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Harmonizing Lamp- and Laser-illuminated Projector Regulations

***Disclaimer:** This document is for guidance purposes only. It does not contain legal advice and it is the responsibility of the LIP installer to research and review the applicable national, state and local laws and regulations and adhere to them when installing and operating the covered equipment.*

Recent updates in the IEC standardization for general electrical equipment have led to a change in how lamp-illuminated projectors are treated under these standards. This article explains the changes and impact in more detail.

Origins of LIPA and standardization history

Laser illuminated projectors (LIPs) didn't always exist. The first commercial projectors using lasers as an illumination source hit the market in the early 2000's. Given the benefits that the laser technology could bring (longevity and stability, improvements in colors, brightness and uniformity, lower electric consumption), soon there was an appetite from the industry to introduce LIPs for applications such as Digital Cinema, conference halls, visitor attractions, meeting rooms, education etc. The legislation however was not yet up to speed. Until as recently as 2014, LIPs had to be certified as laser devices according to the international standard IEC 60825-1 Ed.2 (colloquially called "the laser standard"). This, in effect, meant that LIPs would need to be treated as laser devices, with the corresponding long hazard distances and very strict precautions for use.

LIPA came into existence as a combined industry effort to rationalize these difficult requirements. A laser illuminated projector is not really a "laser device" in the typical sense. The light is spread out from the lens in the same way that it is for lamp projectors that have existed for more than 120 years. Yes, a laser illuminated projector does contain lasers inside, but they can be put safely behind interlocks and mechanical enclosure so that no one can be exposed to direct laser light, even if trying to open the compartment while the lasers are in use. So, with this combined LIPA effort, and maturing awareness among industry experts, the IEC standards have changed in a positive direction.

The first relevant standard to be adapted was IEC 60825-1 with edition 3 in 2014, which allowed LIPs to be “carved out” as a separate class of devices. This meant, if your LIP satisfied a certain condition known as the “exemption clause” (most of the times it did), you could go on and certify it under the lamp standard IEC 62471 series, and no longer treat it as a laser device by itself. Of course, the laser standard is still applicable to light inside the projector.

In 2015, an addition to the lamp standard was published, IEC 62471-5:2015 (Photobiological safety of Lamp Systems of Image Projectors), colloquially known as the “lamp standard” or “dash-five”. This standard set forward the rules under which a projector can be classified: as a Class 1 device, with an associated risk group (RG) – 1, 2 or 3, RG 3 being the highest risk group into which the brightest projectors would fall.



This standardization effort was a major achievement for the LIP industry, as LIPs could now be treated as projectors, and not as dangerous laser devices. In case of RG3 there are still precautions to be taken (separation distances to the hazard zone in front of the lens; employee training; labelling) but nothing as strict as that for a laser with the equivalent optical power.

It is worth noting that the “dash-five” standard does not mention “lasers” in the title. It is a standard for projectors in general, or its own words:

The scope of this part of IEC 62471 is photobiological safety of image projectors including the emissions from laser-illuminated projectors



How about lamp projectors?

After the introduction of the IEC 62471-5:2015 standard in 2015, any lamp-illuminated projector newly introduced to the market would in principle also fall under it. This means that every such projector would also need to have its risk group determined, and, were this to be RG3, have some installation “strings attached”. However, there was a workaround. The laser and lamp standards are only relevant for determining and managing the optical hazard. All electrical equipment designed for ITE applications (Information Technology Equipment, a class of devices into which projectors fall) first needed to be tested and certified according to a base safety standard IEC 60950-1. The latest revision of this standard dates from 2005, so it also didn’t explicitly call for projectors to also bear an RG classification based on optical performance (which was introduced in 2015).

After 2015, a manufacturer could have chosen to also evaluate a lamp projector under the “dash-five” lamp standard and associate a Risk Group when they introduced a new projector. In this time period however, most of the high brightness projectors that were introduced into the market were in fact laser illuminated projectors so it did not matter that much.

What is the current situation?

At the end of 2020, some regions in the world requested replacing the ITE equipment safety standard IEC 60950-1 by a new one – IEC 62368-1 Ed.2 when certifying equipment. This is where things have changed for lamp illuminated projectors.

