

FEATURED ARTICLE

UL Launches Cybersecurity Assurance Program

On Tuesday, April 5, [UL announced the launch](#) of its new Cybersecurity Assurance Program (UL CAP), which uses the UL 2900 series of standards to test and certify networked devices for cybersecurity within the “Internet of Things” (IoT) supply chains and ecosystems.

UL CAP will evaluate security products based on the UL 2900 series of standards, which outline technical criteria for testing and evaluating the security of products and systems that are network connectable. Meeting the requirements outlined in the UL 2900 series of standards allows a product or system to be certified by UL. These standards form a baseline of technical requirements to measure—and then elevate—the security posture of products and systems.

Additionally, since security is dynamic, UL 2900 can support the evaluation of a vendor’s processes for design, development and maintenance of products and systems throughout their lifecycle. UL 2900 is designed to evolve and incorporate additional technical criteria as the security needs in the marketplace mature.

UL CAP is ideal for vendors looking for trusted support in assessing security risks while they continue to focus on product innovation and for product purchasers who want to mitigate risks by sourcing products validated by a trusted third party. UL CAP will help identify security risks in products and systems and suggest methods for mitigating those risks in a wide range of industry functions, including industrial control systems, medical devices,

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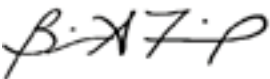
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A Letter from Brian



Have you heard about the latest cybersecurity attack in the news that exposed confidential data, put lives at risk or damaged a company's brand? If any of your products include smart connected devices you're at risk for a cyber-attack too. UL has listened to the industry and created a standard and service to assist manufacturers, retailers, governments, insurance companies and brand owners with the challenge of preventing cybersecurity attacks. Our mission reinforces the need to protect businesses and consumers alike from harm. Please look at the related article in this issue, and let us know how we can protect your company.

Kind Regards,



Brian Ferriol
Director of Global Appliances,
HVAC/R and Lighting

Lighting for Tomorrow 2016 Competition — Final Submission Call

Submission deadline extended, [click here to register your intent to submit!](#) Don't miss your opportunity to be part of a winning design competition.

UL Verified – Philips Field APP for DC TLED Applications

See how UL and Philips are working together to drive innovation with the UL Verified Mark

Mobile device technology is changing the way we interact with our environment, from controlling our smart homes to paying for groceries. Philips has incorporated this technology in their Xitanium LED Drivers, enabling field programmability using their Philips Field APP. For this new technology, Philips chose to differentiate their product with the UL Verified Mark.



UL and Philips partnered to develop a custom evaluation program to evaluate the software integrity and functionality for the combination of the LED Driver with the mobile app.

The result is the ability for Philips to use the UL Verified Mark to instantly stand out in the crowded mobile technology field.

Differentiate your product with the UL Verified Mark! Our engineering teams leverage UL's 120 years of science experience to thoroughly and objectively evaluate marketing claims.

Learn more here: verify.ul.com



In the picture, from left to right: Stephen Italo, Bahram Barzideh, Thomas Sciotto, Ernesto Mendoza, Edward Joseph, Thomas Blewitt, Jason Petrello, Juan Loza

(cover story continued)

UL Launches Cybersecurity Assurance Program

automotive, HVAC, lighting, smart home, appliances, alarm systems, fire systems, building automation, smart meters, network equipment and consumer electronics.

As the volume of connected devices surges to as many as an estimated 50 billion by 2020, industry analysts believe up to 66 percent of networked devices will have an IoT security breach ([IDC](#)). UL CAP arrives at a unique moment in time and addresses a significant and expanding security gap in the marketplace.

