



What are the LED radiation safety requirements?

A: LED radiation safety requirements are generally contained in the ANSI RP-27 and IEC 62471 series of standards. These standards consider the photobiological (interaction of light on living beings) effects of radiation on the skin and eye. These standards contain requirements for classifying the LED radiation, labeling, user manual statements, etc.

How is a potential LED radiation hazard from a product conveyed?

A: When evaluated to the LED radiation safety standards, the LED radiation is assigned a Risk Group classification. There are four possible Risk Groups: Risk Group Exempt, Risk Group 1, Risk Group 2, and Risk Group 3. Risk Group Exempt is the least hazardous and Risk Group 3 is the most hazardous. The higher the Risk Group, the more safeguards you should expect to see on the product.

Is the radiation emitted by lamps also evaluated for photobiological effects?

A: Yes, lamps are also included in the ANSI RP-27 and IEC 62471 series of standards. They are evaluated in a similar manner as LEDs.

How are LED based image projectors checked for radiation safety?

A: A relatively new standard in the IEC 62471 series was just recently published in 2015: IEC 62471-5 – “Photobiological safety of lamps and lamp systems – Part 5: Image projectors”. This standard addresses radiation safety specifically from projectors incorporating LEDs and lamps, as well as laser-illuminated projectors that fulfill the requirements specified in IEC 60825-1 Ed. 3 (2014).

How is the Risk Group of LED radiation determined?

A: The Risk Group of LED radiation is determined by a series of irradiance and radiance measurements on the radiation. Once these irradiance and radiance values are measured, they are used in summation equations for comparison to various Exposure Limits defined in the standards. For example, there are Limits for hazards such as Ultraviolet (UV), Blue Light, Infrared, etc. Also, the standards consider some wavelengths to be more hazardous than others, so there are weighting factors applied to certain wavelengths in some cases. Each Risk Group (Exempt, 1, 2, and 3) has Limits for each of these various hazards. When it is determined that all of the measurement results fall below all Exposure Limits in a Risk Group, the radiation is then described as belonging to that particular Risk Group.



How do I know if the LED radiation emitted from a product is hazardous?

A: The LED radiation standards ANSI RP-27 and IEC 62471 series contain labeling requirements based on the Risk Group determined. Although IEC 62471 itself does not contain any labeling, a companion Technical Report IEC/TR 62471-2 (“Photobiological safety of lamps and lamp systems – Part 2: Guidance on manufacturing requirements relating to non-laser optical radiation safety”) does contain recommended labeling based on the Risk Group. The following table summarizes the Risk Groups:

LED RISK GROUP	DESCRIPTION
Exempt	The lamp/LED does not pose any photobiological hazard
1	The lamp/LED does not pose a hazard due to normal behavioral limitations on exposure
2	The lamp/LED does not pose a hazard due to the aversion response (head turn or eye blink for example) to very bright light sources or due to thermal discomfort
3	The lamp/LED may pose a hazard even for momentary or brief exposure

Is there a difference in how LEDs used for lighting are evaluated vs. LEDs used outside of lighting products?

A: Yes. For example, the IEC 62471 standard separates product types into two categories: General Lighting Service (GLS) and non-GLS. GLS products are those that typically illuminate spaces occupied by people, such as the lights in a school, home, or office. Non-GLS would be any other product, such as LED bar code imagers, cameras with infrared LEDs for night vision, etc. In IEC 62471, the measurement distances for these two product types can differ, with GLS products typically being assessed at the measurement distance at which the light produces 500lux (illuminance), and non-GLS products typically being assessed at 200mm distance. In addition, the lighting industry is moving toward a relatively newer set of photobiological requirements for lighting – the Technical Report IEC/TR 62778 – “Application of IEC 62471 for the assessment of blue light hazard to light sources and luminaires.” The IEC/TR 62778 is similar to IEC 62471, but it requires lighting products to also be assessed at 200mm, it concentrates on only the Blue Light hazard, and it has some slightly different processes for determining the Risk Group.

Can UL issue a Certified Body (CB) Test Certificate to IEC 62471?

A: Yes. As a National Certification Body (NCB), UL has IEC 62471 in its IECEE CB Scope, and has global locations that are Certified Body Testing Laboratories (CBTLs) for IEC 62471. This means that UL has been authorized by the IECEE to perform IEC 62471 testing, generate a CB Test Report, and issue a CB Test Certificate. A CB Test Certificate means that a CBTL has confirmed complete compliance with the standard.

