

ICS 31.260

CCS L 51



**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

GB 7247.1-2012

Replacing GB 7247.1-2001

**Safety of laser products - Part 1: Equipment classification and
requirements**

激光产品的安全 第1部分：设备分类、要求

Issued on: December 31, 2012

Implemented on: December 25, 2013

**Issued by: State Administration for Market Regulation;
Standardization Administration of the PRC**

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1 Scope

The part applies to the safety of laser radiation from laser products whose emission lies in the wavelength range from 180 nm to 1 mm.

A laser product may be a single laser with or without a separate power supply, or a complex optical, electrical or mechanical system fitted with one or more lasers. Laser products are used for the demonstration of physical and optical phenomena, for material processing, for data reading and storage, and for the transmission and display of information; systems of this kind are already used in industry, commerce, entertainment, research, education, medicine and consumer products.

Laser products sold to other manufacturers for use as system components need not comply with the part, because the end product itself will be subject to it. If, however, the laser

system inside a laser product is operable equipment once separated from the equipment, the unit that has been removed shall meet the requirements of the part. Note 1 adds that operable equipment needs no tools to be made ready for operation.

Where a manufacturer produces laser products classified in accordance with Clause 3, Clause 8 and Clause 9, the requirements of the part need not be considered, the emission level of the laser product under all conditions of operation, maintenance, service and failure not exceeding the accessible emission limit of Class 1. The acronym is printed at this point as "ALE", whereas 3.3 and the rest of the text use "AEL". Note 2 states that the exemption above is meant to keep laser products that are inherently safe free from the constraints of the standard.

Besides the hazards caused by laser radiation, laser equipment can cause other injuries, such as fire and electric shock. Note 3 restricts the classification and the other requirements of the part to the hazard that laser radiation presents to the eyes and the skin; other hazards are not included in its scope.

The part states minimum requirements. Compliance with it may still not be enough to reach the required level of product safety: a laser product has to satisfy the performance and test requirements of the corresponding product safety standard. Note 4 observes that other standards may carry further requirements and that the intended application and the user group are to be considered - a Class 3B or Class 4 laser product, for instance, is not suitable for use as a consumer product.

If a laser system forms part of an equipment, the equipment has to comply with the other IEC product safety standards, such as those for medical equipment (IEC 60601-2-22), information technology equipment (IEC 60950), audio and video equipment (IEC 60065), equipment used in hazardous environments (IEC 60079) and electronic toys (IEC 62115). Under the terms of IEC Guide 104, cited in a footnote as IEC Guide 104:1997 on the preparation of safety publications and the use of basic safety publications and group safety publications, the part applies to the hazards caused by laser radiation. Where no applicable product safety standard exists, IEC 61010-1 is to be used.

In earlier editions LEDs (light-emitting diodes) were within the scope of IEC 60825-1, and they are still included in other parts of the IEC 60825 series. With the development of lamp safety standards, however, the optical radiation safety of LEDs is generally better laid down in a lamp safety standard. Removing LEDs from the scope of the part does not prevent other standards from including LEDs where laser products are concerned. CIE S009 may be used to determine the hazard classification of an LED or of a product that contains one or more LEDs.

The MPE (maximum permissible exposure) values of the part apply to laser radiation only and not to accompanying radiation; where an operation involves accessible hazardous accompanying radiation, the MPE values for laser radiation may be used to make a prudent

assessment of that potential hazard. MPE values do not apply to laser exposure used on patients for medical treatment or for cosmetic purposes on the human body. Note 5 presents Annex A to Annex G as general guidance with many typical examples, to be taken as reference material for the corresponding clauses of the part rather than as definitive or exhaustive.

The stated purposes of the part are: to introduce a system that classifies lasers and laser products by the degree of hazard of their optical radiation, so as to help in hazard assessment and to help users determine control measures; to establish requirements on the manufacturer to supply information, so that proper precautions can be taken; to make sure, through labelling and instructions, that warning can be given of the various hazards associated with the accessible radiation of laser products; and to reduce the possibility of injury by minimizing unnecessary accessible radiation and by improving the control of laser radiation hazards through protective measures.

2 Normative references

The documents listed are indispensable for the application of the document. For dated references, only the edition cited applies; for undated references, the latest edition, including all amendments, applies.

Three documents are cited: IEC 60050-845:1987, International Electrotechnical Vocabulary (IEV) - Chapter 845: Lighting; IEC 60601-2-22, Medical electrical equipment - Part 2: Particular requirements for the safety of diagnostic and therapeutic laser equipment; and IEC 61010-1, Safety requirements for electrical equipment for measurement, control, and laboratory use - Part 1: General requirements.

3 Terms and definitions

The terms and definitions given in IEC 60050-845 and the ones below apply to the document; for convenience, some of the terms and definitions of IEC 60050-845 are repeated here.

A note explains that all definitions are arranged in the alphabetical order of the English terms. Where a definition departs from IEC 60050-845 the difference is marked, and in that case the reference is placed in brackets with the wording "modified", following the explanation given in the corresponding part of IEC 60050-845.

3.1 access panel: the part of a protective housing or protective enclosure that, when removed or displaced, gives a path to laser radiation.

3.2 accessible emission: the radiant quantity determined in accordance with Clause 9 at a given position, using an aperture stop (with the AEL in watts or joules) or a limiting aperture (with the AEL in watts per square metre or joules per square metre). As provided in definition 3.37, accessible emission is determined only where persons can gain access. To