

## Overview

Laser classification is subject to national and international standards, and has evolved in both areas over time. Originally based on purely on 'laser class', it has now moved on to 'laser class' and 'risk group' as descriptions of the hazards associated with this type of illumination.

An updated IEC standard has been introduced: IEC/EN 60825-1:2014. In addition, a new standard BS EN 62471 has been introduced to cover the photobiological effects of all light sources, including lasers, arc lamps, LEDs, etc. In particular, BS EN 62471-5:2015 covers the photobiological effects of lamps and lamps systems in projectors. BS EN 62471 has to be applied to all projectors manufactured in the EEC regardless of whether IEC 60825-1:2007 or IEC 60825-1:2014 is quoted.

IEC 60825-1:2014 is still a 'laser class' based standard specifically aimed at laser products. BS EN 62471 introduces the concept of 'risk groups' to indicate the potential hazard of light sources, since any light source may be used.

The risk group classes are described below:

Risk Group	Risk
Exempt	No photobiological hazard
1	No photobiological hazard under normal behavioural limitations
2	Does not pose a hazard due to aversion response or thermal discomfort
3	Hazardous

## Determining the Risk Group

The hazards considered are actinic ultraviolet, near-UV, retinal blue light, retinal thermal and infra-red eye, with associated limiting exposure times.



According to IEC 62471-5, the risk assessment of the projector light shall be carried out with the projector set to maximum brightness or maximum radiance emission. Projectors with non interchangeable lenses should be set so that the lens allows the maximum amount of brightness out of the lens. Projectors with interchangeable lenses should be tested at a throw ratio equal to 2.0:1. If 2.0:1 is not available, then the next higher ratio should be used.

To determine the risk group of projectors, the projection light shall be assessed at a distance of 1.0 m from the closest point of human access toward the light source (for instance, the front lens surface) along the axis of the light beam (see IEC 62471-5, 5.22). Manufacturers shall provide information concerning the hazard distance and necessary information on normal operation, maintenance and service to users through the labeling and the manual.

The hazard distance is the distance where accessible emission becomes equal to the RG2 AEL (accessible emission limit) for retinal thermal hazard where staring into the projection light from the projector within the hazard distance is considered as dangerous behavior.

Note there is no direct relationship between 'laser class' and 'risk group'. However, there is a link in that under section 4.4 of IEC 60825-1:2015, if the laser product is designed to function as a conventional lamp and satisfies defined wavelength, angular and output power limitations, the emission classification can be considered purely under BS EN 62471 in terms of 'risk groups'. The output is not considered as accessible laser radiation, and a 'laser class' 1 can be assigned with the associated 'risk group'. An additional requirement of BS EN 62471 is that a 'hazard distance' should be defined to indicate the distance beyond which the risk group is reduced to 2.

'Risk Group' and hazard distances are indicated on the product label with the appropriate standard. The hazard distance may be on the label or referenced in the product manual (see label on next page)



## Risk Group Guidance

The Risk Group rating is provided as a guide for system designers, integrators, and users to have safe guidelines in using our brightest projector products. Although one should always stay within the safety guidelines, our brightest projectors are still safer than staring at the sun or directly at a laser pointer.

For a comparison of just how bright is a 27,000 lumen projector versus the sun or versus a laser pointer shined directly into the eye.

- 27,000 lumen projector = radiance value of 2 MW/m<sup>2</sup>-sr
- The visible light of the Sun = 7 MW/m<sup>2</sup>-sr
- 5 mW laser pointer = 70 MW/m<sup>2</sup>-sr

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## Projectors and their Risk Groups

The table below displays which Risk Group category each projector falls into.

Projector	Brightness	Risk Group
E-Vision Laser 6110 WU	6,100 Lumens	2
E-Vision Laser 7010 WU	7,000 Lumens	2
E-Vision Laser 6500 II	6,500 Lumens	2
E-Vision Laser 8500	8,500 Lumens	2
E-Vision Laser 10K	10,000 Lumens	2
E-Vision Laser 9000	9,000 Lumens	2
E-Vision 9100	8,600 Lumens	2
E-Vision 8000i WU	7,600 Lumens	2 or 3, lens dependent
E-Vision 10000i WU	9,600 Lumens	2 or 3, lens dependent
E-Vision Laser 4K	7,500 Lumens / HC 4,700 Lumens	2
E-Vision Laser 11000 4K	10,500 Lumens	2
E-Vision Laser 13000	12,500 Lumens	3
E-Vision Laser 15000	15,000 Lumens	3
M-Vision Laser 18K	18,000 Lumens	3
M-Vision Laser 21000 II	21,000 Lumens	3
M-Vision 24000 WU	24,000 Lumens	3
M-Vision 27000 WU	27,000 Lumens	3
Titan 37000 WUXGA	37,000 Lumens	3
Titan 33000 4K-UHD	33,000 Lumens	3
Titan 47000 WUXGA	47,000 Lumens	3
Titan 41000 4K-UHD	41,000 Lumens	3
Satellite HIGHlite WUXGA	Up to 20,000 Lumens	3
Satellite HIGHlite 4K-UHD	Up to 9,000 Lumens	3
Satellite Titan WUXGA	Up to 30,000 Lumens	3
Satellite Titan 4K-UHD	Up to 26,000 Lumens / 29,000 Lumens at WUXGA	3
Satellite INSIGHT 120Hz 4K	Up to 40,000 Lumens	3
Satellite INSIGHT 320Hz MultiView	Up to 40,000 Lumens	3
INSIGHT 8K	Up to 37,000 Lumens	3

## More information

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