This new safety standard has been harmonized with existing regulations for projectors. Very specifically, it requires that if the equipment under test is a lamp-based projector, that it also must be evaluated under the IEC 62471-5 standard (and hence have an associated risk group). And if it’s a laser illuminated projector, to be first evaluated under the IEC 60825-1 Ed.3 (“laser standard”) and if the “carve out” we previously discussed so allows, also under the IEC 62471-5. In practice all current LIPs satisfy the exit clause and are thus evaluated under the -5 standard.

Simply put, after December 20th 2020 if a manufacturer introduces a new Lamp projector to the market, it must be tested under the new standard and have a Risk Group associated to it.

This puts lamp and laser-illuminated projectors on an equal footing. After all, a big part of the argument for easing LIP regulations is that a LIP is no more dangerous than a lamp projector under the same optical conditions.



Regional differences

So far, so good. New standardization now calls for treating all projectors (lamp or laser-illuminated) in the same way, and if any projector is tested as RG3, it needs to be installed and operated in the same way.

However, as of the introduction of the new standard, there are some important regional differences.

- **EU:** In the EU, the regulating bodies have decided that the new ITE/AV equipment safety standard must apply to all equipment to be sold in the EU. This means that if a manufacturer wants to keep selling equipment that had been certified under the previous standard, it needs to be recertified under the new standard. If this happens to be a lamp projector, it needs to be recertified and receive an RG determination, possibly resulting in a RG3.
- **US:** In the US, the regulators do not request recertifying equipment still being sold. The new standard is only applied to newly introduced equipment – in our case new projector models that go through the certification process after December 20th 2020. Lamp illuminated projectors that have been brought to market previously, require no RG determination. A word of caution of course, this doesn't mean they are safer. The same argument and comparison with LIPs is also valid here.
- **Other regions:** other countries may or may not require the equipment to be certified according to the new standard. For example, China has not yet translated the new IEC standard into their own national legislation. For the time being the old IEC 60950 standard is still in effect in China. The situation may be similar in other countries that don't follow the CE or UL certification and have their own national 'translation' of international standards. Some countries do follow for example the CE marking, and thus will 'inherit' the rules set by the European regulators.

Summary

A breakthrough in the market acceptance of LIPs came in 2015, when, helped by LIPA's involvement, IEC standards and regulations positively changed to accept LIPs as projectors and not treat them as laser devices. Lamp-illuminated projectors had a 'loophole' in the regulations from that time until now. With the new international equipment testing standard, lamp projectors



are explicitly required to be treated on the same footing as LIPs, with a resulting risk group. Some regions like EU require recertification of all equipment sold there. Some others like the US don't require recertification – only application of the standard to newly introduced models. Other regions are likely to follow suit with the new standard, but whether they will require recertification or not, remains to be seen.

In practice, this means that European cinemas and venues that use lamp projectors must now take the necessary Risk Group 3 precautions (hazard distances, labelling etc). This might be seen as a step back and lack of a backup solution if the installation conditions don't allow for the safety distances to be respected. However, the argument has not changed. Whether a projector has a lamp or lasers as its illumination sources, the optical hazard principles are still the same, and under the same conditions they are equally hazardous. So, both from a regulatory as well as from a safety perspective, there is no difference and both projector types must be treated in the same way. No hazard zones are required if they are RG2 or lower, and an associated hazard zone and other precautions are required if they are RG3.

Standards Glossary

Standard	Description	Status
IEC 60950-1	“Information technology equipment: Safety’ The base product safety standard to respect when certifying ITE equipment.	In a withdrawal phase. Replaced by UL and CE certifying bodies by IEC 62368-1 as of December 20 th , 2020
IEC 62368-1:2018	Audio/video, information and communication technology equipment - Part 1: Safety requirements A newly introduced safety standard for ITE and AV equipment	Active but not yet adopted by all regions.
IEC 60825-1:2014 (Ed.3)	Safety of laser products - Part 1: Equipment classification and requirements Aka “The laser standard”. The starting point for LIPs, with an ‘exit clause’ to use the lamp standard	Active, applied to all laser equipment and LIPs.
IEC 62471-5:2015	Photobiological safety of lamps and lamp systems - Part 5: Image projectors	Active, applied to all LIPs and lamp illuminated projectors

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