



Laser Safety Protocol # 011

Date: May 2008

TO: Laser users
FROM: Ken Barat, LSO
SUBJECT: Beam Stop or Attenuator Class 4

GOAL

Document the application and requirements for permanently attached Beam Stop or Attenuator with Class 4 lasers at LBNL.

Protocol

LBNL laser safety beam containment controls provide equivalent safety to that provided by a permanently attached beam stop or attenuator for its class 4 lasers.

ANSI Z136.1

Section 4.3.8 of ANSI Z136.1 (2000) A Class 4 laser or laser system shall be provided with a permanently attached beam stop or attenuator. The beam stop or attenuator shall be capable of preventing access to laser radiation on excess of the appropriate MPE level when the laser or laser system output is not required, as in warm up procedures. These may be a few instances, such as during service, when a temporary beam attenuator placed over the beam aperture can reduce the level of accessible laser radiation to levels at or below the applicable MPE. In this case the LSO may deem that laser eye protection is not required.

ANSI note: For these laser or laser systems that do not require a warm up time, the main power switch may be

substituted for the requirement of a beam stop or attenuator.

CRDH

The Center for Devices and Radiological Health is the Food and Drug Administration body tasked with developing laser light performance product safety standards. CDRH states for Beam attenuator, each laser system classified as Class 4 laser product shall be provided with one or more permanently attached means capable of preventing access by any part of the human body to all laser and collateral radiation in excess of class 1 limits.

Rational

The term permanently attached and laser systems is open to interpretation. Does it mean permanently attached to each individual laser itself (internal shutter) and or secured to the optical table as not to be knocked over or moved or does the beam containment system (perimeter guards etc) provide the permanent access control? For some laser systems a beam block or shutter at the pump laser's output provides this protection for the entire laser system.

In CDRH applications internal shutter is the obvious choice. ANSI is a user standard as opposed to a pure manufacturer standard. Laser diodes and

laser fiber systems present a new technologically challenge to this section of the ANSI standard.

There is no ANSI definition of “Beam stop”, but “beam “ is defined as a collection of rays, characterized by direction, diameter (or dimensions), and divergence (or convergence). Laser use at LBNL is a combination of commercial laser products and lasers used in pure research fashion. A common procedure at LBNL during service or maintenance and sometime alignment is to place a beam block, attenuator or dump in the path of the laser beam. These blocks or attenuator s are permanently mounted to the optical table. The determination of the LBNL LSO is that this is an equivalent control measure. One of the goals of the LBNL laser safety program is to contain all laser reflections, regardless if they are below, at or above applicable MPE. This containment can be through beam blocks, perimeter guards, barriers or attenuators.

Commercial certified Class 4 laser products are commonly equipped with an internal shutter or attenuator.

Please note per ANSI for these laser or laser systems that do not require a warm up time, the main power switch may be substituted for the requirement of a beam stop or attenuator, making many solid state lasers exempt from this requirement.