**Forward:**

This procedure shall be reviewed annually by all persons who use Class 3B & 4 lasers or laser systems listed in this SOP. This procedure shall also be reviewed every two years by the Permittee or Laboratory Laser Safety Supervisor (LSS) to ensure it reflects the most current conditions. Changes in the operating procedure shall be forwarded to EHS – Laser Safety for review and approval.

**Laboratory Information:**

|  |  |  |  |
| --- | --- | --- | --- |
| Laboratory PI Name: |  | Date: |  |
| Department: |  | Revision #: |  |
| Building & Room #: |  | Author: |  |

**Contact Information:**

|  |  |  |  |
| --- | --- | --- | --- |
| Laboratory LSS: |  | Phone #: |  |
| University LSO: | DeWayne Holcomb | Phone #: | 512-471-2038 |
| Maintenance/Repair: | Facilities Services | Phone #: | 512-471-2020 |
| Medical Emergencies | 1. Call 911 for medical emergencies and shut down all laser operations.
2. Notify the Laboratory LSS and University LSO of all laser-related injuries and near misses as soon as possible.
 |

**Laser Description:** Describe the laser(s) setup and how it is used including general beam parameters, optics, and equipment. Include a diagram or picture with the beam path depicted. This may be included as an attachment if necessary.

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**Laser Parameters:** Complete the table below using the operating conditions (power output, pulse energy, duration, etc.) of the laser. If more than one laser is used, copy and paste this table to complete the laser parameters for the other lasers. Laser eyewear is to be inspected by the user for lens applicability and integrity prior to each use.

|  |  |  |  |
| --- | --- | --- | --- |
| Make: |  | Wavelength (nm): |  |
| Model: |  | Power Output (W): |  |
| Serial Number: |  | Beam Diameter (mm): |  |
| Class: |  | Beam Divergence (1/e2) (mrad): |  |
| Cont. or Pulsed: |  | Duration (ns) & Rate (Hz): |  |
| Eyewear Make: |  | Eyewear Wavelength: |  |
| Eyewear Model: |  | Eyewear Optical Density: |  |

**Laser Safety Program Resources:**

EHS has several resources on their website at: <https://ehs.utexas.edu/programs/lasers/> including information regarding laser safety training and program requirements. The Laser Safety Program Manual can also be found here and should be referred to for:

|  |  |
| --- | --- |
| * Lab PI roles and responsibilities
 | * PPE requirements (eyewear and inspections)
 |
| * Laser User roles and responsibilities
 | * Signs and Labeling
 |
| * Laser permits and registration
 | * Non-Radiation Hazards
 |
| * Program requirements (SOP, Training, etc.)
 | * Procurement and Disposal Requirements
 |

**Operating Procedures:**

All Class 3B and 4 lasers and laser systems shall have a documented operating procedure that provides the end user the necessary instruction for completing their experiment safely. The operating procedure shall include instructions for all times it is necessary for the laser to be powered on including normal operation, alignments, service, and repairs as applicable. The procedure shall incorporate all safety measures including when to don/doff eyewear, room securement, signs and warning labels, housekeeping, and other control measures identified in the hazard section above. This procedure shall be updated to reflect current operations prior to commencing the experiment.

1. Initial preparation of lab environment for normal operation (lab security, warning light on, keys, interlocks and guards, identification of personnel, etc.)
2. Target area preparation
3. Operation procedures are as follows:
4. Shutdown procedures for this laser are as follows:
5. Alignment procedures (describe the specific steps and settings needed to reduce power before interacting directly with the beam path. For example, shuttering the pump laser, using ND filters, etc.)

**Physical Controls:** Describe the physical controls of the laser setup in the condition which the setup is intended to be operated. Edit the comment section as necessary to depict the lab specific controls implemented. EHS will review and approve the described control measures.