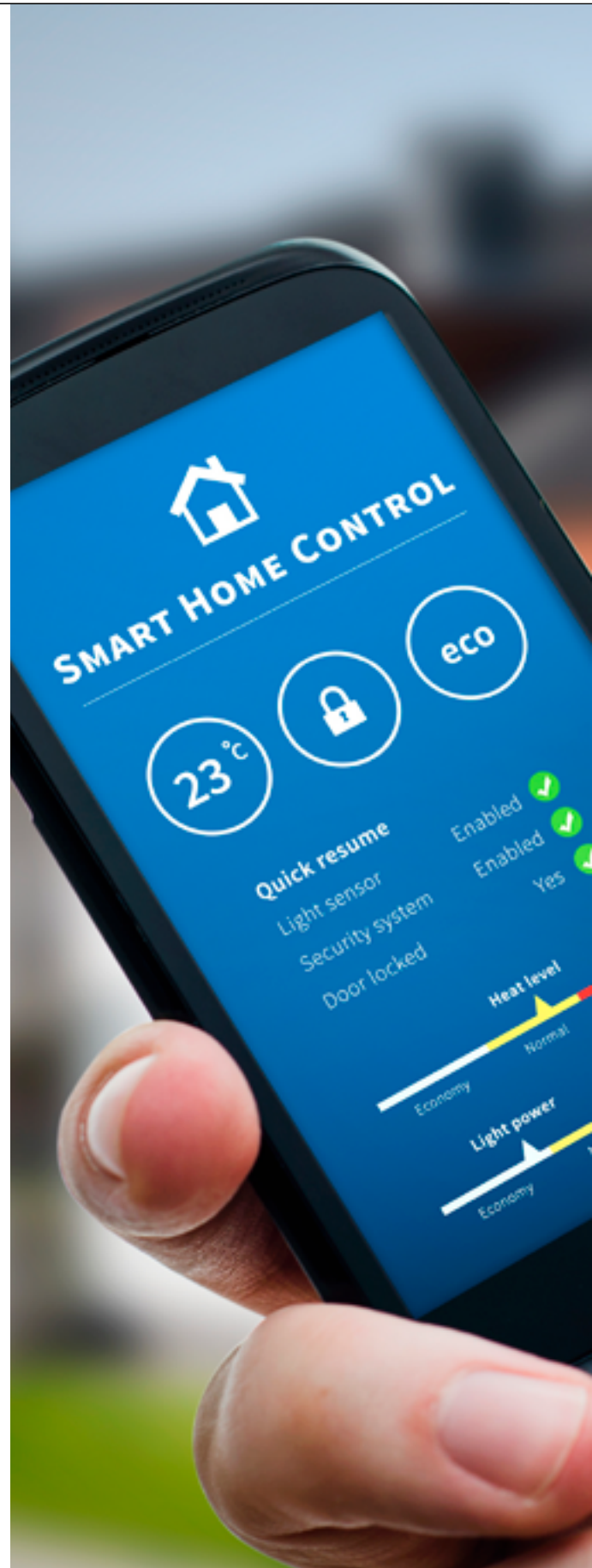
“We’re aiming to support and underpin the innovative, rapidly iterating technologies that make up the Internet of Things with a security program,” said Rachna Stegall, Director of Connected Technologies at UL. “The more devices become interconnected, the greater the potential security risks to products and services across all sectors. UL CAP will help manufacturers, purchasers and end-users, both public and private, mitigate those risks via methodical risk assessments and evaluations.”

A Public-Private Collaboration Model

Developed in coordination with The White House, the U.S. Department of Homeland Defense, academia and industry, UL CAP seeks to elevate the security measures deployed in the critical infrastructure supply chain. In fact, in its [Cybersecurity National Action Plan \(CNAP\)](#), The White House recently recognized UL’s CAP services and software security as a way to test and certify network-connected devices across a range of vital industries, such as energy, utilities and healthcare.

To learn more about UL CAP, please join our live one-hour [webinar](#), “**UL Cybersecurity Assurance Program – evaluating network-connectable products and systems per common security requirements**” on **April 26 at 12 noon EST**. Learn more and register at bit.ly/CAPWeb1.

For more information about UL CAP, visit ul.com/cybersecurity. For product testing, evaluation or certification questions, email ULCyber@ul.com.



Celebrating the 100th Anniversary of UL48

By Shari Hunter / Business Development Manager

This year marks the 100th year of publication of the UL 48 Standard for Electric Signs. UL's founder, William Henry Merrill, served as the President of the staff of officers and engineers who performed the testing and wrote the sign standard. The first edition of UL48 applied only to signs having lamp receptacles set into the sign face with the lamps exposed. Back then, UL labels were made of brass, and the price list was included in the standard. The label indicated the number of lamps used in the sign, starting at 15 lamps minimum up to 1500+ lamps. In 1930, the second edition of UL48 was released, and it included neon lighting that was becoming mainstream in signage in America starting in 1923 when, according to historians, a Los Angeles Packard car dealership purchased two neon signs for \$24,000. Neon signage dominated main streets across the US and Canada and reached their hay day in the 50's as diners, motels, drive-ins and casinos illuminated the night skies with colorful neon signs. Following World War II and into the early '60s, neon lighting experienced a rapid decline as municipal sign codes were introduced and low cost alternatives were grabbing up market share. Fluorescent tubes in box-style cabinets and in channel letters were a much cheaper alternative form of advertising, and it was in the mid-'60s that temperature "test exempt" fluorescent lighting was added to UL48, creating a simplified path for sign manufacturers to build fluorescent signs. The rapid development of plastics during the '60s allowed for colorful sign faces that could be painted or printed on, and they were easily replaced when the message needed updating or the drive-up menu changed. Today, we are using the 15th edition of UL48 to evaluate electric signs. The current edition was published in 2011, and for the first time included LED illumination systems commonly used in channel letters, box signs, and most retrofit kits.



Energy efficiency regulations like California's Title 24 are also a factor in determining which types of illumination systems can be used in today's advertising signs in order to comply with the new codes. Illumination systems in energy efficient signs allowed under Title 24 include fluorescent, high pressure sodium, metal halide, LED and neon with efficiency requirements on the power supplies used for the various lighting sources.

While it is unlikely that exposed incandescent lamp signs will return to the industry, neon is experiencing a revival as projects like the Route 66 Corridor Restoration Act help preserve some of the retro-neon signs. Several museums dedicated to artistic neon have opened across the US, including the Museum of Neon Art in Los Angeles, the Neon Museum of Philadelphia and the Neon Museum in Las Vegas. Herbie Moulton of Masters Technology has been in the sign business since the early '50s, and he remembers the decline of neon lighting, which he now calls "artistic lighting." Herbie, a UL customer since 1985, is happy to see neon making a comeback and says, "We need more apprenticeship programs like we had in the past to keep this artistic lighting form alive."

