TPL VISION
Active LED solutions

TECH NOTE

PHOTOBIOLOGICAL SAFETY OF TPL VISION PRODUCTS

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At TPL Vision **we test our products to determine potential risks of exposure of the skin and eyes in application of European standard EN 62471: 2008**. The resulting risk group classification can be found in the user guide of each product. With this information, our customers can perform their own assessments, including workplace exposure for users and final product assessment for system integrators.

It is the duty of the customer to comply with product and workplace legislation as required. This includes EN 62471:2008, the UK Control of Artificial Optical Radiation at Work Regulations 2010, the EU artificial optical radiation directive 2006/25/EC and any local/other legislation.

OVERVIEW OF EN 62471

EN 62471:2008 provides a framework for the assessment of **six hazards** to the skin and eyes and classification into one of **four risk groups**:

- **RG0**: **no risk** – no hazard,
- **RG1**: **low risk** – no hazard under normal behaviour (no staring at the emitter),
- **RG2**: **medium risk** – no hazard due to aversion response to bright light or thermal discomfort,
- **RG3**: **high risk** – hazardous even for momentary exposure.

Hazard	Wavelength Range (nm)	Target Tissue
Actinic UV	200-400	Skin & front surfaces of eye
Near UV	315-400	Front surfaces of eye
Blue Light	300-700	Retina
Retinal Thermal	380-1400	Retina
IR Eye	780-3000	Front surfaces of eye
Thermal Skin	380-3000	Skin

EN 62471:2008 is the European implementation of **international standard IEC 62471:2006**. These standards are based on internationally agreed exposure limit values. It is expected that the analysis to EN 62471 is accepted throughout the world.

TESTS FOR EN 62471

Measurements of spectral irradiance and spectral radiance are performed at **200mm from the light source** under conditions of maximum optical emission in the direction of peak intensity, no shielding and no angle changers. The resulting values are compared with the accessible emission limits of each risk group to classify. The worst case is the final risk group.

- Irradiance accounts for light arriving from the entire hemisphere above the surface to assess hazards to the skin and front surfaces of the eye,
- Radiance accounts for the power collected by the eye to assess hazards to the retina.

Not considered in the photobiological safety assessment is glare which may be more of a concern. Glare is the impairment of vision experienced in viewing high brightness sources which can lead to accidents. The simple solution is to never **direct bright sources toward the viewer** and to pay attention to specular (mirror-like) surfaces in the setup. Rough (scattering) surfaces or black paint can be useful to minimise reflections.

RISK GROUP INTERPRETATION

A product classified **RG1** has a permissible exposure time (over an eight hour day) of at least 100s at the 200mm distance and that of **RG0** even longer. Exposure at this distance for such long periods is not commensurate with the application. We recommend that RG0 and RG1 sources need no further consideration.

For products classified **RG2**, permissible exposure times are shorter but exposure at 200mm remains unlikely ; we recommend confirming this in your application.

REAL WORLD INTERPRETATION

In practice, it is unlikely that humans will be as close to the source as 200 mm (other than perhaps a service engineer). The greater the distance from the emitter, the lower the risk but that depends on beam angle: the narrower the beam angle, the greater the distance required to reduce optical exposure.

Risk group classification refers to a single product. A risk group classification for retinal hazards (applicable to White, Blue 470 nm, Green 525 nm, Red 630 nm) cannot be increased. A risk group classification for skin/ front surface eye hazards (applicable to UV 365 nm, UV 385 nm, UV 405 nm) can be increased where multiple emitters converge on the same plane. If human exposure in these scenarios is foreseeable, we recommend re-assessing the setup to EN 62471.

RISK MITIGATION

TPL recommends these steps to minimise photobiological risk in accordance with **EN 62471**:

- Direct light sources away from personnel. Pay particular attention to UV and IR light sources which are not visible to the human eye,
- Distance light source from personnel,
- Employ enclosures or filters to shield personnel from light sources,
- Personnel should not stare directly at the light source for extended periods of time.

If these steps cannot be realised then **Personal Protective Equipment** such as **protective glasses** should be worn.

CONTACT US

For any questions regarding risk group classification, photobiological hazards and risk mitigation please contact TPL Vision via the **After Sales Enquiry Form** on the TPL Vision website.

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These recommendations have been verified by Pro-Lite Technology Ltd.

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