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# Eye and Face Protection Manual

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Safety and Environmental considerations are important part of our daily lives, not only for our individual protection, but for the protection of others and the environment as well. In order to maintain a high level of knowledge and responsiveness, each employee and faculty member is issued a copy of this manual. This safety manual is the guiding document of the University Safety Program. Each employee, student and faculty member is responsible for following/obeying to the rules included herein. Student workers are especially subject to accidents and environmental mistakes, and must be trained and guided by knowledgeable faculty and staff. Questions about the content of the manual should be directed to your supervisor or Environmental Health and Safety representatives.

This informational booklet is proposed to provide a general overview of a particular safety related topic. This publication does not itself alter compliance responsibilities, which are set forth in OSHA standards themselves, Department of Environmental Health and Safety at Wichita State University.

**Table of Contents**

**Contents** Page

## 1. Why Do We Need Eye and Face Protection?

According to OSHA thousands of people are blinded each year from work-related eye injuries that could have been prevented with the proper selection and use of eye and face protection. Eye injuries alone cost more than $300 million per year in lost production time, medical expenses, and worker compensation. Eye and face protection must be provided whenever necessary to protect against chemical, environmental, radiological or mechanical irritants and hazards.

## 2. How Can We Prevent an Eye Injury?

1. Know the eye safety dangers at work-complete an eye hazard assessment.
2. Eliminate hazards before starting work. Use machine guarding, work screens, or other engineering controls.
3. Use proper eye protection

## 3. Types of Eye and Face Protection

The employer shall ensure that each affected employee uses appropriate eye or face protection when exposed to eye or face hazards from flying particles, molten metal, liquid chemicals, acids or caustic liquids, chemical gases or vapors, or potentially injurious light radiation. All eye protective equipment shall comply with the requirements set forth in the American National Standard for Occupational and Educational Eye and Face Protection, **Z 87.1-1968** (OSU, 2014).


Figure 1: Eye and face protection selections

## 4. Common Causes of Eye Injuries

### 4.1 Impact Injuries

The primary hazards to the eyes and face are potential injuries caused by heat, dust, chemicals, radiation and impact. Tasks that can cause eye hazards include working with chemicals, chipping, grinding, furnace operations, sanding, welding and woodworking. See Appendix-I, Eye/Face Hazard Assessment (Central Welding Supply, 2014).

### 4.2 Chemicals

A large percentage of eye injuries are caused by direct contact with chemicals. These injuries often result from an inappropriate choice of PPE that allows a chemical substance to

enter from around or under protective eye equipment. Serious and irreversible damage can occur when chemical substances contact the eyes in the form of splash, mists, vapors, or fumes.

### 4.3 Heat Injuries

Heat injuries may occur to the eye and face when workers are exposed to high temperatures, splashes of molten metal, or hot sparks. Protect your eyes from heat when workplace operations involve pouring, casting, hot dipping, furnace operations, and other similar activities. Burns to eye and face tissue are the main concern when working with heat hazards.

### 4.4 Dust

Dust is present in the workplace during operations such as woodworking and buffing. Working in a dusty environment can causes eye injuries and presents additional hazards to contact lens wearers.

### 4.5 Laser Work

Laser work and similar operations create intense concentrations of heat, ultraviolet, infrared, and reflected light radiation. A laser beam, of sufficient power, can produce intensities greater than those experienced when looking directly at the sun. Unprotected laser exposure may result in eye injuries including retinal burns, cataracts, and permanent blindness. When lasers produce invisible ultraviolet or other radiation, both employees and visitors should use appropriate eye protection at all times. The selection of laser protection should depend upon the lasers in use and the operating conditions. Workers with exposure to laser beams must be furnished suitable laser protection.

### 4.6 Computer Usage

Studies have shown that between 50 and 90% of people who work in front of a computer screen have some symptoms of eye trouble .People usually blink around 18 times per minute, which refreshes the eyes naturally. But blink rates are reduced when staring at a computer screen or other digital device, and this can make your eyes burn, dry out, turn red or feel itchy. Sitting too close to your computer monitor, or holding a digital device closer to your eyes than you would normally hold a book or newspaper, also poses a problem. This forces your eyes to work harder than usual as you strain to focus on tiny font sizes (Taylor, 2013).
Common symptoms of eyestrain include: sore eyes, dry eyes, teary eyes, blurry vision, double vision, light sensitivity, difficulty focusing on images, neck pain, headache or a combination of all of the above.

