

LED LIGHT COMPARATIVE TEST

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What is LED light?

LED is the abbreviation of the words: Light Emitting Diode. LED lights are used in a lot of products. For example, stand-by lights. After the ban of light bulbs there are now LED lights on the market as a substitute for light bulbs. Or better, as a substitute for the highly polluting compact fluorescent lamp that became mandatory by the ban on light bulbs.

Ban on the light bulbs

The building biology compares building materials with nature. Nature is the reference. Is it available in nature, then it's no problem to use it in homes. For every rule, there is an exception. Including on this one. Asbestos is a real product of nature and radioactivity as well. You do not want them both in your home.

A new subject in the building biology is light. Since the ban on light bulbs from September 2012, light is in the interest of the building biology. Before that, there was no need. The light bulbs are a very good light source. Its light spectrum comes very close to that of morning- and evening light, because light bulbs have a big red share. Blue light is hardly produced by light bulbs. The sun makes blue light, especially in the blue afternoon ours of the day. That is no problem because we have adapted to this in approximately 3.5 billion years.

Due to the ban on light bulbs there are alternatives on the market. The ministers of Europe were enthusiastic about the saving of energy. By a strong lobby they had become blind to the disadvantages of the CFLs [compact fluorescent lamp / energy saving lamps]. Mercury is a highly toxic heavy metal, which is especially in a vapor extremely harmful. And mercury is in a CFL, without the lamp doesn't work. Only one milligram mercury can contaminate 5.500 litres of water and in the average energy saving lamp there is 3,5 milligram of mercury. The disadvantages of energy saving lamps cannot be told often enough. CFLs are a real deterioration in comparison to light bulbs in energy use, health and environment.

What makes a light good?

A lamp is good when it is close to our natural source of light, the sun. The sun has a very good colour rendering. The sun doesn't flash and the sun has the complete light spectrum.

Many CFLs and LED light have a bad light spectrum with a big blue share. In daytime that blue share is not a big problem. In the evening before going to bed, it is a problem. Then the blue light can disrupt the melatonin metabolism and falling a sleep can be difficult. Also, CFLs and LED light flash, that's because of the electronics they have. Light bulbs also flash. The power net has 50Hz. That means that 50 times a second the power is off. Then the filament doesn't get electricity and goes out. The filament does not cool down immediately it glows a little afterword before receiving new power. All that within 50 times a second. [in the USA it's 60Hz]

The ideal lamp has the complete colour spectrum, like the sun. Does not flash like the sun. And has a minimum colour rendering of 90, like the sun.

Which LED lamps were tested?

LED Light 1 is the Flair, produced by Hornbach. According to the packaging of the lamp: power consumption 5,5 Watt, light output 620 Lumen, warm white 2700K. More van 100.000 times switch on and off. 20.000 hours, not dimmable and an energy label A++

LED Light 2 is the LED Glühfaden Birne from a German supermarket. The producer is not on the packaging. Power consumption 6 Watt, light output 650 Lumen, warm white 2600K. 50.000 hours. Not dimmable and a colour rendering of more than 90. And an energy label A++.

LED Light 3 is the Sfeerpeer produced by Moodmakers. According to the packaging of the lamp: power consumption 3,6 Watt, light output 350-400 Lumen. 2500K, 20.000 hours and dimmable. No energy label given.

LED Light 4 is the Pure-Z retro LED, produced by BioLicht. According to the packaging of the lamp: power consumption 6,4 Watt, light output 600 Lumen, warm white 2700K. 20.000 times switch on and off. 15.000 hours. Not dimmable and a colour rendering of more than 90. And an energy label A+.





How have the LED lights been tested?

The LED lights have been tested in a complete darkened room and measured with two measuring instruments. The Fauser light measurement LM10. This measures the light output in Lux and the amount of blinking with the dominant frequency from the blinking or flashing. The other instrument is the MK350s LED spectrometer from UPRtek. This one gives the spectrum of the light and all other relevant light data like colour rendering. The LED lights are placed in an electric shielded armature. The measurement instruments are placed on a tripod with 20 centimetres.

Besides the light quality also the electrical load produced by the ledlamp is measured. With a TCO-probe and a Fauser FM-10 the alternating electric fields were measured on 30 centimetres. The background radiation was 0,7V/m.

Blinking content

What is blinking or flashing? When the blinking content is 50%, the amount of light is going back to 50% of the light output. Is the blinking content 100% then the light switches off. The frequency of the blinking is expressed in Hertz. 1Hz is 1 blink a second. 50Hz is 50 times a second. The blinking content of the Sfeerpeer is 99% with a frequency of 100Hz. That means that the Sfeerpeer goes off 100 times a second. This is too fast for our eyes. Is blinking unhealthy? That's a difficult question. In nature, there is no blinking light. But why use products that have no natural characteristics?

Colour rendering index

Colour rendering index is an important characteristic of light. The maximum is 100. As from 90 lights are considered good. Light bulbs have a very good colour rendering index of almost 100. The higher the colour rendering index, the better the colours are seen with the human eye. The colour rendering index from the Flair LED light is 82. That's moderate. Also, here, is a bad colour rendering index bad for your health? Not an easy question. But in nature, such a moderate colour rendering index does not exist. Why use products that have no natural characteristics?

Results

All lamps light up. And also with beautiful light. It's clear that the LED manufacturers are on the right path. All tested LED lights have a good light spectrum with a small peak of blue. An enormous improvement over the bulbs. In the case of the light spectrum, there is no bad lamp in this test.

