

## Warning – Unshielded LED Lighting Can Damage the Retina



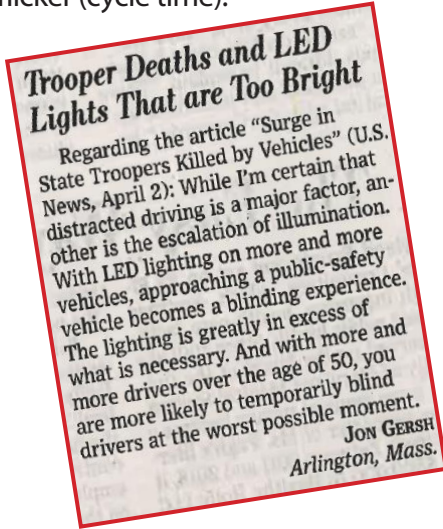
In the May 13, 2013 edition of Live Science, Assistant Editor Marc Lallanilla reported

ed on the research of Dr. Celia Sánchez-Ramos of Complutense University (Madrid, Spain) regarding potential dangers of directly viewing unshielded LED lighting. Simply put, the intense concentrated light of LEDs can permanently damage the retina, causing blind spots and color de-sensitization. As the LED installed base rapidly expands, more and more emphasis is being placed upon health risks associated with directly viewing LEDs. While still under peer review, this revelation has raised concerns of possible liabilities associated with newly deployed or anticipated LED roadway lighting. Now, lighting designers and consultants are increasingly faced with the tradeoff between installing energy efficient LED fixtures and potential liability associated with eye-damage claims.

For most high intensity LED street lighting, flicker presents several advanced challenges. "Strobe Effect" is the motion distortion that occurs when moving objects are viewed under the offending light. This disrupts visual perception and the ability to judge time and distance. Since many LED arrays are subject to flicker rates of 60 and 120 cycles per second, the strobe effect will be proportional to the speed at which a vehicle or other objects are traveling. Perception distortion is compounded by the motion of the reference vehicle (one being

*After two decades, LEDs have become the major replacement for high-pressure sodium and metal halide lighting. Now, there are significant safety issues after alarming increases in accidents.*

driven) relative to the moving vehicle (one being viewed) combined with the duration of the flicker (cycle time).



Since LED streetlight deployment is new, the consequence of strobe effect has not been fully evaluated. However, there is strong anecdotal evidence that strobe effect disrupts visual perception and acuity. For highway driving above 65mph, the amount of missing interpolative perception may significantly contribute to night time accidents. It should also be noted that some LED street lighting systems offer dimming capabilities for enhanced energy savings. Dimming LEDs increases strobe effect and may not be advisable based upon current knowledge and evidence.

## SOMETIMES THE SOLUTION BECOMES A PROBLEM!

LEDs can be significantly more energy efficient than conventional metal halide, sodium, fluorescent, and incandescent lighting. But, solving the energy-efficiency problem with technology that contains significantly **toxic components** presents serious environmental issues since all white LEDs contain:

- Aluminum gallium indium phosphide (AlInGaP) - **"toxic"**
- Aluminum phosphide (AlP) - **"highly toxic"**
- Indium Gallium Nitride (InGaN) - **"toxic"**
- Gallium Arsenide (GaAs) - **"highly toxic"**
- Aluminum Gallium Arsenide (AlGaAs) - **"highly toxic"**

These compounds have been labeled **"Forever Chemicals"** and are subject to being banned by the European Union environmental ministry. Consider the following:

Aluminum phosphide is a **highly toxic inorganic compound** with the chemical formula AlP, and is used as a wide band gap semiconductor in **LEDs**.

Aluminum gallium arsenide is a semiconductor material that is used in a variety of electronic devices; **LEDs in particular**. It can be **hazardous if inhaled or ingested**, causing irritation to the eyes, skin, and respiratory system. **It can also be toxic** if it enters the body through cuts or other wounds.

Environmental agencies are dealing with these issues as these compounds are not sustainable within current sustainability definitions.

