# **National Institutes of Health (NIH) Laser Safety Program**

# **Appendix B: General Laser Safety Standard Operating Procedures (SOP)**

## Laser Background Information

### Laser Classification:

* Is identified in the manufacturer’s operations manual
* Must be labeled on the laser system
* Contact the manufacturer for information and specifications if you cannot find specific information

### Beam Paths:

* Open beam path - There are several specific application areas where high power (Class 3b and Class 4) lasers are used in an unenclosed beam condition. Examples include open industrial processing systems (often incorporating robotic delivery), laser research laboratory installations, and surgical installations.
* Partially enclosed beam path- It is becoming an accepted work practice to build an enclosure that completely surrounds the laser-focusing optics and the immediate area of the workstation. A computer-controlled positioning table is often located within this enclosure. The design allows a gap of less than one quarter of an inch between the bottom of the enclosure and the top of the material to be laser processed. This design allows the laser delivery optics to remain stationary while enabling the part that is going to be cut or welded to move.
* Enclosed beam path- Perhaps the most common form of a Class I laser system is a high-power laser that has been totally enclosed (embedded) inside a protective enclosure equipped with appropriate interlocks and/or labels on all removable panels or access doors. Beam access is prevented during operation and maintenance.
* If protective enclosure is removed for alignment/turning, the laser class reverts to the laser’s classification without the enclosure. For example, a class 3b laser with a complete enclosure is a class 1 laser. However, when the protective housing is removed, the laser is classified as a class 3b laser.

### Examples of Non Beam Hazard:

* Electrical and fire hazards, reflective surfaces, laser-generated air contaminants, and explosion hazards

### Maintenance

* Laser equipment will be maintained in accordance with the manufacturer’s recommended procedures. System safety devices will be tested and documented. Accurate records will be kept of tests, calibrations, adjustments, and repairs done. The door interlock will be checked quarterly and a record kept.

### Emergency Procedures

* Authorized laser users will be familiar with the NIH occupant evacuation plan, location of emergency equipment, and emergency procedures for fires, and evacuations. Emergency shut-off procedures for lasers consist of shutting off the electrical power to the laser system. The main electrical shut-off switches to the laser should be labeled.

### Annual Review Schedule

* If new hazards have been introduced into the existing SOP than a full review of operations and potential hazards will be required. If no changes other than users have been made (an update of the users list will be sent to LSO) the existing SOP will be considered valid. Concurrence of the LSO shall be obtained.

## SOP Template

Principle Investigators are required to use the example outline below to develop an SOP for the use of class 3b and 4 lasers. The SOP will detail alignment, operation and maintenance procedures for each laser. Site and/or procedure specific non-beam hazards and their appropriate controls should be noted.

### **General**

 Lasers should only be operated by authorized personnel who have received proper training for the operation of the laser within the last year by DOHS or an approved alternative training source

 Laser users should periodically read and always follow the SOP

**Information**

Lab Manager (Last name, first name):

IC:

Principal Investigator (Last name, first name):

Campus/Building/Room:

Phone number:

DOHS Laser Identification number(s):

**Description of Activity**

Medical  Research Type of research:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Ongoing  Limited period of time Specify:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Step-by-step procedures for laser system use during research protocol:

**Laser System**

Individual laser  Commercially embedded laser system  Custom-built laser system

**Beam Characteristics**

Path:  Open  Fully enclosed  Partially enclosed

Beam between sitting and standing height

**Alignment**

Completed through a service provider:  Yes  No

Done in house:  Yes  No

If done in house, additional safety procedures established:  Yes  No

Step-by-step procedures (if done in house):

**Laser Controls**

Windows covered where applicable

Only anodized, dull, non-reflective or matte finished instruments used near laser site

Watches and reflective jewelry removed or covered prior to operating the laser

Grounded

Rapid egress paths established

Protective housing

Complete enclosure

Restricted room access

Barriers, curtains, beam stops, etc.

Key control (On/off switch, class 4 only)

Laser key returned to secure storage when the laser is not in use

Fail-safe interlock

Safety latch

Fire extinguisher available

**Warning Signs and Labels**

Warning system type(s):  Audible  Light  Verbal

Warning signs posted on all entrances to laser room

Emergency contact information located on door signage

**Laser Protective Eyewear**

Clean and without scratches

Store in case when not in use

Marked with appropriate wavelengths and optical density

Confirm optical density on LIA website: <https://www.lia.org/evaluator/od.php>

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Number of pairs | Location (Building/Room) | Manufacturer | Optical Density | Wavelength(s) |
|  |  |  |  |  |