Unfortunately, the LEDs blink, except the Pure-Z, which does not blink. The Flair blinks only 26%, but with a frequency of 63,000 times per second! The LED Glühfaden offers a flash content of 63% and a frequency of 100Hz. That's just bad. The flashing content of the Sfeerpeer is 99%, with a frequency of 100 times per second, this is a very bad lamp.

Regarding the colour rendering index there is a big difference between the worst, 82.2 from the Flair, and the best, 91.1 from the Pure-Z. The Glühfaden LED displays on the packaging that the colour rendering index is above 90. The measurement shows however 88.7. That's a lot better than the 83.7 from the Sfeer Peer. But, only lamps with more than 90 are classified as good.

Conclusion

In addition to the quality of light the amount of electric alternating current is also important. This did not vary much between all the LED lamps. Flair was the lowest with 15,6V/m and the highest Pure-Z was 22V/m. All lamps give a strong load of alternating electric fields. For a comparison an energy saving lamp was also tested that gives a whopping 53.7V/m which is very extreme. Fortunately, Danell has developed a special shield in the form of a basket to greatly reduce the electrical alternating fields. Therefore the problem of the electric AC voltages generated by the LED lamps is solved. This makes the light quality determine which LED light is the winner of the LEDs test.

The worst lamp is the Sfeer Peer. The flashing content is highest at 99% and has the worst colour rendering. Between Flair and the LED Glühfaden Birne there is not much of a difference. Both are not good. Flair has poor colour rendering index and a flashing frequency of 63,000 times per second. The LED Birne Glühfaden flashes by 63% and 100Hz, which is massive but on the other hand has a reasonable colour rendering index.



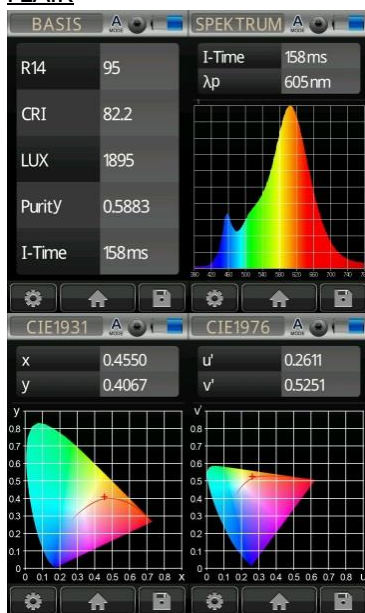
Pure-Z retro LED lamp is the lamp which resembles the sun most. Its spectrum is very good. The LED lamp does not flash and the colour reproduction is above 90. The price for the lamp seems high. 15,000 hours is equivalent to about 15 years at a daily use of about 3 hours. The old-fashioned light bulb seems very cheap to buy, but annual cost € 15,- for electricity and € 1.60 at the Pure-Z in equal use.

This makes the Pure-Z the winner of this test, and even the winner in relation to the light bulb!

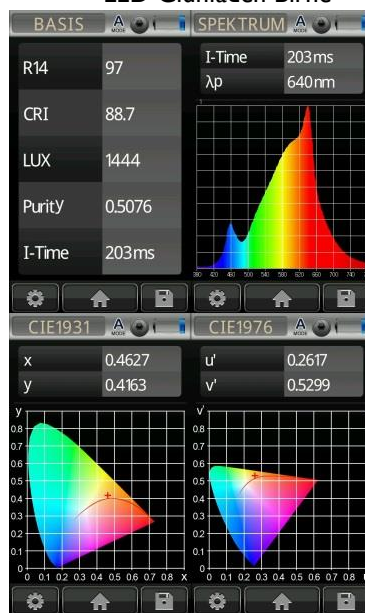
Measurement data

name	V/m	lux	blink %	Blink frequency	spectrum	Colour rendering	price
Flair	15,6	1895	26	63kHz	Good	82.2	€6,95
LED glühfaden	22,4	1444	63	100Hz	Good	88.7	?
Sfeerpeer	16,5	832	99	100Hz	Good	83.7	€26,50
Pure - Z	22,0	1457	0	-	Good	91.1	€25,37
Light bulb 40W	16,5	558	29	100Hz	Good	99.6	€0,90

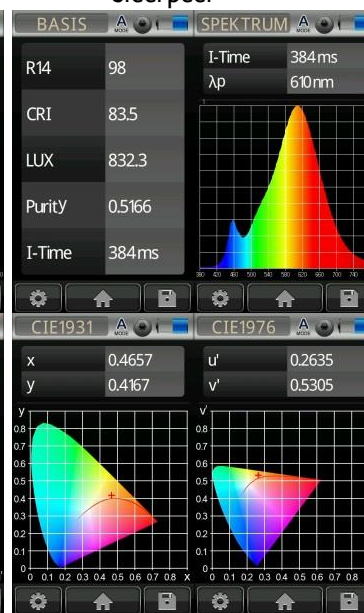
FLAIR



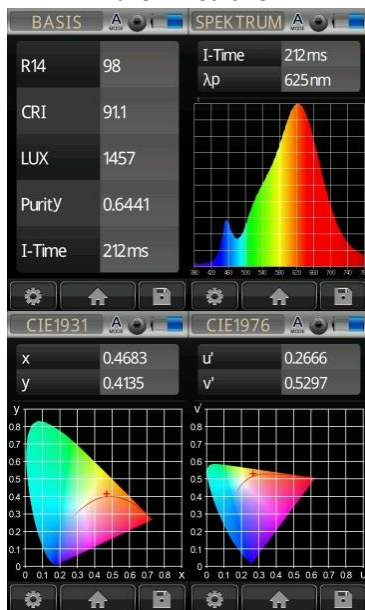
LED Glühfaden Birne



Sfeerpeer



Pure-Z retro led



Light bulb

