



**Laser Safety Protocol # 012**

Date: May 2008

**TO:** Laser users  
**FROM:** Ken Barat, LSO  
**SUBJECT:** Interlocks on Removable Protective Housings

---

---

**GOAL**

Determine the application and requirements for Interlocks on Removal Protective Housings.

**Protocol**

Interlocks on removable Protective Housings covering the laser mechanism (resonance cavity) for certified laser products will be interlocked. Those covering non-certified units or enclosing the optical set up are not required to be interlocked as per section 4.3.1.1. (2000 version) and table enclosures are considered barriers per the ANSI Z136.1 2007 version. A non interlocked protective housing label or sign will be an added awareness item when feasible.

**ANSI Z136.1**

Section 4.3.2 (2000) Interlocks on Removable Protective Housings states: Protective Housing (PH) which enclose Class 3B or Class 4 lasers or laser systems shall be provided with an interlock system which is activated when the PH is opened or removed during operation and maintenance. The interlock or interlock system shall be designed to prevent access to laser radiation above the applicable MPE. The interlock may for example, be electrically or mechanically interfaced to

a shutter which interrupts the beam when the protective housing is opened or removed. The PH interlock shall not be defeated or overridden during operation unless the provisions of 4.3.1.1 have been fully implemented.

Section 4.3.1.1 Operating a Laser without PH. States "In some circumstances, such as research and development and during the manufacture of servicing of laser, operation of lasers or laser systems without a PH may become necessary. In such cases the LSO shall affect a hazard analysis and ensure that controls measures are instituted appropriate to the class of maximum accessible emission level to assure safe operation. These controls may include, but not limited to:

1. Laser controlled area
2. Eye protection
3. Barriers, shrouds, beam stops, etc
4. Administrative and procedural controls
5. Education and training"

There is no ANSI Z136.1 definition of "Removable Protective Housings", the definition of Protective Housing is: An enclosure surrounding the laser or laser system that prevents access to laser radiation above the applicable MPE level. The aperture through which the

useful beam is emitted is not part of the protective housing. The protective housing may enclose associated optics and a workstation, and limits access to other associated optics and energy emissions and to electrical hazards associated with components and terminals.”

The ANSI Z136.1 -2007 edition states in 4.3.1 PH: “If a user-created enclosure does not meet the requirements of a protective housing (a non-interlocked cover), it shall be considered as a barrier or curtain and other controls are required per section 4.3.1.1”.

### **CRDH**

Definition of Protective Housing is those portions of a laser product which are designed to prevent human access to laser or collateral radiation in excess of the prescribed accessible emission limits under condition specified in the section and in 1040.11

### **Rational**

All commercial CDRH certified laser products meet this requirement. At a research facility the potential exists for home made and non-certified laser to be built or in use. Enactment of a protective housing interlock requirement and program would be impractical and of limited value. Section 4.3.2 allows itself to be overridden by section 4.3.1.1. LBNL authorization is required for the use of class 3B & 4 lasers. This authorization contains the elements of section 4.3.1.1

1. Laser controlled area
2. Eye protection
3. Barriers, shrouds, beam stops, etc
4. Administrative and procedural controls
5. Education and training”

Therefore the use of non interlocked protective housing is approved through the AHD process.

The application setting where 4.3.2 is most useful is in the industrial setting. This is because it covers more than the actual laser but also the workstation. It is common in industrial laser equipment to have the work piece enter through a door. In this case opening the door to the device to place a new work piece or remove the finished product, since the laser does not need to be on, an interlock system makes perfect sense.

While in the research setting it is common to allow the researcher access to their optical table when the beam is on. The researcher is encouraged to place barriers around their optical table to cut down the chances of reflections. The ANSI definition of PH, may lead one to require optical table enclosures and beam blocks be interlocked. All Class 3B or Class 4 laser operations are evaluated and pre-authorized. Users receive laser safety training and PPE is required when appropriate.

The ANSI Z136.1 -2007 edition states in 4.3.1 PH: “If a user-created enclosure does not meet the requirements of a protective housing (a non-interlocked cover), it shall be considered as a barrier or curtain and other controls are required per section 4.3.1.1”.