To celebrate the 100th anniversary of UL48, UL is offering a 10% discount to all new and existing sign and sign accessory customers who request safety or energy efficiency certification services. Mention code '100YEARS of UL48' in your request, valid through July 1, 2016.



Old Brass UL Label used in 1917

UL Performance Lighting Presents: Lumen Insights Live!

YOU ARE INVITED...

UL invites you to spend the day at our Allentown, PA laboratory with industry experts as they cover lighting performance topics including test equipment, ENERGY STAR®, CEC, DLC, LM-79, and other energy efficiency program updates. The day will include keynote speakers, informative presentations and discussions, a lab tour, and an on-site demonstration.

Our engineers will be available to answer any of your questions. Lunch will be provided.

We look forward to welcoming you to our Lumen Insights Live session. We are confident you will find it a worthwhile and memorable experience.

As a token of our appreciation, attendees will receive a free LM-79 test (Gonio & Sphere).*

**Terms and conditions: One LM-79 Test per company. Other terms and conditions may apply.*

EVENT DETAILS

Date: June 7, 2016

Time: 10AM-3PM (Q&A to follow)

Location: 7036 Snowdrift Rd.
Suite 200, Allentown, PA 18106

If you have any questions, please contact Victoria at Victoria.Tagliamonti@ul.com.

Please RSVP by May 17, 2016.



UL Lighting Presents – Webcast Wednesdays

Starting this year, UL's Lighting Business Unit will be hosting webcasts on topics relevant to our customers and industry stakeholders. We are pleased to announce our first series of webcasts, which will focus on Energy Efficiency and Performance regulations that impact the lighting sector. Topics covered in this series will be:

1. California Codes – Title 20, Title 24, The California Quality Lamp
2. EPA Requirements – Energy Star, Bulb-in-a-Box, Inseparable SSL Luminaires
3. DLC and Outdoor Lighting – DLC requirements, Ingress Protection, Impact Ratings
4. Building and Efficiency Codes – WAC, IECC, ASHRAE, Air Leakage
5. Lighting Controls – Dimming, Integrated Controls, Sensors

Please join UL's Austin A. Gelder for our first of five one-hour live learning sessions, which is scheduled for Wednesday, May 18 at 1pm Central time. To register online, go to UL.com/LightingWebcastSeries.

Upcoming UL Education & Training for the Lighting Industry

At UL Knowledge Solutions, our goal is to help you develop safe, useful products that meet and exceed your customers' needs. Here you'll find dozens of training courses taught by qualified instructors, both instructor-led Public Workshops and Online eLearning Courses, UL.com/lightingtraining.

Scheduled Public Workshops

[Plastics: Specifying and Evaluating Materials for Electrical, Electronic and Mechanical Applications](#)

5/10/2016 Northbrook, IL
9/27/2016 Northbrook, IL

[Safety of Household and Similar Electrical Appliances; General Requirements, IEC 60335-1, 5th Edition](#)

5/24/2016 Northbrook, IL
10/18/2016 Northbrook, IL

[Applied Safety Science and Engineering Techniques \(ASSET\)™](#)

6/21/2016 Northbrook, IL
9/20/2016 Fremont, CA

[Designing for Compliance to UL 60730: Automatic Electrical Controls for Household and Similar Use](#)

5/17/2016 Los Morales, Mexico City
9/21/2016 Los Morales, Mexico City
10/4/2016 Northbrook, IL

[Introduction to Boiler Safety](#)

5/10/2016 Raleigh, NC
8/23/2016 Raleigh, NC

Online eLearning Courses

Available Anytime, Anywhere

[Diagnosing HVAC Lightning and Electrical Surge Failures](#)

[Electronically Controlled and Electronically Protected Motors: UL 1004](#)

[ENERGY STAR® Requirements](#)

[Free Webinar: UL Cybersecurity Assurance Program – Evaluating Network-Connectable Products and Systems per Common Security Requirements](#)

[Introduction to IEEE 1776\(2008\): Recommended Practice for Thermal Evaluation of Unsealed or Sealed Insulation Systems for AC Electric Machinery Employing Form-Wound Pre-Insulated Stator Coils for Machines Rated 15000 V and Below](#)

[Overview of the UL 474, UL 484, UL 1995, and UL 60335-2-40 Transition](#)

[The New Standard for Appliance Switches: UL 61058-1](#)

[Third-Party Certification Requirements for Unevaluated Electrical Equipment - Part 1 & 2](#)

[Third-Party Certification Requirements for Unevaluated Electrical Equipment - Part 1](#)

[Third-Party Certification Requirements for Unevaluated Electrical Equipment - Part 2](#)

[UL 2158: Electric Clothes Dryer Containment Requirement](#)

Lighting Retrofits Could be Creating Hazardous Situations

By Shari Hunter / Business Development Manager

UL alerts the public that improperly installed or uncertified kits could be posing safety hazards.

