

User guide for Laboratorio di Ateneo

PoliFAB

Building 30, via G. Colombo 81, 20133 - Milano

Lasers

General description

In PoliFAB several equipments which utilize lasers are installed. Aim of this document is to inform the users about the danger associated to the laser equipments and teach them about their usage. In the following table we show the list of the laser system with their technical details and placement in the cleanroom.

System	Position	λ (nm)	Class	Power	DPI
Lasse	Magnetic thin films	266, 355, 532, 1064	4	0.125 J, 0.250 J, 0.5 J, 1 J per pulse of 7 ns and repetition up to 10 Hz.	Glasses + collective DPI
Lasse	Magnetic thin films	635-670, 831	3R	< 5 mW	Glasses
Metricon	Metrology	633, 1310, 1550	3B	< 10 mW	Glasses

The main danger connect to the usage of lasers are for eyes and skin. Lasers are classified respect to their danger in different classes:

Class 1: Lasers that are safe in their normal operating conditions, including the usage of instrument to enable the beam visual inspection.

Class 1M: Lasers that emit light in the wavelength range 302.5 nm - 4000 nm that are safe in their normal operating conditions, but that can be harmful in case of usage of instrument to enable the beam visual inspection.

Class 2: Lasers that emit light in the wavelength range 400 e 700 nm (visible); the eye protection is normally assured by the human corneal reflex. This reaction provides the suitable protection even in case of usage of instrument to enable the beam visual inspection.

Class 2M: Lasers that emit light in the wavelength range 400 e 700 nm (visible); the eye protection is normally assured by the human corneal reflex. This reaction provides the suitable protection, but in case of usage of instrument to enable the beam visual inspection, the laser can be harmful.

Class 3R: Lasers that emit light in the wavelength range 302.5 e 106 nm, where direct exposure to the beam can be harmful, but with lower risk compared to the Class 3B; safety rules in this case are less severe compared to the Class 3B lasers.

Class 3B: Lasers which are dangerous in case of direct and indirect exposure; vision of reflected light is normally not harmful.

Class 4: Lasers that are dangerous even in case of reflected light; they can cause skin damage and could also cause electrocution and fire. They have to be used under severe safety constraints and with extreme care.

Operative instructions

Users have to place the highest care during laser operation in order to minimize the danger connected with their usage for themselves and the other operators. Lasers have to be equipped with the safety key for on/off operation. For Class 2 lasers, users have to take care that the direct and indirect laser beam cannot strike their eyes and the same care has to be taken for the other users. Special attention has to be taken during set up, check or maintenance operations. During these and normal operation, protective glasses have to be used in case of prolonged exposition to the laser beam. Class 3 lasers are dangerous if direct or reflected beam (e.g. by rings, watch, any mirror-like surface) shines on human eye. More than what already specified for the Class 2 lasers, it is mandatory to block the laser beam with a suitable material to avoid reflection. If it is possible for the eyes to meet the laser beam, the use of protective gloves is mandatory. Any housing part of the system which can be moved or replaced for any reason, must be equipped with security connection which block the laser beam in case of replacement. Periodical medical health monitoring is mandatory for the users of these lasers. In addition to what specified for Classes 2 and 3, Class 4 lasers are extremely dangerous even for reflected light and also for the skin. The entire laser path must be monitored and confined and the laser has to be placed in a restricted area. In Polifab, only one Class 4 laser is installed, in the Magnetic thin film area. A light indicates the laser operation and it is not possible to enter the room if the light is on. Users who work in the room during laser operation have to wear protective glasses and pay the maximum care not to be exposed directly or indirectly to the laser beam or its reflection for both eyes and skin. Fire danger is also present for these lasers and the use of material which can be burned by the laser is forbidden.

Emergency

The emergency exit of the laboratory is placed at the very end of the corridor in the grey area and opens to the external area of the building. The collection point of the cleanroom users and, more in general, for all the users present at the basement is placed in the courtyard of the building, next to the gate towards via Pascoli. In case the emergency exit of the cleanroom is blocked or the access through it not possible, it is recommended to leave the cleanroom via the first air-lock, leaving its two doors open for the other users. The collection point can then be reached via the corridor outside of the cleanroom. The correct safety paths in case of emergency are indicated on the panels placed in the basement and in cleanroom. Users already present outside of the cleanroom can follow the same path described above.

In case of health emergency, defined as any situation where one or more users show (even small) health problems, it is necessary to evaluate the danger. Only after a careful evaluation it is possible to proceed, helping the injured person(s). At the same time users have to inform the Staff. In the case of danger for other users, activate the fire alarm. If no Staff personal is available it is possible to call Portineria Centrale of Politecnico (2006) and, only if also there nobody replies, call 118.