

INTERNATIONAL ELECTROTECHNICAL COMMISSION

---

**IEC 60825-1**  
Edition 3.0 2014-05

**SAFETY OF LASER PRODUCTS –**

**Part 1: Equipment classification and requirements**

**INTERPRETATION SHEET 2**

This interpretation sheet has been prepared by IEC technical committee 76: Optical radiation safety and laser equipment.

The text of this interpretation sheet is based on the following documents:

FDIS	Report on voting
76/588/FDIS	76/594/RVD

Full information on the voting for the approval of this interpretation sheet can be found in the report on voting indicated in the above table.

[IEC 60825-1:2014/ISH2:2017](https://standards.iteh.ai/catalog/standards/iec/be68126d-3288-4ee6-afea-cbd02cd89873/iec-60825-1-2014-ish2-2017)

<https://standards.iteh.ai/catalog/standards/iec/be68126d-3288-4ee6-afea-cbd02cd89873/iec-60825-1-2014-ish2-2017>

---

**Subclause 4.4 – Conventional lamp replacement**

*This subclause is clarified by the following:*

Subclause 4.4 introduces a criterion based on radiance, which is a quantity not normally determined for laser products. This interpretation sheet clarifies the determination of radiance and the radiance limit.

**Interpretation**

The angular subtense  $\alpha$  is determined based on the 50 % of the peak radiance (not averaged over an angle of acceptance larger than 1,5 mrad) of the apparent source, which is an equivalent criterion as given in IEC 62471:2006 and IEC 62471-5:2015. For inhomogeneous or multiple sources, the outer edge (defined by the 50 % level) of the apparent source profile is used to determine  $\alpha$  for the calculation of the radiance limit as well as for the limit regarding the minimum size of the apparent source, even if there are hotspots within the apparent source profile. Both the radiance as well as the angular subtense of the apparent source  $\alpha$  is determined at a distance of 200 mm from the closest point of human access.

NOTE The IEC 62471 series also uses the 50 % level outer edge of the source profile for determination of  $\alpha$  for the retinal thermal radiance limit.

The radiance limit ( $L_T$ ) specified in subclause 4.4 is not an AEL but merely a criterion to fulfil this subclause. To satisfy the limit does not imply that the emission of the product is necessarily considered “safe” or of any specific Risk Group under IEC 62471.

Although the accessible emission that complies with the definition of subclause 4.4 is excluded from classification under IEC 60825-1, the applicable requirements of IEC 60825-1 still apply (i.e. labels, engineering features, service, user information, etc.) and the product is classified as a laser product under IEC 60825-1, but excluding (i.e. “neglecting”) the light emission that falls under subclause 4.4 (usually, the product will be Class 1). For the case of classification as Class 1, contrary to a “normal” Class 1 laser product where placing the Class 1 label on the product is optional, for a product with light emission that is excluded under subclause 4.4, the Class 1 label is mandatory, additional to the label of the Risk Group according to the IEC 62471 series.

A laser based light module that, as a component, is intended to be sold to manufacturers of luminaires is not subject to IEC 60825-1 per the scope of this standard. However, the end product (i.e. the luminaire) is in the scope of IEC 60825-1, including subclause 4.4. A light module can, however, be classified based on the IEC 62471 series.

In order to exclude the emission, it is not a requirement that the emission is broadband; for example the emission can be multiple monochromatic bands or in some cases even monochromatic. Also there is no specific requirement with respect to the degree of coherence of the emission.

The conditions to determine the radiance that is compared to the radiance limit ( $L_T$ ) are clarified by the following:

- a) The un-weighted maximum radiance (i.e. for pulsed or scanned emission, the temporal peak radiance during the pulse or the scan across the stationary aperture, respectively) is averaged over an acceptance angle of 5 mrad and is determined at 200 mm from the closest point of human access.
- b) If the radiance criterion is applied to beams with diameters less than 7 mm at 200 mm, the diameter of the averaging aperture stop at the imaging system for the determination of radiance is 1 mm.
- c) It is necessary to consider maximum emissions (as described in 5.2 b)) during normal operation and maintenance as well as reasonably foreseeable single fault conditions. For example, a diffusing element failure could result in exceeding the radiance criterion described in subclause 4.4.
- d) When laser and non-laser (incoherent) radiation are coincident within the same retinal location (i.e. emitting from within the specified angle of acceptance), both laser and non-laser (incoherent) radiation must be included. Emissions that are excluded for laser classification are included for the determination of a Risk Group (RG) under the applicable IEC 62471 standard.

Item d) also clarifies subclause 4.3 b) and with respect to intended non-laser radiation takes precedence over 5.2 f). This means that if subclause 4.4 is not applied and the emission is classified under the laser standard, both laser and non-laser emissions are included.