

20th June 2017

Avoid direct laser scanning of audiences

Recommendations from Nordic radiation safety authorities

Exposure of audiences to direct beams or scanning effects from high-powered lasers should always be avoided. This kind of exposure during laser displays and shows is called “direct audience scanning”. It risks causing eye injuries among audiences in the case of an accident or neglectful use.

Exposure of audiences to laser radiation using optical elements that spread the laser beams, such as diffractive mirrors or diffraction gratings, implies almost as high a risk as direct audience scanning. Such planned exposure should be verified by performing measurements in advance. No exposure of audiences may exceed the Maximum Permissible Exposure (MPE) of the eye.

Rationale of these recommendations

Nordic radiation safety authorities emphasize that exposure of audiences to beams or scanning effects from high-powered lasers, i.e. lasers of classes 3B or 4, involves high risks. The output from such lasers is powerful enough to cause exposures that far exceed limit values. During direct laser scanning, detrimental exposures could be merely a single fault away: a fault that might be caused by a technical error, human error or even poor planning. Although it is possible to safely use laser light effects that intentionally expose audiences, it is the shared experience of Nordic radiation safety authorities that, in practice, some safety details are too often overlooked.

Good practices

Avoid exposing audiences to laser radiation from high-powered lasers. Make sure that you follow these key steps as a minimum when planning for exposing audiences to laser radiation:

1. Use continuous wave lasers only. Never use pulsed lasers when exposing audiences.
2. Use an accurate meter to check the intensity of the static beam(s). This intensity should normally be limited to 2.55 mW/cm². Alternatively, the power through a 7 mm diameter aperture should normally be limited to 1 mW.
3. Perform measurements before each show at the spot(s) where the audience might be exposed to the most intense laser beams. This is to confirm that the MPE of the eye is not exceeded.

Laser personnel should always make preparations so that they can deal with possible faults that might arise. Other technical measures can be taken to improve the level of safety, for example by using beam expanders and automatic power reduction techniques. However, such measures **do not** exclude the need to perform measurements.

All of the above safety precautions should be documented and made readily accessible for checking by local and national government authorities.