In many states, utility providers are offering rebates and other financial incentives to businesses that upgrade or retrofit their facilities with more energy-efficient lighting. While the move is a positive step, care isn't always taken to use properly certified retrofit kits and/or to complete the retrofit according to kit installation instructions to assure that the resulting upgraded lighting fixture meets the equivalent certification requirements of the enforced code. Compounding the issue is that companies and individuals performing retrofits are not always obtaining the proper permits, and not all authorities having jurisdiction (AHJs) mandate inspection of lighting retrofits, so the hazards are not always easily identified.

"Many of these retrofits are being completed in ways that create safety hazards where none existed before, creating unintended consequences in the name of energy efficiency," said Marguerite Carroll, regional manager for UL's Regulatory Services division.

The components used in the retrofit may be UL Listed or otherwise certified, but if the whole system, including the ballasts, drivers, lamp holders and lamps, is not evaluated and certified for safety as a complete kit for the specific type of luminaire, problems can occur.

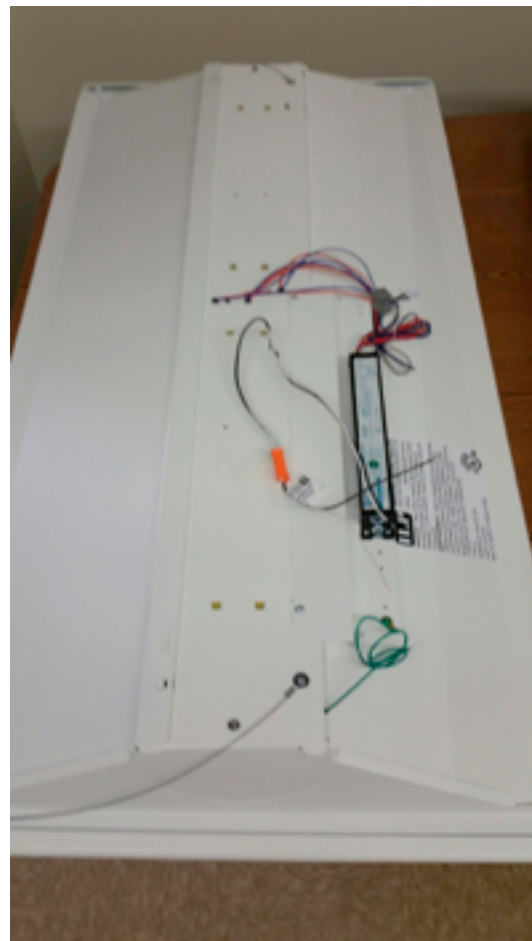
"The common thinking is that LED retrofits are low-voltage. This is not true. All retrofit kits will include branch circuit connections and should be treated with proper safety precautions," said Bahram Barzideh, principal engineer with UL's lighting division.

For utilities providing financial incentives for lighting conversions that modify the existing luminaire, consideration should be given to implementing minimum specific criteria before the retrofit installation can begin. The minimum criteria should include proper permits, use of the proper certified luminaire retrofits kits by qualified installers, and proof of inspection by the local authority having jurisdiction (AHJ). In most jurisdictions, this is the electrical inspector.

UL urges those undertaking a lighting retrofit to use only certified retrofit kits in accordance with their certification to help ensure the continued compliance with certification requirements for the retrofitted luminaire and the NEC and to have the installation inspected by their local jurisdiction. Certified LED retrofit kits can be verified on UL Product Spec at productspec.UL.com or in UL's Online Certifications Database at bit.ly/RetrofitKits. More detailed information about retrofits and retrofit safety can be found [here](#).

Click [here](#) or go to library.UL.com to receive a copy of our white paper on Luminaire Retrofits.

Click [here](#) to view UL's Press Release on the **Potential Hazards From Improper Installation of Lighting Retrofit Kits**.



Driver added to the outside top of the luminaire, no enclosure.

Standards Corner

Standards information: ulstandards.ul.com

Sign up for “What’s New” at: 2000.com/WhatsNew.aspx by selecting “Join Email List” on the What’s New site to receive email notifications twice a month that list the various UL, UL Environment, and ULC Standards documents published during that timeframe.

Did you know that reviewing and commenting on proposed changes to UL Standards is free? Visit the Proposals Available section on UL’s online Collaborative Standards Development System (CSDS) and search for a UL standard, or scan the list of currently available proposals:

ul.com/Home/ProposalsDefault.aspx

UL 1598 - Luminaires (Tri-National Standard)

- The next revision cycle has started, which will be a 2-year cycle. Proposals received by the SDOs were issued for preliminary review on August 28, 2015. Comments were due on October 12, 2015. Link to summary of topics: www.comm-2000.com/ProductDetail.aspx?UniqueKey=30005.

UL 1598C - Light Emitting Diode (LED) Retrofit Luminaire Conversion Kits

- The proposal went out for preliminary review on February 6, 2015. The proposal relates to fuse requirements for tubular fluorescent to LED conversion retrofit kits.

UL 1993 - Self-Ballasted Lamps and Lamp Adapters (Tri-National Standard)

- The next revision cycle has started. UL is the Publication Coordinator. Multiple proposals went out for ballot on August 7, 2015 with a due date of September 21, 2015. Link to summary of topics: www.comm-2000.com/ProductDetail.aspx?UniqueKey=29887.

