

Western Carolina University

Standard Operating Procedure for Lasers

Contact Information

Procedure Title

Procedure Author

Date of Creation/Revision

Name of Responsible Person (PI, Supervisor,
or Autonomous Researcher)

Location of Procedure (Building and room)

Safety Office 828-227-7443

Purpose

This Standard Operating Procedure (SOP) outlines requires to be considered by an authorized user for the laser described herein, as well as describes the normal operation of the laser and any hazards that may be encountered during normal operation. Finally, the SOP explains how to minimize any hazards and how to respond in an emergency situation.

Laser Description

Wavelength: (nm)

Range of Beam Diameter: (nm)

Range of Beam Divergence: (mrad)

Mode

Continuous Wave

Avg. Power: (Watts)

Max. Power: (Watts)

Pulsed or Q-Switched

Pulse Duration: (sec)

Pulse Frequency: (Hz)

Avg. Joules/Pulse: (J)

Max. Joules/Pulse: (J)

Personnel

Authorized Personnel: The laser device described in this document may be operated only by authorized personnel who are fully cognizant of all safety issues involved in the operation of this equipment. These personnel are to ensure that the laser is only operated in the manner consistent with this document. To become an authorized user, one must:

1. Complete Laser Safety training
2. Pass the laser safety quiz
3. Read and fully understand the SOP

Unauthorized personnel: No unauthorized personnel may be in the room during laser operation unless accompanied by an authorized user. All visitors must be briefed on proper safety protocol and must wear appropriate laser safety goggles located on the premises

Hazards

Beam/Target Interaction Hazards:

Non-Beam Hazards:

General Safety Considerations

1. All laser beams must be terminated within the control area. Beam stops provide protection from misaligned beams, and should be placed in all appropriate and practical locations.
2. Light levels in excess of the MPE must not pass the boundaries of the control area. All windows, doorways, open portals, and other openings through which light might escape from a laser control area must be covered or shielded in such a manner as to preclude the transmission of laser light.
3. There must be provisions for rapid egress from a laser control area under all normal and emergency conditions. Any control area interlock system must not interfere with emergency egress.
4. Posting Requirements - The area must be posted with appropriate warning signs that indicate the nature of the hazard. The wording on the signs will be specified by the Laser Safety Manual and conform with the ANSI Z136.1 guidelines. Only authorized personnel will operate lasers.
5. The laboratory doors will be closed and locked when the laser is operating.
6. During alignment, the laboratory doors will be closed and a sign posted stating **“Laser alignment in progress. Do not enter. Eye protection required.”**
7. Laser protective eyewear for sufficient protection against _____ nm are available and are located _____

Laser protective eyewear must always be worn when the laser is in operation. No filters or other optics will provide suitable protection; use only laser safety protective eyewear.

8. Laser alignment must be performed only by following the steps outlined in the alignment procedure supplement or alignment section.
 9. Perform physical surveys to determine if there are stray beams (specular or diffuse) emanating from each laser and its optics, and then document the beam surveys noting the location of stray beams and the measures taken to control them.
 10. If the beam path must be changed significantly by relocating the laser or optics, all users must be notified of the change.
 11. The same precautions that are taken for safe operation of the laser must also be followed when adjusting any of the optics in use with the apparatus.
 12. When a new principal investigator (PI) takes over use of the laser system, the new user must conduct a survey for unwanted stray or diffuse beams.
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Normal Operation

Laser Use Checklist

Alignment Procedures.

Procedural Considerations

1. To reduce accidental reflections; watches, rings, dangling badges, and other reflective objects must be taken off before any alignment activity begins.
 2. Use of non-reflective tools should be considered.
 3. Access to the room/area is limited to authorized personnel only.
 4. Alignments should be performed with a companion, not alone.
 5. Review alignment procedures.
 6. Identify equipment and materials necessary to perform alignment.
 7. Remove all unnecessary equipment, tools, and combustible materials to minimize the possibility of stray reflections and non-beam accidents.
 8. Persons conducting the alignment must be authorized by the PI.
 9. A 'Notice' sign is posted at the entrance when temporary laser control areas are set up or unusual conditions warrant additional hazard information.
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Internal Alignment Mirrors

External Optics

Incident Response

In the event of a laser accident, follow the procedure below:

1. Ensure that the laser system is shut off.
2. Provide for the safety of the personnel (first aid, evacuation, etc.) as needed. Note — if an eye injury is suspected, have the injured person keep his/her head upright and still to reduce bleeding in the eye. A physician should evaluate laser injuries as soon as possible.
3. Obtain medical assistance for anyone who may be injured. Proceed to University Health Services for first aid. If immediate medical care is required, dial x8911 during normal business hours or 911 outside of normal business hours.
4. If there is a fire, pull the alarm, and contact the fire department by calling x8911 during normal business hours or 911 outside of normal business hours. Do not fight the fire unless it is very small and you have been trained in firefighting techniques.
5. Inform the Safety Office and Laboratory PI as soon as possible.
7. If there is an injury, the PI will need to submit a report of injury to the Safety Office.
8. After the incident, do not resume use of the laser system until the Safety Office has reviewed the incident and approved the resumption of operation.

In the event of a power outage, turn off the laser system to avoid a hazardous situation when power is restored.

9. Decontamination Procedures

Personnel: If the laser system includes the use of carcinogens immediately remove gloves and wash hands and arms with soap and water after work is complete.

Area: Decontamination procedures vary depending on the material being handled; consult the SDS. The toxicity of some materials can be neutralized with other reagents. All surfaces should be wiped with the appropriate cleaning agent following dispensing or handling. Waste materials generated should be treated as a hazardous waste.

Equipment: Decontaminate vacuum pumps or other contaminated equipment (glassware) before removing them from the designated area.

10. Designated Area

For use of carcinogens, a designated area shall be established where limited access, special procedures, knowledge, and work skills are required. A designated area can be the entire laboratory, a specific laboratory workbench, or a laboratory hood. Designated areas must be clearly marked with signs that identify the chemical hazard and include an appropriate warning; for example: WARNING! FORMALDEHYDE WORK AREA – CARCINOGEN.

- Upon leaving the designated area, remove any personal protective equipment worn and wash hands, forearms, face, and neck.
 - After each use (or day), wipe down the immediate work area and equipment to prevent accumulation of chemical residue.
 - At the end of each project, thoroughly decontaminate the designated area before resuming normal laboratory work in the area.
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