

Summary of Class 4 Laser Laboratory Design Guidance

This document is intended to provide general design and engineering guidance for the development and installation of safety controls in laboratories containing Class 4 laser systems. This Design Guide does not apply to clinical use settings. The responsible Principal Laser Users for each Class 4 system should incorporate as many of these design features as appropriate/applicable into their laboratories, or work with the Laser Safety Manager to achieve the same level of protection with alternate control measures.

1. Illuminated “Laser On” warning sign, posted at each entrance to the laser laboratory, that is activated when the laser tube is energized
2. Curtained entryway enclosure [unless a non-defeatable (cannot be bypassed) interlock tied to beam shutters as described below is installed] composed of fabric sufficiently fire-resistant to prevent combustion when hit by the enclosed laser beam, at the primary entrance to the laser lab; arranged such that, when closed, it fully protects the doorway from stray beams that might otherwise be transmitted out the door
3. Protective eyewear station inside the lab near the main entrance, and the within the curtained enclosure (item 2) if so equipped, so that personnel may put on appropriate protective eyewear before proceeding into the Class 4 laser area
4. Laser-resistant beam shutter that blocks the laser beam, activated:
 - Manually as needed by laser operators,
 - If any emergency “Beam Off” button (item 6) is depressed
 - Automatically upon electrical power failure, and
 - Automatically upon opening any of the interlocks described in item 5.
5. Interlock on Entry Door(s) wired to activate the shutter described in item 4 (and requiring manual reset once activated) upon opening of the door into the laser use area; those doors without a curtained entryway enclosure (item 2) must be equipped with a non-defeatable interlock system, while doors protected by a curtained enclosure must have either a non-defeatable or a defeatable interlock system (i.e. bypass switch allows trained individuals to temporarily bypass the interlock when entering or exiting).
6. Emergency “Beam Off” buttons which activate the beam shutter described in item 4; one button located within curtained enclosure (item 2), another at an easily accessible point within the laboratory
7. Emergency “Power Off” button (for laboratories containing high voltage or high current devices) which cuts electrical service to high power equipment in case of electrical emergency; located at an easily accessible point within the laboratory

References

¹American National Standards Institute, Z136.1-2000 American National Standard for the Safe Use of Lasers (American National Standards Institute, New York, 2000).

²Occupational Safety and Health Administration. OSHA Instruction Publication 8-1.7: *Guidelines for Laser Safety and Hazard Assessment*. August 15, 1991.

³NC State University Environmental Health & Public Safety Center, Design specifications for Class IV laser laboratories. On line: available at: www2.ncsu.edu/ehs/laser/index.htm