University of Victoria

**Occupational Health, Safety and Environment: Laser Safety**

Laser Safe Operating Procedure (LSOP # XXX)

Title of Procedure

**Last revised: dd mmm yyyy**

# Revision History

|  |  |  |  |
| --- | --- | --- | --- |
|  | *Revision Date* | *Author* | *Position* |
|  | DD-MMM-YYYY | Author’s name | e.g. Research assistant / PhD candidate / PI |

# DOCUMENT REVIEW

*Reviewed by*: Document was reviewed by LSO

*Review Signature Date Reviewed*

# Document Approval

*Approved by*: Document was approved by (e.g. Dept. Chair / Supervisor)

*Approval Signature Date Approved*

**INSTRUCTIONS**

**Remember that an SOP simply documents steps taken every day to perform a task (and does not have to be fancy). It should be accurate, easy to access, and contain locations for additional information, if needed.**

**Replace or remove text in grey italics (if replaced, change font colour to black). The grey text explains the rationale or content for populating the SOP. Delete this introduction as well.**

**This guideline is organized to start with the daily, normal operating procedures followed by emergency procedures. This organization allows for these two pages to be copied and attached to the lasers, if necessary, to provide laboratory personnel a handy guide. Addition of pictures are encouraged**

**Ensure the latest procedures are always posted by using the Revision History above.**

# **Purpose**

*State the purpose of the Laser Safety Procedure – include name, model &, serial # class of the laser system.*

# **Training**

The following training is require to be completed prior to working with lasers:

* [WHMIS](https://www.uvic.ca/ohse/training/research-safety/laboratory-safety/index.php#acc-laboratory-safety-for-lab-workers)
* [Lab safety for Lab Workers](https://www.uvic.ca/ohse/training/research-safety/laboratory-safety/index.php#acc-laboratory-safety-for-lab-workers)
* [Laser Safety Training](https://www.uvic.ca/ohse/training/research-safety/laser-safety/index.php)
* Lab SOP with documented signoff by the individual and their supervisor

Optional training to complete prior to working with lasers:

* Fire extinguisher training

Refresher training in the General, Laser and Lab SOP must be provided when:

* There has ben an extended timeframe of inactivity, or
* There has been an incident or injury, or
* 3 years has elapsed since the original training.

# **Policy**

The University of Victoria will follow the WorkSafeBC Occupational Health and Safety Regulation for laser safety that includes: ANSI Z136.1 – 2014 and the University of Victoria Occupational Health, Safety & Environment Department.

# **RESPONSIBILITY**

*Provide a description of the responsibilities for all personnel working with or around the laser, and how individuals will be trained on their* *responsibilities.*

Responsibilities of the laboratory supervisor, {insert professor}, include:

* Ensure all laser operators receive UVic laser safety training
* Ensure all laser operators receive laser specific training
* Ensure all administrative and engineering safety controls are implemented
* Ensure safe operating procedures are written, current, and readily accessible to laser operators
* Ensure laser operators have reviewed and understood standard operating procedures and demonstrated safe practice prior to operating a laser
* Provide appropriate personal protective equipment and ensure it is worn
* Maintain records of training
* *List additional responsibilities.*

Responsibilities of all laser operators include:

* Complete successfully UVic’s laser safety training and receive on-the-job training before operating or working in proximity to Class 3b and 4 laser or laser systems
* Participate in UVic’s medical surveillance program
* Report all unsafe conditions to the laser supervisor and the laser safety officer
* *List additional responsibilities*

# **Definitions**

ANSI – American National Standards Institute

SOP – Safe Operating Procedure

LEP – Laser Eye Protection

OD – Optical Density

*List additional abbreviations*

# **Laser system Characteristics**

*List the various lasers & laser systems this SOP applies to; duplicate the table below per laser*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Laser Type:** | *Pulsed or continuous wave* | | **Lasing Medium:** | *e.g. Ar ion, diode, etc* |
| **Wavelength:** | *Enter ranges (nm); visible or invisible?* | | **Power:** | *CW: max power; pulsed: average power or max energy per pulse* |
| **Rep. Rate:** | *Maximum if pulsed, else CW* | | **Beam Divergence** | *Enter 1/e2 at laser aperture*  *(mrad)* |
| **Pulse width:** | *Enter operating value, if applicable* | | **Beam Diameter:** | *Enter 1/e at laser aperture*  *(mm)* |
| **Required Goggle OD:** | | *List ODs for all wavelengths (ex: 532 nm: 5+; 800 nm: 7+) – model number, if applicable* | | |
| **Storage Location:** | | *Indicate where these goggles can be found* | | |
| **Additional PPE:** | | *If applicable* | | |

