

# Talks **ZONE**

**Safety Talks**  
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TZ4614

## Know and respect laser dangers

**L**asers are a valuable tool for improving productivity and accuracy in a wide variety of industries, but are sometimes taken for granted. They can be dangerous to those who work with and near them.

The word laser is an acronym for Light Amplification by Stimulated Emission of Radiation. Laser light is generated when a power source, usually electric, is used to excite what is termed a lasing material. These can be solid (such as ruby or garnet), gas (helium or carbon dioxide), liquid (organic dyes) or semiconductors.

Laser equipment makes billions of atoms pump out trillions of photons (light particles) all at once so they line up to form a highly concentrated, powerful light beam of a single color.

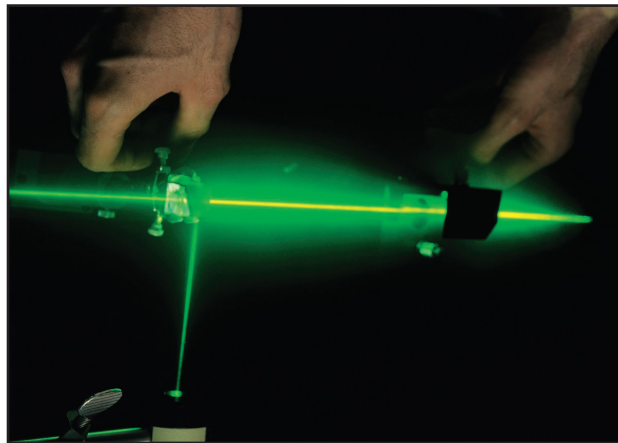
The most common danger from exposure to laser light is injury to the eye. When a bright light hits the eye, a person will blink or turn away from the source. This typically takes a quarter of a second, but higher power lasers can damage the eye in less time than that.

Symptoms of a laser burn to the eye include headache and the sudden appearance of floaters (swirling distortions) in your vision. Floaters are bits of dead cells and tissue that detach and float in the eye. Some are present in normal vision.

Minor burns to the cornea (transparent layer of tissue covering the eye) can cause a gritty feeling, like sand in the eye. Serious laser eye injuries can lead to permanent blindness.

Lasers can also harm the skin by causing thermal burns, ranging from redness and blistering to third-degree burns.

Lasers are generally divided into four basic classifications, based upon a system of graded risk. The higher the class, the greater potential for personal injury.



**Class 4** are high-powered lasers that can cause eye damage (direct or reflected beam), skin damage, and fires. A Class 4 laser has enough power to cut off body parts.

**Class 3** lasers are intermediate in power and can cause eye damage if viewed directly.

**Class 2** lasers are also low power but emit a visible beam (for example, laser pointers). The human blink reflex to bright light will protect a person from exposure to a Class 2 laser.

**Class 1** lasers are low power and don't produce damaging radiation under normal operating conditions. Examples of Class 1 lasers include those found in laser printers and supermarket scanners.

Occupational health and safety regulations in the U.S. and Canada often require that lasers be operated in accordance with the American National Standards Institute (ANSI) standard Z136. Many jurisdictions also require that a laser safety officer (LSO) oversee the use of all Class 4 lasers.

The most effective way to prevent the exposure to laser light is to use a system with proper engineering controls in place, including opaque barriers protected by

interlocks and viewing panels of optically dense material, such as Perspex. (Interlocks are devices that prevent the laser from firing as long as any of the protective panels remain open.)

For workers themselves, laser safety begins with knowing what class of laser they are working with or near, to determine the precautions to be taken. Some basic ones include:

- Proper training, especially for those using Class 4 lasers.
- Never intentionally directing a laser at another person.
- Turning off the laser or shuttering its beam when the device is left unattended for a substantial period of time, such as overnight or during a work shift change.
- Wearing adequate eye protection if there is any risk of injury. Protective clothing (gown, cap, mask) and gloves might also be required for working near a laser. Consult manufacturer's operating procedures to determine the specific needs.
- Aligning beams and optical components at a reduced power whenever possible.
- Attempting to keep laser beam paths above or below eye level for either sitting or standing positions.
- Not looking directly into a laser beam with optical instruments unless an adequate protective filter is present.
- Enclosing a Class 4 laser's entire beam path if possible.
- Posting danger or caution signs (depending on the degree of hazard) in all work areas where lasers are used.

