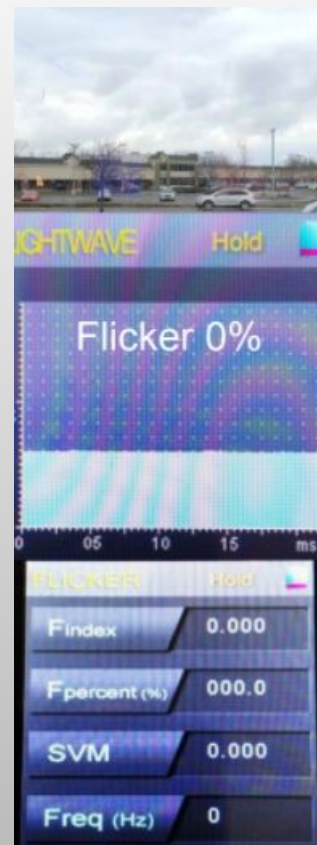


General
Electric
T8
Fluorescent
Tube
42.7%
flicker



AZ-Light

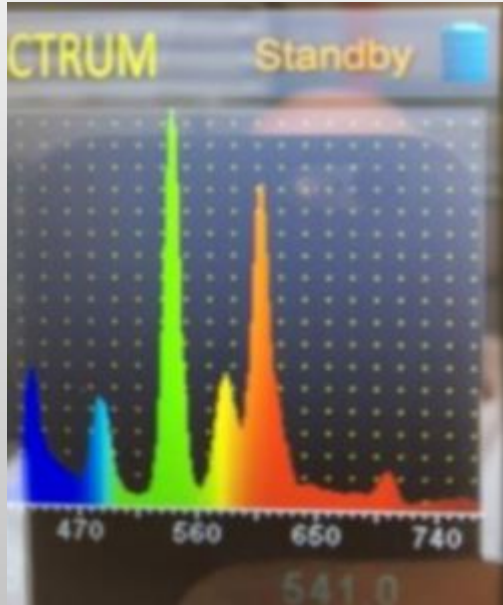
AZ-Light
T8
LED
Tube
0.7%
flicker



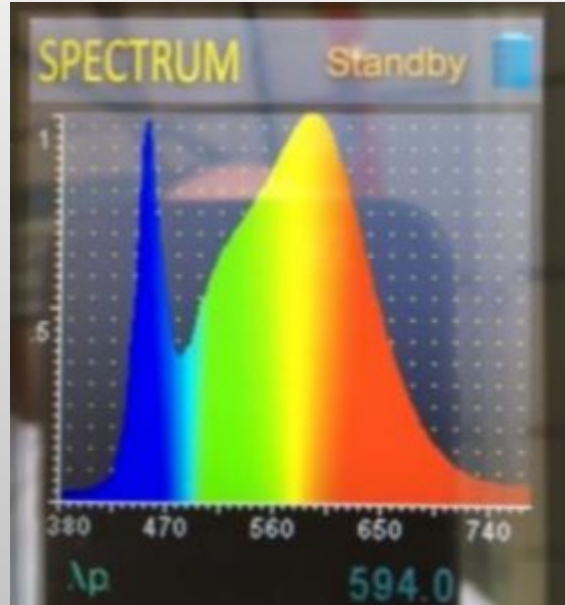
Natural
sunlight
0%
flicker

Spectral Distribution Comparison