UL 8750 - Light Emitting Diode (LED) Equipment for Use in Lighting Products

- A proposal went out for preliminary review on July 24, 2015. The proposal relates to the addition of a new Supplement SE covering Requirements for Class P LED Drivers. This proposal was issued for ballot on December 11, 2015. Link to the summary of topics: <http://www.comm-2000.com/ProductDetail.aspx?UniqueKey=30375>.
- A new proposal was issued for preliminary review on January 8, 2016. The proposal relates to the addition of a new Supplement SF covering Requirements for LED Drivers with Control Circuits. Link to the summary of topics: www.comm-2000.com/ProductDetail.aspx?UniqueKey=30433.
- A new proposal went out for preliminary review on February 19, 2016. The proposal relates to RTI requirements for thermosetting potting compounds. Link to the summary of topics: <http://www.comm-2000.com/ProductDetail.aspx?UniqueKey=30669>.

UL 496 – Lampholders (Bi-National Standard)

- The next revision cycle has started. A Call for Proposals was sent out on May 9, 2014. UL (the Publication Coordinator) sent the proposals received to the Technical Harmonization Committee for review. Multiple proposals went out for preliminary review on October 3, 2014. The proposals related to: (1) Proposed Addition of Requirements for Lampholder Fittings with Integral USB Connectors, (2) Proposed Addition of Requirements for Minimum Lead Wire Gauge Size for GU24 Outlet-Box Lampholders, and (3) Proposed Addition of Requirements to Clarify the Creepage Distances and Clearances Measurements. The comments received in response to the preliminary review were sent to the Technical Harmonization Committee (THC) for review and input. A proposed new edition, which incorporates the proposals that were sent out for preliminary review, is being finalized and will be issued for ballot in April 2016.

UL 482 – Portable Sun/Heat Lamps

- FDA proposal to amend performance standard for sunlamp products and ultraviolet (UV) lamps intended for use in these products (which may be viewed at federalregister.gov/a/2015-32023) would reference IEC 60335-2-27, Household and similar electrical appliances – Safety Part 2-27: Particular requirements for appliances for skin exposure to ultraviolet and infrared radiation, rather than UL 482. The FDA sought out comments on the proposed rule by March 21, 2016.

UL 48 – Electric Signs / UL 879A – LED Signs and Sign Retrofit Kits

- STP 48 Meeting that was originally scheduled for November 18, 2015 is being rescheduled for March 2016. The meeting agenda included proposals for UL 48 and UL 879A for discussion at the November 18, 2015 STP 48 Meeting. The proposals relate to: (1) UL 48 - New Requirements for Rough-In Sign Sections, (2) UL 48-Standard Reference for LED Components and LED Retrofit Kits, (3) UL 879A – Deletion of Supplement SA, and (4) UL 879A – Markings for Kit Installation Instructions. These proposals will be reissued in the new meeting agenda once the STP 48 Meeting has been rescheduled. Additional important items that will be discussed at the STP 48 Meeting are: (1) UL 879A - Are revisions needed to 1.2.2 to meet the 2014 NEC definition of Retrofit Kits, and (2) Retrofit Kit Discussion.

Flicker: Explained

By: Austin Gelder / Lighting Business Advisor

Introduction

With the wide acceptance of LEDs for use in general lighting, light flicker has become a concern in some situations. As LEDs have a fast response time to a change in electrical conditions, they have more potential to pass on flicker from the incoming power line and the LED driver. This is agreed upon by most, but how much flicker is too much, how flicker impacts users of the light, and where it becomes critical are areas of disagreement.

What is Flicker?

Flicker is a term most commonly used to describe the variations in the intensity of a light over a period of time. This is most often referred to when referring to the regular pattern in the variation of light intensity from electrical cycle to electrical cycle, but it can also be caused by irregular variations between power cycles, which can be a result of system instability.

Flicker can be more or less apparent depending on several factors, primarily the relevant amount of variation in the light per cycle, the proportions of the lighting waveform, and the frequency (or frequencies) at which the light variation occurs. To describe the variation within a cycle, there are two primary measures: percent flicker and flicker index.

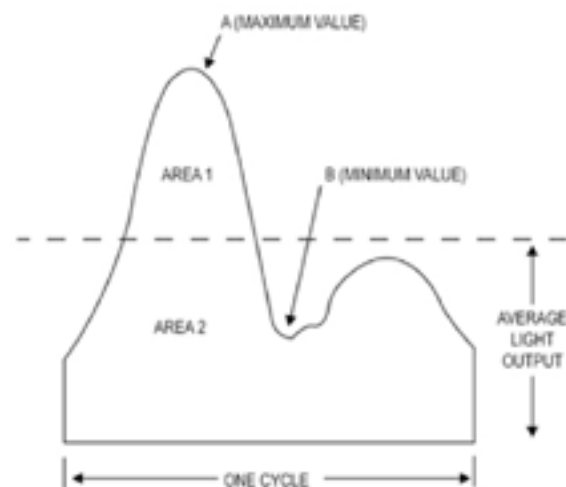


Figure 1: Example Light Waveform¹

¹ Adapted from IES Handbook

² US DOE Solid State Lighting Technology Fact Sheet: Flicker

Percent flicker is the measure of the maximum light vs. the minimum light in a cycle, meaning a product that had no light output at any point in cycle would have 100% flicker, and a product that had no light variation would have 0% flicker. This only accounts for the minimum and maximum light outputs, and it does not differentiate between waveforms. This is the simplest form of flicker to determine, calculated as:

$$\text{Percent Flicker} = 100\% \times \frac{(\text{Maximum} - \text{Minimum})}{(\text{Maximum} + \text{Minimum})}$$