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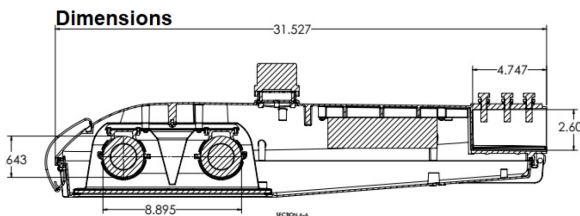
- No glare
- No Flicker
- Actual 100,000 lifecycle
- Auto-sensing input voltage from 110V to 277V
- .98 Power factor
- IP65 Rated
- Bright-Tech® System integrated technology
- Color Rendition Index (CRI) > .90
- Street-Bright™ LumenTec® tuned spectrum
- Large format full dispersion light source
- Full diffusion nano particle reflector



## STBT-CH-(40W, 60W, 80W, 100W)



- Street-Bright™ LumenTec® tuned spectrum
- Bright-Tech® System integrated technology
- Color Rendition Index (CRI) > .90
- 100,000 hour life cycle
- 110V ~ 277V auto-sensing ballast
- Instant strike/re-strike
- Large format full dispersion light source
- Full diffusion nano particle reflector
- Powder-coated all-weather aluminum
- IP66 rated WF2 anti-corrosion grade

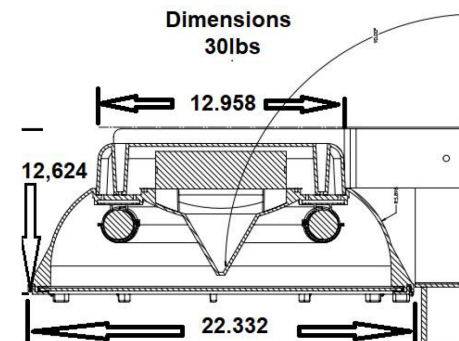


The compact Street-Bright™ wide area diffusion “cobra head” fixture is designed for roadways, highways, streets, and parking lots where lateral parameters are constrained. Its unique full-spectrum/full-diffusion design can replace sodium and metal halide fixtures for up to 80% energy savings including ballast overhead. Full cut-off and dispersion geometry minimizes light pollution while adhering to existing pole separations. Fully recyclable makes Street-Bright™ environmentally friendly and safe. Special disposal is not required since mercury is encapsulated and isolated. Street-Bright™ lights use proprietary LumenTec® spectral tuning for stunning resolution and contrast on blacktop and white-top roadway surfaces. Vari-Bright® integrated dimmable technology works in conjunction with Vari-Beam® focal length adjustments to allow variable lighting intensity. Instant strike means no waiting for a warm-up or cool-down. The STBT-CH-XXXW series comes in 40W, 60W, 80W and 100W configurations from Type I to VS. Lights are animal friendly and will not disturb nocturnal wildlife such as owls. Equally important, it is a neighbor-friendly fixture that can be focused away from surrounding buildings and homes. Street-Bright™ lights are not affected by temperature. The extraordinary 100,000 hour life cycle can lower maintenance costs by as much as 600% over conventional outdoor lighting systems.

## STBT-FL-300W



- Street-Bright™ LumenTec® tuned spectrum
- Bright-Tech® System integrated technology
- Color Rendition Index (CRI) > .90
- 100,000 hour life cycle
- 110V ~ 277V auto-sensing ballast
- Large format full dispersion light source
- Full diffusion nano particle reflector
- Powder-coated all-weather aluminum
- IP66 rated WF2 anti-corrosion grade



The Street-Bright™ STBT-FL-300W wide-area diffusion flood fixture is designed for roadways, highways, streets, tunnels, and parking lots where flicker-free, high visual acuity, and minimal light pollution are critical. With a 2.77 photopic ratio and .90 color rendition index (CRI), its unique full-spectrum/full-diffusion design can replace sodium and metal halide fixtures for up to 70% energy savings including ballast overhead. Full cut-off and lateral dispersion geometry meets most Dark Sky guidelines. Multi-angle armature for any mounting requirements. Fully recyclable Street Bright™ is environmentally friendly and safe. Special disposal is not required since mercury is encapsulated and isolated. Street-Bright™ lights use proprietary LumenTec® spectral tuning for stunning resolution and contrast on blacktop and white-top roadway surfaces. Instant strike means never having to wait for a warm-up or cool-down. Lights are animal friendly and will not disturb nocturnal wildlife such as owls. Equally important, it is a neighbor-friendly fixture that can be focused away from surrounding buildings and homes. Street-Bright™ lights are not affected by temperature. The extraordinary 100,000 hour life cycle can lower maintenance costs by as much as 600% over conventional outdoor lighting systems including LEDs