

**⚠ DANGER: CLASS 4 HIGH-POWER INDUSTRIAL LASER
WORKSPACE**

CLASS 4 LASER REFINISHING SAFETY SHEET

Location / Bay: _____

Laser Safety Officer (LSO): _____

1. Equipment Specifications (System Description)

- Laser Type: Industrial Refinishing / Cleaning Laser (Fiber or CO₂)
- Classification: CLASS 4 (High Power System)
- Operating Wavelength: _____ nm / μm
- Maximum Power Output: _____ Watts
- Beam Delivery Method: Handheld Galvo Scanner / CNC Gantry

2. Primary Hazards (ANSI Z136.1 Reference)

- Eye Hazard: Direct or scattered beam exposure will cause immediate, permanent retinal or corneal blindness.
- Skin Hazard: Severe thermal burns occur instantly upon contact with the primary beam or specular reflections.
- Fire Hazard: High power density will ignite solvents, paints, wood, fabrics, and combustible dust instantly.
- Airborne Contaminants (LGACs): Vaporized surface coatings (lead, epoxies, rust, oils) generate toxic chemical vapors and hazardous respirable metal fumes.

3. Engineering & Area Controls

- Nominal Hazard Zone (NHZ): The entire designated refinishing bay or room is an active NHZ while the laser is operational.
- Entryway Barriers: Access doors must feature active safety interlocks or physical laser-attenuating curtains.

- **Warning Signage:** An ANSI Class 4 Danger Sign must be permanently mounted on all entry doors.
- **Operational Controls:** A master key switch control must be strictly restricted to authorized operators.
- **Emergency Shutdown:** A dedicated, unobstructed Emergency Stop (E-Stop) button must remain accessible at all times.

4. Mandatory Personal Protective Equipment (PPE)

- **Laser Safety Eyewear:** Mandatory for all personnel within the NHZ. Goggles must be certified for the exact wavelength with a minimum Optical Density (OD) rating of OD 6+.
- **Skin Protection:** Flame-resistant (FR) long-sleeve garments, leather welding gloves, and closed-toe leather boots.
- **Respiratory Protection:** A continuous fume extraction nozzle must be positioned directly at the material ablation point.

5. Safe Operating Procedures (SOP)

1. **Pre-Operational Check:** Verify the workspace is clear of unauthorized personnel and highly reflective objects (watches, rings, chrome tools).
2. **Area Clearing:** Remove all flammable liquids, solvent rags, and loose combustible debris from the target path.
3. **PPE Verification:** Confirm that all individuals inside the boundary are wearing verified, wavelength-specific laser goggles.
4. **Ventilation Activation:** Engage the localized fume extraction system prior to activating the laser generator.
5. **Firing Protocol:** Turn the key switch, check the emission indicator light, and sweep the target surface uniformly. Never point a handheld system at anything other than the designated work piece.
6. **Post-Operation Shutdown:** Deactivate the key switch and remove the key immediately when leaving the station unattended.

6. Emergency Protocols

- **Machine Fault/Fire:** Press the Emergency Stop (E-Stop) button immediately. Cut power to the main electrical breaker if a fire persists.
- **Radiation Exposure Injury:** Treat eye exposure as a critical medical emergency. Do not rub the eye. Evacuate to an emergency medical center immediately.

- Incident Notification: Call emergency response lines and notify the Laser Safety Officer (LSO) immediately following any safety breach or injury.