

Important Basic Facts to know about Lasers

- Lasers are sources of non-ionizing radiation (unlike x-ray machines, which produce ionizing radiation capable of removing electrons from atoms).
- Different types of lasers emit ultraviolet radiation, visible light, and infrared radiation — all forms of non-ionizing radiation.
- Many lasers can only produce radiation at one wavelength. Some lasers, like Argon lasers, are capable of producing radiation at more than one wavelength.
- Even low power lasers are capable of exposing the eyes to levels of optical ("light") radiation which can exceed that which occurs when staring at the sun.
- Class 3b and Class 4 lasers present the potential for serious eye injuries from viewing the direct beam or reflections from mirror-like surfaces.
- Only Class 4 lasers generate sufficient power such that the reflection of the beam from non-shiny surfaces such as painted walls and white paper can produce hazardous eye exposure conditions.
- The deaths associated with lasers have been electrocutions caused by electrical hazards such as improper grounding, uncovered or improperly insulated electrical terminals, and hidden "power-on" warning lights.

Laser Classification

- Lasers are classified with regards to beam-related safety as follows:
 - Class 1 (Exempt Lasers): Generally not hazardous to the eyes and have completely enclosed laser beams. Examples: laser printers, compact disc players.
 - Class 2 and 2a (Low Power Lasers): Use caution. Examples: supermarket barcode scanners.
 - Class 3a and 3b (Medium Power Lasers): Are often dangerous – especially Class 3b. Examples of Class 3a lasers: laser pointers used in seminars; Examples of Class 3b lasers: some lasers used in research (often HeNe or diode lasers).
 - Class 4 (High Power Lasers): Are almost always dangerous. Examples: Most lasers used in medical procedures (laser eye surgery, etc.) in research, in laser, shows and in industry

Exposure to the laser beam is not limited to direct beam exposure. Particularly for high powered lasers, exposure to beam reflections may be just as damaging as exposure to the primary beam.

Intrabeam exposure means that the eye or skin is exposed directly to all or part of the laser beam. The eye or skin is exposed to the full irradiance or radiant exposure possible.

Specular reflections from mirror surfaces can be nearly as harmful as exposure to the direct beam, particularly if the surface is flat. Curved mirror-like surfaces will widen the beam such that while the exposed eye or skin does not absorb the full impact of the beam, there is a larger area for possible exposure.

A diffuse surface is a surface that will reflect the laser beam in many directions. Mirror-like surfaces that are not completely flat, such as jewelry or metal tools, may cause diffuse reflections of the beam. These reflections do not carry the full power or energy of the primary beam, but may still be harmful, particularly for high powered lasers. Diffuse reflections from Class 4 lasers are capable of initiating fires.

Whether a surface is a diffuse reflector or a specular reflector will depend upon the wavelength of the beam. A surface that would be a diffuse reflector for a visible laser may be a specular reflector for an infrared laser beam.