Flicker index is another common metric for describing the behavior in amount of light that a product produces over a given cycle. Flicker index requires a greater amount of calculation, as there is consideration to the shape of the waveform. Flicker index considers the area of the waveform above the average light output and the area below the average light output. This is calculated as:

$$\text{Flicker Index} = \frac{(\text{Area Above Average Light Output})}{(\text{Area Below Average Light Output})}$$

As a reference point, incandescent lamps can have a percent flicker from the low single percentages up to the low teen percentages², and these products are generally considered to have no visible flicker.

The difference in perceptibility in these two metrics is one that is still being debated, but it is generally acknowledged that the perceptibility of both is dependent on the frequency at which the product operates.

To complicate the definition of what we perceive and describe as flicker, the detectability can be increased because of motion. The combined perception of flicker and motion has been described as a temporal lighting artifact. This motion can be the regular motion of our eye (a saccade), the motion of an object, or both. An example of this is LED car taillights. These appear to be very consistent when viewed at a stop, but during motion at night, there can appear to be multiple points of light per LED due to motion of the car and motion of the eye. One study suggests that object motion and eye movements can roughly double the frequency at

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Flicker: Explained

which flicker can be detected³. Thus, even at moderately low frequencies such as 120Hz, flicker is largely invisible to direct perception for most people, but there are individuals who are more sensitive, and this frequency is typically more visible with indirect or peripheral vision.

What Causes Flicker?

Regardless of the cause, all light sources have some degree of flicker. There are multiple causes of flicker, but they can all be traced back to the incoming power to the light source. Even incandescent lamps have some flicker due to the incoming line voltage.

Most sources will be powered by mains voltage with a sinusoidal 50Hz or 60Hz frequency, which is effectively doubled when light output is measured in all but the most rudimentary systems. Most efficient technologies, such as fluorescent and LED, cannot operate directly off mains voltage and require a ballast or driver to create the appropriate electrical conditions to operate, and they also add additional modifications to the frequency that reaches the light sources. The 100Hz or 120Hz base frequency is frequently passed along to some degree in ballasted or driven products, such as fluorescent or LED. A magnetically ballasted fluorescent or “AC type” LED⁴ typically keeps the doubled frequency for light output, and it will usually hit zero light output at some point in the cycle.

Electric light sources have different reaction times to changes in power conditions and will react differently to these variations. Some properties slow reaction time, such as the heating and cooling of an incandescent lamp’s filament or the persistence of some fluorescent phosphors, and they effectively smooth flicker to varying degrees. Most energy efficient technologies, such as modern triphosphor fluorescent lamps and phosphor converted white LEDs have very fast response times, which can transmit flicker from the power supply to visible light more readily.

Flicker issues were largely eliminated from fluorescent lighting with the shift to electronic ballasts that operated at 40kHz or more (which increased the efficiency of the fluorescent), but the issue of flicker has returned with LEDs.

There is a balance between size, cost and lifetime when designing drivers, and many LED drivers operate at lower frequencies or contain lower frequency components to the light wave that can cause perceptible flicker.

In addition to the device-level flicker, lighting system design can have an influence on the amount and type of flicker that is experienced. Methods of dimming can introduce additional flicker into the light output. Phase-cut type dimmers alter the incoming power to the lamp, driver or ballast, which will often alter the light frequency components coming out of the product. Some drivers and ballasts do a very good job of smoothing this, while others transfer more of the cut wave to the light output. A common method of dimming in LED drivers is pulse-width modulation, or rapidly changing the LED light output to make the light appear dimmer, but also introducing additional moderate frequency components (typically 400-800Hz).

What Problems Can Flicker Cause?

Flicker has the potential to cause physiological issues, which are largely dependent on the frequency.

According to IEEE 1789, patients with photosensitive epilepsy exhibit a response to flicker, but at lower frequencies than are typically encountered in lighting (from about 3Hz to 65Hz). This is in the range that would typically be visible to the human eye and would likely cause discomfort in non-photosensitive individuals.

Invisible flicker, those having moderately low frequencies of 100-200Hz, can be resolved by the eye and appear as a steady light source, but can cause headache and eyestrain in individuals sensitive to the flicker, or can cause reduced visual performance⁵. Frequency alone does not determine effect, and field of view and task at hand both play a role in how much flicker will impact a viewer.

While these potential problems exist, it is important to consider the situation and the amount of exposure. Flicker occurs naturally in many forms, such as reflections from water, candles and fires, and sunlight filtering through tree canopies.