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| **Check If Applicable:** | **Control:** | **Comments:** |
|[ ]  Entryway (door) Interlocks or Controls | Entry to the lab is restricted to authorized and properly trained lab personnel only with an active keypad lock. The lab door is to remain closed at all times unless the laser is shutdown and under the direct supervision of an authorized person. Illuminated laser signs/placards are provided at the entrance to the laser control area/nominal hazard zone. A laser curtain is provided at the nominal hazard zone perimeter. |
|[ ]  Laser Enclosure Interlocks | Any laser enclosure interlocks will be engineered to fail safe and require manual re-activation if defeated. |
|[ ]  Laser Housing Interlocks | Fail-safe or redundant interlocks shall be provided if they can be removed or displaced during operation and still allow access to Class 3B or 4 laser radiation. Warning labels shall be provided near the interlock if it can be defeated or by-passed. |
|[ ]  Emergency Stop | An emergency E-stop button shall be provided or the master key/power switch shall be designated at the emergency stop as applicable and clearly labeled as such. |
|[ ]  Beam Stops | The beam terminates in an aluminum beam block capable of withstanding the heat from the laser setup without degradation.  |
|[ ]  Master Switch  | The laser is only operable via a switch key. When the key is in standby mode, the laser is inactive. |

**Hazards & Controls:**

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| --- | --- | --- |
| **Check If Applicable:** | **Hazard:** | **Controls:** |
|[ ]  Housekeeping | The beam path and surrounding areas will be kept free of clutter and obstructions. Hand clearing of clutter from the optical table and beam area will be performed prior to each laser operation. |
|[ ]  High Voltage | The building manager and facilities electrical shop shall be consulted prior to operation/maintenance involving high voltage exposure including any adjustments needed. |
|[ ]  Capacitors | Any capacitors will be enclosed within a protective panel during operation and fully discharged prior to maintenance. |
|[ ]  Unenclosed Beam Access to Beam | The beam is contained within a curtained area. The outside door will also be closed as a secondary protection. Appropriate laser eyewear protection shall be worn in all areas with open, accessible laser radiation. |
|[ ]  Fumes/Vapors | Any fumes/vapors generated during operation will be exhausted through a fume hood or local ventilation apparatus. |
|[ ]  Ultraviolet Radiation or Blue Light | Appropriate barriers and PPE to protect skin and eyes from UV and eyes from blue light will be in place upon consultation with EHS if needed. This may include lab coats, eyewear, gloves, fade shields or topical sunblock applications. |
|[ ]  Compressed Gases | Compressed gases will be properly secured and labeled. Safety caps will be in place for unused cylinders. Flammable and oxidizing cylinders shall be stored at least 20 feet apart unless specifically required for an experiment upon consultation with EHS. OH 204 compressed gas cylinder training from EHS should be taken and is available in UT Learn. |
|[ ]  Hazardous Chemicals/Waste | No hazardous waste is expected to be made during ordinary operation. If hazardous waste is generated, training course OH 202 should be taken (available in UT Learn) and all waste properly handled, labeled and stored per EHS guidelines. |
|[ ]  Reflective Material in Beam Path | The open beam paths will be kept free of clutter to prevent inadvertent ignition of materials, specular and diffuse reflections, and laser generated airborne contaminants. |
|[ ]  Fire | A fire extinguisher is located within a few steps of the table. Laser operators will ensure familiarity with its location and complete FF 205 hands on fire extinguisher training from Fire Prevention Services. Beam blocks will be used to absorb laser energy capable of generating hazardous levels of heat. |
|[ ]  Laser at eye level of person sitting or standing | The laser is mounted below the eye level of a person sitting normally. Beam blocks and additional barriers will be used to prevent the cohesive beam from travelling beyond the limits of the optical table. |
|[ ]  Infrared Lasers | Invisible lasers will be properly blocked and attenuated. Adequate viewing equipment such as IR viewers, cards, cameras, etc. must be available to the end user to ensure reflections are minimized. |
|[ ]  Correct Eyewear | Appropriate EHS approved laser eyewear protection with labelling of wavelength and optical density will be present and worn by all lab personnel working in rooms with accessible laser radiation. The eyewear will be made readily available prior to entering a nominal hazard zone at the door or curtain entrance, properly maintained, cleaned, and stored per manufacturers recommendations. |
|[ ]  Secured Laser | Lasers shall be secured to the operating surface during operation to prevent movement of the beam while the laser is on. The method of securing should be robust enough that if the laser is incidentally bumped or contacted, the beam does not lose contact with the target surface. |

**Operator Review:**

By signing this form, I agree that I have read and understand the contents of this SOP and will adhere to it’ instructions. Furthermore, I agree that I have successfully complete the University’s Laser Safety Training and I am aware that it is my responsibility to operate in a safe manner.

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| **Name:** | **EID:** | **Signature:** | **Date:** |
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