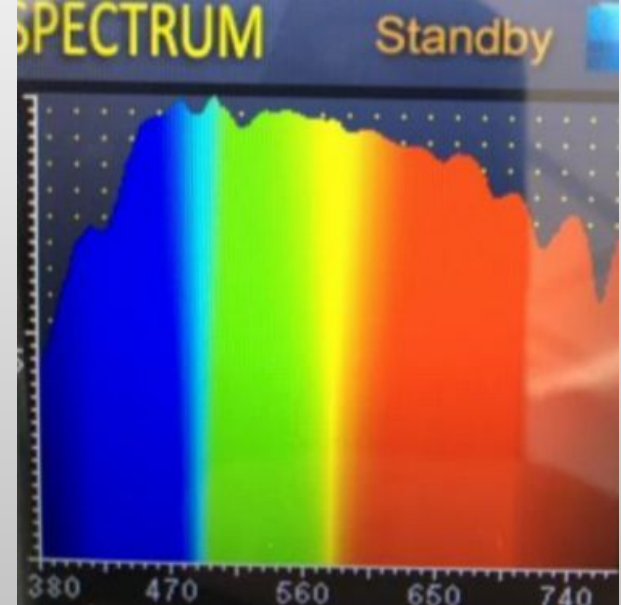
T8 Fluorescent tube



Typical T8 LED tube



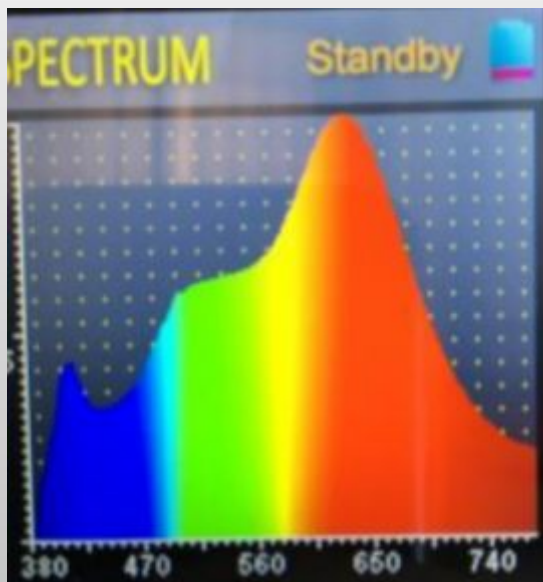
Sunlight



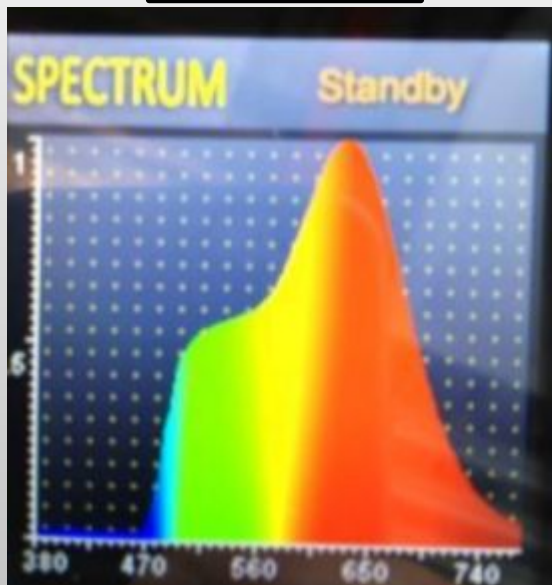
Natural sunlight has an even and high content of all colors, unlike artificial lighting.

