

# Factsheet

## Laser systems

The operation of laser systems is subject to approval, and Messe Frankfurt Venue GmbH, Technical Event Management, must be notified in writing ("Registering a laser system" form) of the use of such devices at least six weeks before the start of the set-up period. In addition, the Darmstadt Regional Council [Regierungspräsidium Darmstadt] must also be informed thereof.

Regierungspräsidium Darmstadt [Darmstadt Regional Council]  
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In the event that your laser/LED equipment, during normal operation and/or during the set-up phase, corresponds to Class 3R, 3B or 4 in accordance with DIN EN 60825-1, you must have a trained laser protection advisor pursuant to IEC/EN 60825 and/or 2006/25/EG/OStrV (national) at your stand. Please include a copy of the certification of the laser protection advisor with your registration, along with a copy of the necessary certification/classification of the laser system from an independent testing institute (e.g. TÜV, BG-Zert, VDE, BSI, UL, FDA).

- General: Laser systems in accordance with DIN EN 60825-1 generate extremely intense radiation that is concentrated to create a high energy density using optical systems. Even at great distances, the decline in energy density is very small. If laser radiation strikes human eyes, it can result in irreparable damage to the retina. Improper handling can also result in skin burns. As a result, the following must be observed when setting up lasers and LED equipment at trade fairs, exhibitions and shows:
- Only those lasers that emit visible light (wavelength from 400 to 700 nm) can be used. The output power must be limited to that which is required for the use in question.

Class	Output power	Basic concept	Comments	Authorisation required
1	< 25 µW	Eye-safe; the accessible laser radiation is harmless or the laser is located in a closed housing	No additional protective equipment is required	
1M	< 25 µW	Eye-safe; the accessible laser radiation is harmless, as long as no optical instruments such as magnifying glasses or binoculars are used	No additional protective equipment is required, as long as no optical instruments are used	
2	≤ 1 mW	Eye-safe under certain conditions; the accessible laser radiation lies solely in the visible spectral range (from 400 to 700 nm). It is also eye-safe if exposure is brief (up to 0.25 s)	No additional protective equipment is required	
2M	≤ 1 mW	Eye-safe under certain conditions; as with Class 2, as long as no optical instruments such as magnifying glasses or binoculars are used	No additional protective equipment is required, as long as no optical instruments are used	
3R	1 to 5 mW	The accessible laser radiation is dangerous for eyes	Poses a danger to eyes, protective goggles are recommended	X
3B	5 to 500 mW	The accessible laser radiation is dangerous for eyes, and in some circumstances for the skin as well. Diffuse/scattered light is generally harmless. (lasers in CD/DVD burners; laser radiation is not directly accessible, however)	Poses a danger to eyes and potentially to the skin, protective goggles are required	X

Class	Output power	Basic concept	Comments	Authorisation required
4	> 500 mW	The accessible laser radiation is very dangerous for eyes, and is dangerous for the skin as well. Diffuse/scattered radiation can also be dangerous. The use of this laser radiation can pose a danger of fire or explosion. (material processing, research lasers)	Personal protective equipment is required (goggles, shielding)	X

- Laser systems must be assigned to a class (1-4) in accordance with DIN EN 60825-1/11.01 and must be labelled accordingly.
- Laser systems must satisfy the requirements of the German Product Safety Act [ProdSG] and generally recognised engineering standards. The operation of laser systems must be in compliance with the requirements of the German occupational health and safety regulations on artificial optical radiation 2006/25/EG/OStrV, Technical Rules for Laser Radiation [TROS Laserstrahlung], DIN EN 60825-1 and DIN EN 12254; show lasers must also meet the requirements of DIN 56912.
- The operation of Class 3R, 3B or 4 laser systems at stands is only permitted if they have been inspected by a publicly appointed and sworn authority before the start of the trade fair and certified as safe. In the event that the exhibitor is unable to produce this certification, Messe Frankfurt reserves the right to have this inspection conducted at the expense of the exhibitor or to prohibit the operation of these systems.
- If lasers of class 3A to 4 are used, optical installations must be employed to widen the beam such that it is reduced to a harmless power density in all areas where people are present. Otherwise, it must be located at least 2.7 metres above the floor. Laser beams can only be used if the beams have been widened such that the energy of the direct or reflected beam anywhere within the room would not generate a temperature over 80 °C even with extended exposure. Furthermore, a laser protection advisor must be present on location at all times.
- In the event that it is not possible to comply with these requirements, the following protective measures must be taken:
 

Fixed installations are to be used to direct the laser beam such that people cannot enter the beam area. In addition, radiation reflected either intentionally or unintentionally from reflective surfaces (mirrors, metal surfaces, glasses, bottles) cannot be directed at areas in which people are present. If this possibility cannot be excluded or if it is accepted that this may happen during demonstrations, then the people thus affected must be given suitable certified protective goggles.

When they are being used to create lighting effects for shows and other such events, no people are permitted in the projection area of the laser. This also applies to areas through which the laser beam may pass as a result of reflection equipment. No focusing facilities are permitted in the laser area. The unintentional straying or deflection of the laser beam is to be prevented by the use of non-flammable barriers.
- Laser systems must be shielded such that only the useful beam is emitted.
- Laser systems must be set up such that they are stable and secured against shifting out of position.
- Optical equipment, deflector devices, scanners etc. must be secured against falling or being moved unintentionally. The applicable rules and regulations of event engineering must be observed.
- Optical equipment that is intended for use with the lasers but which is not directly attached to the laser system must include information that makes it possible to assess the changes in the beam data.
- The adjustment of the laser system must be tested before every demonstration. If it is determined that the system is out of adjustment, the system must be taken out of operation immediately and repaired by an expert.
- It must be ensured that unauthorised individuals cannot access the laser systems, operating consoles and other control facilities or accidentally activate these (emergency-off switch with key).
- The operating personnel must be able to view the laser's entire area of action.
- Laser pointers that are designated "IIa", "IIIA", or "3A" in accordance with the US-American ANSI/CDRH regulations do not correspond to the applicable EN 60825-1 and cannot be used.

Messe Frankfurt can intervene in the event that these rules are violated and may demand that the systems be deactivated.

If you have any questions, please do not hesitate to contact us.

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You can download our Technical Guidelines from the Messe Frankfurt website:  
<https://www.messefrankfurt.com/frankfurt/en/services.html>