



**Portland Fire & Rescue**  
**Fire Marshal's Office**  
**1300 SE Gideon Street**  
**Portland, OR 97202-2419**  
**Phone: 503.823.3712 Fax: 503.823.3925**



## **REQUIREMENTS FOR LASER USE**

**LASER** – a device that produces an intense, coherent, directional beam of light by stimulating electronic or molecular transitions to lower energy levels.

### **1. PERMITS:**

- If a Federal variance for use of lasers is required, a permit from the Fire Marshal's Office is also required.
- Permit application must be submitted with a complete copy of your Federal variance.
- Permit applications are available from the Permit Office at 1300 SE Gideon St., Portland OR 97202-2419
- A **permit fee of \$100.00** is required.
- Make check payable to "Portland City Treasurer".

### **2. PLANS & DIAGRAMS:**

- The laser company shall provide this office with diagrams and drawings indicating the intended use of lasers.
- Both plan and elevation drawings must show dimensions of the show.
- Include in the drawings the location of:
  - Projector(s) and control panel(s)
  - Audience
  - Performer(s)
  - Operator(s)
  - Mirrors, and mirror balls
  - Display screens (or other targets)
  - Beam termination points
- Show the direct and reflected laser radiation beam paths.
- Provide the laser radiation levels in each beam including the wavelengths, average peak power and scan parameters (if scanned) for the worst case from a human access point of view.
- Be sure the drawings indicate the minimum separations of the laser radiation fields (or beams), and any direct or reflected beams into audience or performer locations.

### **3. PROJECTION /SCANNING:**

- The projection system shall be securely mounted or immobilized to prevent unintended movement or misalignment.
- Beam limiters will be provided as an inherent part of the system design to prevent overfilling of screens, beam stops, targets, etc.
- Scanning, projection, or reflection of laser and collateral radiation (light show radiation) into audience or other areas, will not be permitted except to diffuse reflections produced by the atmosphere, added atmospheric scattering media (smoke) or target screens.
- **AUDIENCE SCANNING IS NOT ALLOWED** – Any scanning effect that may expose members of the audience to the scanned laser radiation, either directly from the projector or indirectly, by nearly specular reflection from some auxiliary component of the projection system is considered to be audience scanning.
- Laser light shows that contain aerial beam patterns formed by projection to termination points or reflection by one or more fixed mirrors to a termination point, must have adequate means to terminate or contain any laser radiation for each remote mirror and the final termination target.
  - The concern in this requirement is the assurance that laser radiation that misses a mirror, due to overfilling the mirror or beam movement, will be terminated by some suitable beam stop, or beam containment, and thus be prevented from either projection or reflection into areas that may be occupied by people.

## **REQUIREMENTS FOR LASER USE**

### **PROJECTIONS / SCANNING (continued)**

- In outdoor shows, the size of the beam stop can present considerable wind resistance and may make the mirror unstable if attached to the same mount.
  - Under such conditions, independent mountings for the mirror and the beam stop may be needed.
- Another specification in the condition covering remote mirrors requires that the mounting must be secure.
  - The mounting must be a sturdy design that provides for a very positive locking of the mirror's orientation.
  - There must be adequate protection in the context of the specific show or display to prevent accidental misalignment of the mirrors by someone bumping into them or dropping something on them.
- In some situations, there may have to be beam containment enclosures or baffles to prevent a beam from entering audience areas due to a misaligned mirror.

#### **4. OPERATION:**

- All personnel not needed for the alignment should be cleared from the projection area until the initial alignment is done.
- The use of any laser(s) shall be under the continuous control of a trained laser operator.
- The laser operator shall perform no other task, except the operation of the laser(s).
- The laser operator shall be able to see all the propagating beam paths, their terminations, and the audience at all times during the performance.

#### **5. SAFETY MEASURES:**

- A protective housing is required for all laser products.
- One or more readily accessible controls shall be provided to immediately terminate laser radiation.
- The beam block(s) shall be secured in place and set, to prevent any laser beam from going into the audience.
- Laser radiation areas, which can contain radiation levels above Class I or II, shall be clearly identified by the posting of warning signs and/or the restriction of access through physical means such as pressure switches, photocells, barriers, guards, etc..
- Proof of **FAA (Federal Aviation Administration)** must be provided when projecting the laser into the sky.
  - There must be an adult present to notify the laser operator of any aircraft coming into the area of the laser.

**Violation of these requirements may result in a citation at the time of inspection.**