Spectral Distribution Comparison

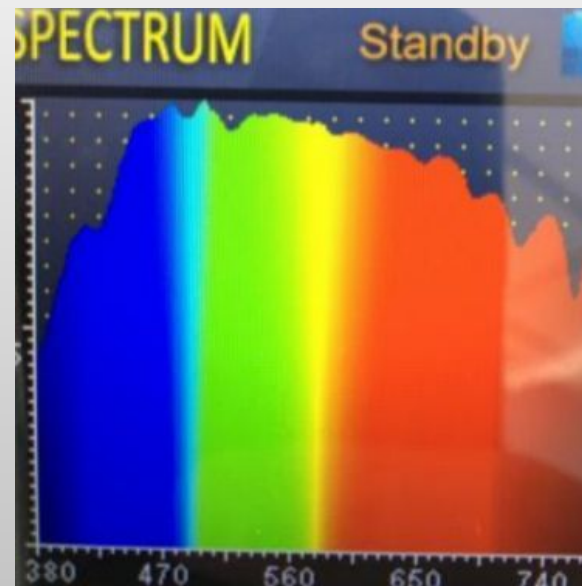
AZ-Light



AZ-Light

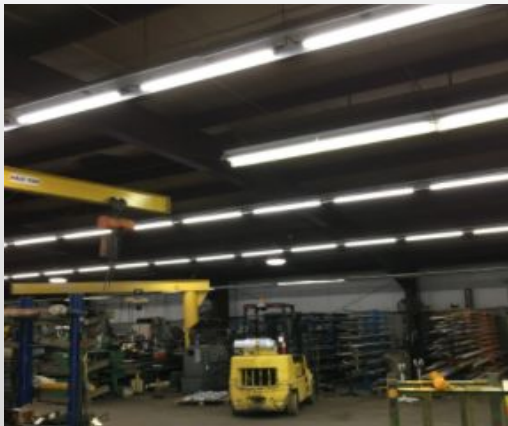


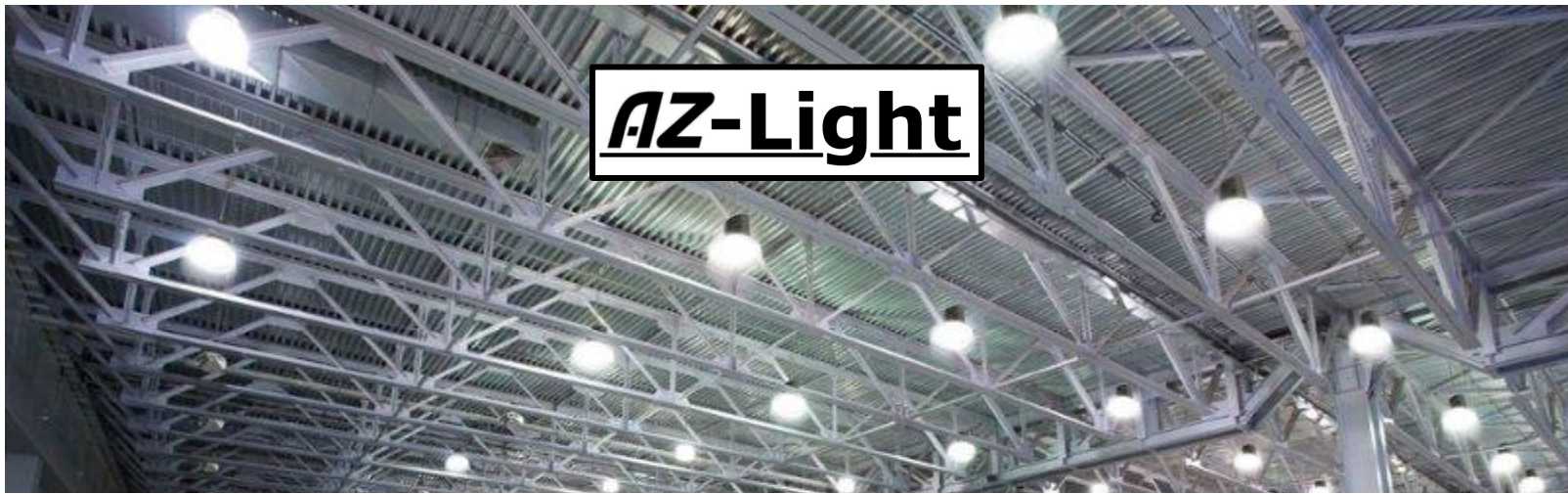
Sunlight



AZ-Lights are designed to have a greater similarity to Natural Light and contain less blue light to give better performance and comfort for users.

AZ-Light





AZ-Light

For more information and details about our AZ-Light
Please Contact Us



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