

Laser protection in the medial range

LASERVISION, Germany

Life Energy Light—Lasers are the future in medicine as well, but require special protective measures

In 1960, Theodor Maiman built the first apparatus, which used the principle of "Light Amplification by Stimulated Emission of Radiation". A principle that allows light to be bundled so that tattoos can be removed; skin can be cut or treated with the help of photodynamic therapy. According to recent research, the laser is even used in the context of cancer therapy. With the growing application of laser technology, adequate laser protection becomes more and more important.



Danger due to laser radiation

This advanced laser technology has specific dangers that must be considered. The greatest danger is the accidental, unintentional irradiation of humans. In particular, the eyes are at risk because they react much more sensitive to light and there is a risk of irreversible blindness even when looking into a laser beam with low power. When we consider that 90 per cent of our perception works through the eyes, this is an unlikely event that must be avoided. This has also been recognised by the legislator and therefore regulations have been drawn up at EU level to prevent accidents involving lasers. To understand why you need to be protected from laser radiation, let's take a quick tour of the basics, hazards and norms.

Classification in laser classes

First, the manufacturer of a laser device recommends classification according to DIN EN 60825-1:2008-05. The classification of laser devices in different laser classes described therein is intended to make the potential danger immediately recognisable for the user, so that he can easily estimate which protective measures are necessary. The assignment is selected in such a way that as the number of the class increases, the risk becomes greater, which is why the protective measures are becoming more extensive. The limits of accessible emission (AEL) for the individual classes are chosen so that the maximum permissible exposure values (MPE) with respect to the respective time base for class 1 are not exceeded. Most devices used in medicine are class 3 or 4 lasers, the two highest laser classes.

Protection against laser radiation

There are currently two limit values in Germany that must be complied with—those in accordance with the accident prevention regulations (MPE values) and those of the OStrV (Occupational Safety and Health Ordinance on Artificial Optical Radiation). The exposure values according to OStrV can be determined by formulas and depend i.a. on the wavelength and duration of the irradiation. The results are to be compared with the corresponding limit values. There are tables for this which can be viewed in OStrV. Based on these results, the appropriate precautions can now be decided. The precautions result from the risk assessment of the OStrV in which first the danger area must be determined. Afterwards is has to be considered how this danger area can be reduced by structural/technical measures. Nevertheless, if it is unavoidable that employees must be present within the laser danger area, personal protective equipment—eye protection—must be used. The following should be noted:



– All persons who are in the laser area during laser operation must wear laser safety goggles that are designed to mitigate the harmful radiation of that specific laser—all laser safety eyewear MUST be matched to the wavelength of the device.
– Each user of a laser safety goggles must ensure that the goggles do not show any changes (cracks, changes in colour, etc.) that could impair the protection before use. Such errors must be reported immediately to the laser safety officer.

The new occupational health and safety ordinance stipulates that, as of laser class 3, an expert laser safety officer must be appointed in written form. The laser safety officer shall be considered competent if he has acquired, sufficient knowledge of the lasers which are used and is thus fully informed of the effect of the laser radiation, the protective measures and protective provisions, so that he can arrange the necessary precautions. The laser safety officer must have successfully taken part in a course to gain the expertise and has to prove this (see OStrV). More detailed information on eye protection against laser radiation (laser goggles) may e.g. also from DIN EN 207 (standard for eye protection products against laser radiation) or obtained from the manufacturers of the protective products.

In addition to laser safety goggles, all laser protection devices in the hospital, a doctor's office or in the operating room generally have to be carefully selected due to the high risk potential of the laser. In addition to the most commonly used goggles against laser radiation, this also applies, to adding laser protection of existing windows with laser-safe curtains, roller blinds or additional screens for shielding the laser radiation. The user, the purchaser and the laser safety officer can therefore only be strongly recommended to make use of the know-how and the experience of the providers as early as possible in the early planning phase in order to be able to realise a safe and cost-effective laser protection solution.

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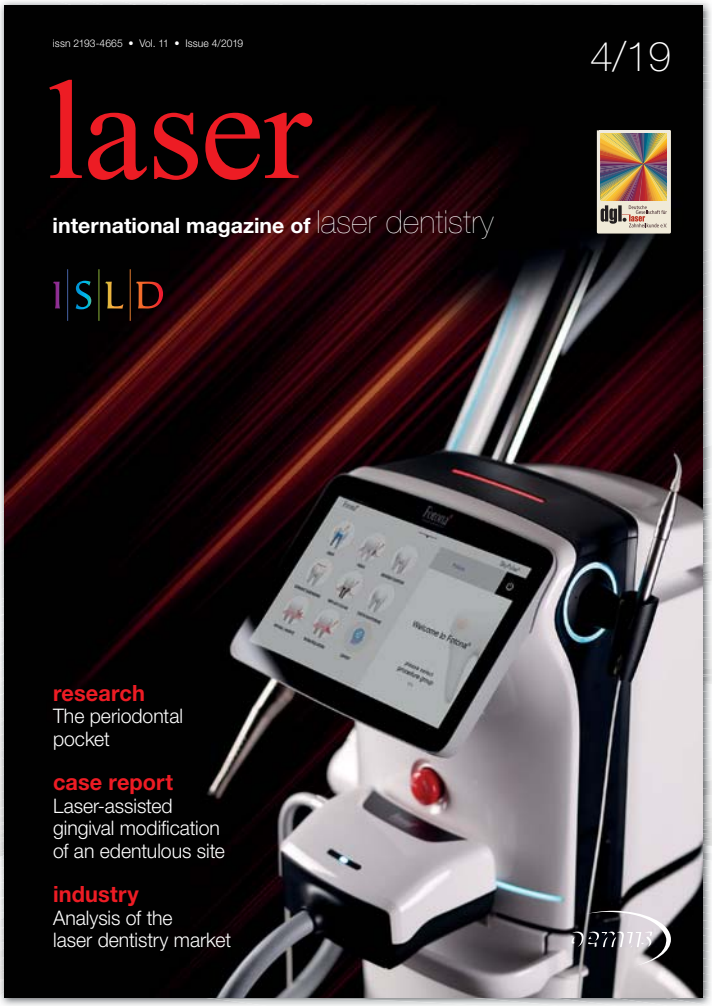
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