The material contained in this document has been prepared from sources believed to be accurate and reliable. Application of this information to a specific worksite should be reviewed by a safety professional. Anyone making use of the information set forth herein does so at their own risk and assumes any and all liability arising therefrom. Specific medical advice should be obtained through consultation with a physician or other trained health care practitioner.

## The Quiz

These questions are meant to help you remember what was discussed today — not to test your patience or challenge your intelligence. The answers are at the bottom of the page. Cover them up, and complete the quiz as quickly as you can.

1. Some laser systems are more dangerous than others.  
TRUE \_\_\_\_ FALSE \_\_\_\_
2. Can laser beams be generated from materials that are not solid?  
YES \_\_\_\_ NO \_\_\_\_
3. Which of these is the most common danger associated with lasers:
  - A. Fire and explosion.
  - B. Burns to the skin.
  - C. Eye injury.
  - D. Electrical shock.
  - E. None of the above
4. Laser systems are generally divided into five basic classifications, depending on their potential to cause personal injury.  
TRUE \_\_\_\_ FALSE \_\_\_\_
5. Which of these is the average duration of the human blink reflex:
  - A. One second.
  - B. One-hundredth of a second.
  - C. One-quarter of a second.
  - D. None of these.
6. Engineering controls are best way to prevent exposure to laser light.  
TRUE \_\_\_\_ FALSE \_\_\_\_
7. Which of these are basic safety precautions to take when working with lasers :
  - A. Never direct a laser beam at another person.
  - B. Wear adequate eye protection if there is any risk of injury.
  - C. Align beams and optical components at a reduced power whenever possible.
  - D. Post danger or caution signs in all work areas where lasers are being used
  - E. All of the above.
8. Does your workplace use lasers that could cause injury if not operated properly?  
YES \_\_\_\_ NO \_\_\_\_ DON'T KNOW \_\_\_\_

**ANSWERS:** 1. True, 2. Yes, 3. C., 4. False, 5. C., 6. True, 7. E., 8. Your answer

## Hold These Thoughts

The beams created by laser systems aren't the only potential hazard. Many lasers use high-voltage and high-current electrical power. The danger of electrical shock or electrocution arises when an untrained or unauthorized person tries to perform maintenance work without following the proper safety procedures.

The American National Standards Institute (ANSI) Standard Z136 outlines electrical safety procedures applicable to laser equipment. Electrical safety requirements include the following:

- Use proper grounding for metal parts of the laser equipment.
- Label laser equipment with electrical rating, frequency and watts.
- Prevent explosions in high-pressure arc lamps and filament lamps.
- Avoid contact with electrical components, including capacitors which can contain an electrical charge even after the power is turned off.
- Ensure that combustible components of electrical circuit are short circuit tested.
- Make sure there is no electromagnetic interference between the laser equipment and other electrical equipment.

Fire is also a potential problem. It can be started when a laser beam or reflection of the beam strikes a combustible material such as rubber, plastic, human tissues, paper products, skin treated with acetone and alcohol-based preparations, human hair and intestinal gases. Fire hazards are of particular concern in oxygen-rich atmospheres when oxygen or when nitrous oxide is being used.

## For the Record

Date of Meeting: \_\_\_\_\_

Topic: \_\_\_\_\_

Location: \_\_\_\_\_

Department: \_\_\_\_\_

Start Time: \_\_\_\_\_ Finish Time: \_\_\_\_\_

Meeting Leader: \_\_\_\_\_

In Attendance:


## Tips for Safety Meeting Leaders

**Put on a panel discussion.** The use of a panel permits several people to discuss different aspects of a subject. You can ask your employees to be on the panel. You should select the panel members for their special background, or they should develop information on the portion of the subject assigned to them. After the panel members have presented their comments, you can invite the audience to direct questions to specific members of the panel.

**Or how about a debate?** You can start a stimulating discussion by holding a debate. Choose a topical, controversial subject. Place a statement about the subject in two envelopes, write on one envelope,

For, and on the other, Against, and give one envelope to each of the two debaters. Tell them to speak as indicated on the envelopes regardless of their own feelings about the subject. Write the points the debaters make on a blackboard after they have given their reasons for them. Ask the group for its opinion on the subject after the debaters have spoken.

Keep the meetings short. Attention spans are varied, especially when their mind is on some pressing matter at work that needs clearing up. Sure, have more meetings, but you don't want people sitting there wishing the person speaking would just shut up so they can all get out of there and back to work.

**Note: *TalksZone* safety meetings are not intended to take the place of your own safety procedures. Always consult and/or review your procedures before attempting any work.**