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³ Fukuda (1979) Effect of eye movement on perception of flicker

⁴ LEDs do not operate directly on AC, but these products typically have a driver with fewer components than traditional LED drivers.

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Flicker: Explained

High flicker light sources have also been used in many situations without significant effect, such as outdoor street and area lighting.

Are There Standards or Test Methods for Flicker?

IEEE 1789

IEEE 1789: IEEE Recommended Practices for Modulating Current in High-Brightness LEDs for Mitigating Health Risks to Viewers is a document that attempts to describe the challenge of flicker, some potential health impacts, and recommendations for minimizing any risk of adverse effects. The document is not a standard, and the recommendations in the document are very conservative, to the point some incandescent lamps would not meet the requirements, but the recommendations can be useful in situations where minimal flicker is a requirement.

ENERGY STAR®

EPA's ENERGY STAR program introduced a frequency requirement many years ago with CFLs, but only recently, with Lamps V1.0, did they introduce any specific requirements for flicker. The recommended practice for flicker requires flicker index and percent flicker and requires testing with five different dimmers. There is not a specific requirement yet, but with the program gathering information, it is likely to introduce a flicker requirement in a future specification revision.

California Title 20 and Title 24

Shortly after ENERGY STAR released their recommended practices for measurement of flicker, California introduced their Joint Appendix 10 test method for flicker. This requirement is significant, as these are building and appliance standards, which are required by the state of California.

California's requirements include the test method "Joint Appendix 10" or JA10, which requires measuring the light output of a source or luminaire and dimmer for 2 seconds and then running the data through several complex calculations to evaluate flicker at multiple frequencies up

to 400Hz. Title 24 requires high efficacy sources to be "low flicker operation," which means the LED product will have less than 30% flicker at frequencies below 200Hz. This goes into effect in January 2017. Title 20 will cover LED lamps and also requires "low flicker operation," requiring that the lamps be paired with controls and tested.

Does UL have a service solution?

UL Verified Program

As a result of numerous inquiries and requests, UL has recently introduced a voluntary verification program that allows manufacturers to test their products and have a neutral, 3rd party verified claim of flicker performance. The UL verified mark will address low optical flicker (per IEEE 1789) and will include a packaging mark of "Low Optical Flicker Less Than x%"; it is currently being launched in the European market. While the European market is the primary target for the program, the testing is designed so it will also meet the testing requirements for ENERGY STAR® and California.

Where is Low Flicker Critical, and Where Isn't it?

Different situations require a different focus on flicker, largely based on location, historical experience, likely exposure time, and what sort of activities are taking place.

In an outdoor environment, such as street or area lighting, there is little documentation of flicker complaints, and having light sources with higher flicker in such situations may not have a negative impact. If the outdoor environment hosts evening sporting events, however, a low flicker light source should be considered to avoid stroboscopic effects on the field.

If the environment is indoors, consider what sorts of tasks are taking place. In an office or educational environment where individuals will be exposed for a length of time, and perhaps performing complex reading tasks, low flicker may have the benefit of reduced eye fatigue and may not negatively affect those who suffer migraines.

UL Activates Suzhou Lighting Energy Efficiency Laboratory to Assist China's Lighting Industry to Light up the World

(Suzhou, March 10, 2016) As the world's renowned leader undertaking safety science, UL has officially announced the opening of its Suzhou Lighting Energy Efficiency Laboratory in China with the aim of further enhancing UL "hard power" and providing more local services in terms of testing and certification for lighting energy efficiency to help customers confidently cope with different and complicated market access all over the world. Li Bingtao, Deputy Affiliate General Manager of UL CCIC, and Todd A. Straka, Business Development Director of Performance Testing Appliances, HVAC, & Lighting, along with more than 80 customers from local lighting industry, attended this grand opening.

Developed countries in Europe and the Americas have formulated incentive systems and policies to propel the development of the energy-saving and environmental protection industries. While looking back at China, energy and environment has also been the focus when pushing forward the strategy of "Made in China 2025." Against this backdrop, the lighting industry requires manufacturers to not only care about function and beauty of lighting products, but to also concentrate on energy-use efficiency. Li Bingtao, Deputy Affiliate General Manager of UL CCIC addressed this in his opening speech: "With the deepening strategy of Made in China 2025," all the lighting manufacturers have considered energy-saving and intelligence as necessary tools for them to upgrade and improve competitive power."

The establishment of Suzhou Lighting Energy Efficiency Laboratory reflects UL's service concept of delivering solutions in the constantly evolving world and forward-looking lighting industry trends. The purpose is to introduce customer-related energy efficiency services to China and to help customers realize a seamless link between product compliance and global access. "UL will lead the development of safety as always and will make efforts to expand its services to energy efficiency in order to meet customers' demands," said Todd A. Straka, Business Development Director of Performance Testing Appliances, HVAC, & Lighting.



