The LED lighting industry has experienced a tremendous growth over the past few years, and LEDs became one of the most popular solutions not only in illumination products but also in entertainment and medical equipment. Any manufacturer of LED lighting for consumer, industrial or commercial use wishing to market its products in North America or internationally has to meet the entry requirements set by the target markets. If your product involves LEDs and you are looking to expand the market, Electromagnetic Compatibility (EMC) testing is one of the compliance requisites to consider. This white paper provides an overview of primary EMC compliance requirements for LED lighting marketed in the European Union (EU) and North America.
EU EMC Compliance of Lighting Products

All electrical and electronic devices when placed on the market and/or taken into service in the EU need to meet the EMC requirements per the new EMC Directive 2014/30/EU. The new directive was published on March 29, 2014 and has been in effect since April 18, 2014. Manufacturers need to consult the following standards to determine the primary EMC compliance requirements for LED lighting:

- EN 55015:2013 defines emissions requirements;
- EN 61547:2009 determines immunity requirements;
- EN 61000-3-2 deals with the harmonics emitted by electric equipment;
- EN 61000-3-3 outlines the flicker requirements; and
- EN 62493:2010 states Electromagnetic Field (EMF) requirements.


Emissions Requirements per EN 55015:2013

The current version of EN 55015:2009 titled “Limits and Methods of Measurement of Radio Disturbance Characteristics of Electrical Lighting and Similar Equipment” (which includes A1 2007 and A2 2009 amendments) will no longer show conformity to the EMC directive after June 12, 2016. To maintain their CE mark certifications, both new and existing products will need to be evaluated to the 2013 version after this date. The standard allows no grandfathering.

Manufacturers should note the following significant technical changes in the 2013 version:

- LED light sources and luminaires are included;
- Test supply voltage and frequency requirements are clarified;
- Improvements are made to clause 5 relating to the application of the limits to various types of lighting equipment;
- Requirements for flashing type emergency lights using Xenon lamps are introduced;
- Requirements for neon and other advertising signs are introduced; and
- Requirements are clarified for radiated disturbances between 30Mhz and 300Mhz when operating frequency of the light source is below 100Hz.

The 2013 version of the standard covers the same lighting products as the 2009 edition:

- Battery-powered or AC mains powered lighting equipment used for illumination,
- The lighting part of multi-functional equipment, with illumination as one of the primary functions,
- Independent auxiliaries used exclusively with lighting equipment,
- Ultraviolet (UV) and infrared (IR) radiation equipment,
- Neon advertising signs,
- Street and flood lighting intended for outdoor use, and
- Transport lighting installed in buses and trains.

Excluded from the scope are lighting equipment operating in the ISM frequency bands and lighting equipment for aircraft and airports.

Immunity Testing per EN 61547:2009

Tests per EN 61547 measure the ability of electronic products to tolerate the influence of electrical energy conducted or radiated from other electronic products and electromagnetic phenomena. Immunity tests are conducted for product reliability purposes.

Lighting products that fall within the scope of the standard include battery-powered or AC mains powered lighting equipment used for illumination, independent auxiliaries
exclusively for use with lighting equipment, and UV and IR radiation equipment. Lighting equipment without active electronics is deemed to comply without testing.

Excluded from the standard scope are the following types of lighting products:

- Lighting equipment operating in the ISM frequency bands,
- Lighting equipment used in transport vehicles,
- Entertainment lighting control equipment for professional purposes, and
- Lighting devices built into other equipment.

**Harmonics Testing per EN 61000-3-2 and Flicker Testing per EN 61000-3-3**

In addition to the requirements of the above-mentioned product family standards, lighting products must meet the requirements for harmonics and flicker found correspondingly in EN 61000-3-2 and EN 61000-3-3. Growing use of electronic devices in a daily life has greatly increased the stress caused by harmonic currents on low-voltage AC public mains networks. EN 61000-3-2 was created to set levels for harmonic currents injected by loads back onto the network. EN 61000-3-2 replaces EN 60555-2 for the purpose of adding more practical rules and providing a clearer definition of equipment classes. EN 610003-3-3 standards address voltage fluctuations and flicker. Compliance with these standards ensures that voltage disturbances in the electrical distribution system do not interfere with other equipment connected to the AC mains or cause incandescent lights to flicker visibly to the degree that causes an annoyance or poses health risks to people.

**EMF Requirements per EN 62493**

EN 62493 applies to lighting equipment and defines requirements for human exposure to electromagnetic fields. This standard came into force on February 1, 2013, and the requirements are identical to those of IEC 62493:2009.

The scope of the standard includes lighting devices with illumination as their primary function as well as multi-functional equipment where illumination remains one of its primary purposes. That includes AC mains powered or battery-powered devices and indoor, outdoor and street lighting. Independent auxiliaries are also covered.

Excluded from the scope of EN 62493 are the following products:

- Lighting for aircraft and airports,
- Lighting for road vehicles,
- Lighting equipment for agricultural use,
- Lighting for boats and vessels, and
- Copiers and slide projectors.

Additionally, excluded from testing are lighting equipment without electronic control gear and all kinds of starters, igniters, switches and dimmers not considered to be control gear.

**EMC Requirements in the US and Canada**

In the US, lighting products must meet the requirements of FCC Part 15, Subpart B, either class “A” or “B” or FCC Part 18 depending on the application. The full text of the requirements is available with this link: [http://www.gpo.gov/fdsys/pkg/CFR-2010-title47-vol1/content-detail.html](http://www.gpo.gov/fdsys/pkg/CFR-2010-title47-vol1/content-detail.html). In Canada, lighting products must meet the requirements of ICES-003 or ICES-005 for RF lighting devices. Further information is available at [http://www.ic.gc.ca/eic/sitesmt-gst.nsf/eng/h_sf06127.html](http://www.ic.gc.ca/eic/sitesmt-gst.nsf/eng/h_sf06127.html).

**Why TÜV Rheinland?**

TÜV Rheinland, an organization with more than 140 years of testing and certification experience, has been testing lighting products for many years. The types of products covered include but are not limited to LED equipment and drivers, luminaires, self-ballasted lamps, low-voltage lighting systems, dimmers and controllers.
The company holds accreditations as a Nationally Recognized Testing Laboratory (NRTL) by OSHA, testing and certification organization by Standards Council of Canada (SCC), Electrical Laboratory by A2LA, CBTL by IECEE, and is a Certification Body under the ENERGY STAR. It tests lighting products for Product Safety, EMC/EMI, performance, energy efficiency, RoHS/REACH/WEEE and other sustainability requirements as well as to applicable wireless and international approval requirements.

TÜV Rheinland operates 16 lighting laboratories worldwide – six in the US, four in the EU, and six in Asia. The US laboratories are conveniently located on both coasts for the fast turn-around and reduced shipping costs. The organization also has a National Certification Body status in two countries and operates 10 CB test labs globally, helping customers achieve CB certificates quickly.

TÜV Rheinland enables you to comply with requirements necessary to access domestic and international markets and benefit from a quick turn-around time, regulatory expertise and one-stop service for all of your testing and certification needs. Talk to the experts about taking your product globally, including to Australia and New Zealand, China, EU, Japan, Korea, Mexico, Saudi Arabia and others.

TÜV Rheinland is a global leader in independent testing, inspection, and certification services, ensuring quality and safety for people, the environment and technology in nearly all aspects of life. The company maintains a presence in 550 locations spanning 69 countries and employs 20,000 people.

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