# **Designated area**

*Any work with the laser must be performed in a delineated area with signage to alert others that the laser is in use in that area. Provide a description of the designated area, i.e. building and room number, location in room, where signage is located etc.*

# **Safety controls**

*The purpose of this section is to identify all safety controls to be followed. Include all implemented engineered (e.g. laser curtains etc) and administrative safety controls (e.g. warning lights etc), and all required personal protective equipment (e.g. laser eye protection).*

# **Laser operation procedure**

*Standard start-up sequence of the laser usually from the manufacturer with additional comments that may pertain to the specific implementation of the system in the lab and/or in conjunction with the experimental protocol. If you keep a lab book that tracks the daily operation of the laser, and the procedure is written permanently there, you can indicate that here. Include safety controls that must be in place prior to operating the laser (e.g. closing curtains, blocking windows, wearing laser protection glasses)*

## **1. Start-up Procedure**

1. Step 1
2. Step 2

**2. Shutdown procedure**

# **Laser Alignment procedure**

*If applicable, laser beam alignment is a laser repair/internal optimization activity. Usually this procedure changes the wavelength conditions listed on the Danger sign of the laboratory door because other embedded lasers are exposed. If the conditions in the laboratory change, a Notice sign is required indicating those changes and that only authorized personnel are allowed to enter the lab: it is unlikely that sufficient PPE for everyone in the lab under these conditions are available, so this sign indicates restricted access.*

*If only particular personnel are permitted to align laser, list their names*

*Safety interlocks shall not be permanently disabled without the consent of the Laser Safety Officer.*

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| --- | --- |
| **Required Goggle OD:** | *List ODs for all wavelengths (ex: 532 nm: 5+; 800 nm: 7+)* |
| **Storage Location:** | *Indicate where these goggles can be found* |

# **Laser Maintenance**

*These steps should be followed, including by external service providers (remove if not applicable)*

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| --- | --- |
| **Required Goggle OD:** | *List ODs for all wavelengths (ex: 532 nm: 5+; 800 nm: 7+)* |
| **Storage Location:** | *Indicate where these goggles can be found* |

# **Laser Emergency Procedures**

*The purpose of the emergency procedure is to determine if the laser can be safely contained or safely shutdown without damaging the equipment in an emergency situation. The procedure could be a single step, such as engaging an emergency stop button. If a lengthy shutdown procedure is required, a procedure is needed, or protocol documented, to ensure that the beam is safely contained and will not present a further hazard during the emergency or to emergency response personnel that may need to access the laboratory.*

*All efforts should be made to set up a single step safe shutdown of the system so that laser operators can rapidly exit the area while ensuring that the laser hazard is minimized or non-existent.*

*List all emergency procedures specific to the laboratory (ex: laser shut down, spills, etc.) Include procedures for evacuations, location of posted emergency procedures, location of safety equipment, safety showers, eyewash stations, extinguishers, etc.).*

# **INCIDENT OR SUSPECTED INCIDENT PROCEDURES**

*Outline the steps that will be taken in the event there is an incident or suspected incident involving the laser.*

# **Training sign off**

It is required before working with Class 3B or Class 4 lasers that personnel shall read and fully adhere to the laboratory specific LSP and shall document that they have read it and are trained in the procedure by signing and dating a training record. The PI or Responsible Person will counter sign that they acknowledge that the individual has received the training and they are confident in their knowledge and ability to adhere safely to the LSP.

| First name | Last Name | Date | Signature Incumbent | Signature PI / Responsible Person |
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