At present, Suzhou Lighting Energy Efficiency Laboratory mainly covers two energy efficiency programs, namely ENERGY STAR® and DLC, to be able to provide tests of color, luminous efficiency, light distribution, etc. Meanwhile, tests like LM-79 and LM-82 which focus on lifetime of lamps and bulbs can also be conducted. In today's opening ceremony, lighting engineers from UL America and UL China both made presentations about energy efficiency trends and UL one-stop service of safety and energy efficiency in hopes of empowering customers to lead the industry and enter the market one step ahead of the competition.

In the future, UL Suzhou Lighting Energy Efficiency Laboratory will share responsibilities with the existing Suzhou Lighting Safety Laboratory to guarantee safety and energy efficiency for the lighting industry and safeguard lighting manufacturers in their global competition.

NOM-003-SCFI-2014 to Become Effective on May 27, 2016

Aurora Paguia / Senior Project Engineer

On May 28, 2015, the Official Gazette Diary published NOM-003-SCFI-2014 – "Electrical products – Safety Specification." This new requirement supersedes NOM-003-SCFI-2000 – "Electrical products – Safety Specification," effective date May 27, 2016.

Norma Oficial Mexicana (NOM) establishes safety characteristics and specifications that shall be met by electrical products (powered by public electrical power or other power sources, such as batteries, cells and self-generation, direct current and/or alternating current supply, with a rated voltage up to 1,000 V ac and up to 1,500 V dc) that are imported or marketed in the territory of the Mexican United States for the following specific sections:

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UL Mexico Becomes a Certification Office to Issue the NOM Mark for Energy Efficiency Standards

Aurora Paguia / Senior Project Engineer

In the past years, CONUEE (Mexican National Commission for the efficient use of energy) has developed the guidelines, actions and specific programs to:

- Mitigate climate change
- Strengthen economic competition in the energy efficiency market
- Gather and coordinate the efforts coming from different sectors

UL de Mexico in an effort to offer a more complete service portfolio has spent the last year working to expand the accreditation scope. Finally, we can announce that UL de Mexico has been accredited and approved in following Energy Efficiency Standards, since March 1, 2016.

The Standards accredited are:

- NOM-005-ENER-2012. Energy efficiency of household washing machines. Limits, test methods and labeling.
- NOM-015-ENER-2012. Energy efficiency of household refrigerators and freezers. Limits, test methods and labeling.
- NOM-022-ENER/SCFI-2014. Energy efficiency and user safety requirements for self-contained commercial refrigeration appliances. Limits, test methods and labeling.

In-country testing will be required.

With UL Mexico's newly accredited standards, UL can now offer a more complete service path for Mexico Market Access for the above mentioned products.

How UL can help

Our Global Market Access team can help you achieve compliance by identifying applicable requirements for your specific product or technology feature to comply with current regulations in safety, wireless, energy efficiency and energy consumption. **For more information, visit our Global Market Access website Global Market Access www.ul.com/gma or contact our experts at gma@ul.com.**

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NOM-003-SCFI-2014 to Become Effective on May 27, 2016

Section 1 – Wiring devices

Section 2 – Household electrical appliances

Section 3 – Electrical tools

- I. Hand-held motor operated tools
- II. Welding power sources

Section 4 – Distribution and control equipment

Section 5 – Luminaires

Section 6 – Seasonal and holiday decorative products

Section 7 – Electric toys

The product scope and exemptions of NOM-003-SCFI-2014 are similar to NOM-003-SCFI-2000, with some additional product types and some exemption modifications. The main changes affecting the certification process are:

- All products covered under the scope of Official Mexican Standard NOM-003-SCFI-2014, must comply with the safety requirements effective on May 27, 2016.
- Effective May 27, 2016, in-country testing will be required.

Note: All NOM -003 Certificates issued prior to May 27, 2016 will continue to be valid for one year from the issue date and allowed to be used for the commercialization and importation of products.

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Tradeshows

LFI – Lightfair International

April 26-28 – San Diego, CA

Booth#: 1921

Make sure to check out our sponsored seminar that will take place on April 27, 2016. Austin Gelder, UL Lighting Performance Technical Advisor, will be presenting this year. The seminar will review lighting performance testing overlap for the U.S. DOE, California Title 20 and 24, NRCAN, ENERGY STAR®, DLC, and Lighting Facts, and will provide strategies for optimizing the value of photometric and performance testing.

[For more details, click here.](#)

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NOM-003-SCFI-2014 to Become Effective on May 27, 2016

UL Mexico is working on the expansion of their accreditation to be on time in order to continue offering the service to their customers.

How UL can help

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Flicker: Explained

If the environment is industrial, the situation again warrants consideration. A warehouse where objects in motion are limited and the visual tasks are not as great may not need low flicker. A production facility with many moving pieces of machinery could be risky if the machinery and lighting modulation coincide to mask or alter the appearance of movement or if detailed assembly work is taking place.

If there are dimming controls of any kind, from a wall box dimmer to an automated daylight harvesting system, there is the potential for system mismatch and additional flicker introduction. A phase-cut wall box dimmer has the most potential for additional flicker, although other methods can introduce some flicker as well.

While the application-specific impacts of flicker have not been well studied, having knowledge of light source or luminaire flicker characteristics and using good practices to when considering the tasks of a space and selection of lighting may help avoid discomfort. This is particularly important for LED installations, which have the potential to operate for many years.

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