



## Laser Safety Protocol # 007

**TO:** Laser Users  
**FROM:** Laser Safety Program  
**SUBJECT:** Emergency Stop  
**REVISION DATE:** May 2016

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### Goal

Specifications of LBNL standard protocol for laser emergency stop (E-stop) requirements.

### LBNL Protocol

A Laser emergency stop (E-stop) button will be required for Class 4 laser controlled areas (LCAs) and will be recommended for Class 3B LCAs.

The E-stop shall be connected to either the laser power or to a shutter located at the laser aperture. When LCAs are interlocked for access control, the E-stop may be a part of the interlock LCA access system. The E-stop may be located outside the LCA entrance or inside the LCA and within easy reach of the entry/exit location.

The E-stop must be a red button on yellow background per NFPA 79 standard. E-stops installed before 2016 that do not meet this requirement may be allowed to remain as installed at LSO discretion.

An evaluation by the LSO may determine that an E-stop is not required. In cases where the laser beam is fully

enclosed, the enclosure interlocked, and the output laser radiation is below the applicable MPE, the E-stop may not be required. A clear statement such as 'Fully enclosed laser system in normal operation', 'Class 1 system in normal operation', 'Class 1 condition in normal operation' or similar wording must be added in the laser warning sign to indicate that the laser hazard is fully contained.

The LSO has the authority to recommend or approve substitute or alternate control measures when the primary ones are not feasible or practical (ANSI Z136.1-2014, Section 4.3 and Appendix A, 1.2 d).

### Fundamental Drivers

ANSI Z136.1 2014 *Safe Use of Lasers*

4.4.2.10 Laser Controlled Area (Class 4).

4.4.2.10.1 Access. All Class 4 area or entryway safety controls shall be designed to allow both rapid egress by laser personnel at all times and admittance to the laser controlled area under emergency conditions.

4.4.2.10.2 Emergency Conditions. For emergency conditions there shall be a clearly marked "Emergency Stop" or other appropriately marked device suitable for the intended purpose (remote controlled connector or equivalent device) of deactivating the laser or reducing the output to levels at or below the applicable MPE.

Laser use at LBNL is also guided by LBNL PUB-3000, Chapter 16 *Laser Safety* and EHS Procedure 732, *LBNL Laser Interlock Program*.

### **Rationale**

The intent for the E-stop button used as an integral part of an interlock system or directly connected to the laser power or shutter is to deactivate the laser or reduce the output to levels at or below the applicable MPE. The LBNL laser safety philosophy is to ensure all laser beams and reflections are contained and many laser setups are fully enclosed. When the laser setup and beam path is fully enclosed and the LSO evaluation concludes that the laser exposure is below the applicable MPE, the laser beams do not present a hazard to anyone entering the laser-use area and E-stop is not a necessity. A note like 'Fully enclosed during normal operation' or 'Class 1 condition in normal operation' added to the laser warning sign notifies the incoming personnel and emergency responders that the laser beam is enclosed and does not pose a hazard. The emergency personnel may proceed with the response without wasting precious time looking for an escort.

### **Contact Information**

In case of questions or comments, contact the LBNL laser safety officer.