#### 4.6.1 Can the Looking at Computer Screen Cause Eyestrain?

Fatigue, dry eyes, bad lighting, or how you sit in front of the computer can cause eyestrain. Symptoms of eyestrain include sore or irritated eyes and difficulty focusing. You may also have symptoms of eyestrain if you need glasses or a change in your glasses.

#### 4.6.2 What Can I Do to Prevent Eye Strain?

You can help prevent eyestrain by making changes to your computer workspace and by visiting your eye doctor. Here are a few suggestions on how to make your workspace more comfortable:

- Place your screen 20 to 26 inches away from your eyes and a little bit below eye level.

- Use a document holder placed next to your computer screen. It should be close enough so you don't have to swing your head back and forth or constantly change your eye focus.
- Change your lighting to lower glare and harsh reflections. Glare filters over your computer screen can also help.
- Get a chair you can adjust.
- Choose screens that can tilt and swivel. A keyboard that you can adjust is also helpful (TARKEEB, 2010).

## 5. Eye and Face Protection Selection

1) The type of eye protection required depends on the hazard. For most situations, safety glasses with side shields are adequate. Where there is a danger of splashing chemicals, goggles are required. More hazardous operations include conducting reactions that have potential for explosion and using or mixing strong caustics or acids. In these situations, a face shield or a combination of face shield and safety goggles or glasses should be used.

2) Face shields should only be worn over primary eye protection (spectacles or goggles).

3) As required by the standard, persons whose vision requires the use of prescription (Rx) lenses must wear either protective devices fitted with prescription (Rx) lenses or protective devices designed to be worn over regular prescription (Rx) eye wear (OSHA, 2002).

4) It is recommended that contact lenses not be permitted in the laboratory. The reasons for this prohibition are:

a. If a corrosive liquid splash in the eye, the natural reflex to clamp the eyelids shut makes it very difficult, so to remove the contact lens before damage is done.

b. The plastic used in contact lenses is permeable to some of the vapors found in the laboratory. These vapors can be trapped behind the lenses and can cause extensive irritation.

c. The lenses can prevent tears from removing the irritant. If chemical vapors contact the eyes while wearing contact lenses, these steps should be followed:

- Immediately remove the lenses.
- Continuously flush the eyes, for at least 15 to 30 minutes.
- Seek medical attention.

5) Caution should be exercised in the use of metal frame protective devices in electrical hazard areas.

6) Welding helmets or face shields should be used only over primary eye protection (spectacles or goggles).

7) Ventilation should be adequate, but well protected from splash entry. Eye and face protection should be designed and used so that it provides both adequate ventilation and protects the wearer from splash entry.

8) Protection from light radiation is directly related to filter lens density. Select the darkest shade that allows task performance (OSHA, 2002).

9) Visitors shall follow the same eye protection policy as employees. If they do not provide their own eye protection, it is the laboratory's responsibility to provide adequate protection (OSU, 2014).

**Table 1:** Eye and face protection selection chart.

| Hazard to Eyes and Face | Common Related Task | Possible Impact | Personal Protective Equipment |
|---|---|---|---|
| Flying particles, fragments composite chips, dust, sand and dirt | Chipping, grinding, machining, masonry work, wood-working, sawing, drilling, chiseling, powered fastening, riveting and sanding. | Can cause punctures, abrasions and contusions. | Safety glasses with side shields<br>Googles<br>Face shields |
| Liquid chemicals, acids, caustics, corrosives, splash, fumes, vapors, and irritating mists. | Acid and chemical handling, degreasing, plating, and working with blood. | May cause extremely serious and irreversible effect. | Goggles with indirect vents<br>Face shields |
| Heat(e.g. molten metal, hot sparks) | Pouring, casting, hot dipping, furnace operations and welding. | Burns | Safety glass with side shields<br>Googles<br>Face shields may use with safety glass and googles |
| Dust | Woodworking and buffing. | Eye injuries and especially presents hazards to contact lens wearers. | Eyecup or googles |
| Ultraviolet light (Radiant energy, glare, and intense light) | Welding, torch-cutting, brazing, soldering, and laser work. | Retinal burns, cataracts and permanent blindness. | Face shields, filter lenses |

Source: Noone (2003), OSHA (2014), MIT (2014)

## 6. Common Eye Injuries

Injuries commonly suffered by emergency response and recovery workers at a structural collapse include the following:

- Corneal abrasions and conjunctivitis (red eyes)
- Chemical splashes or burns
- Concrete or metal particles or slivers embedded in the eye
- Welder's flash
- Eyeball laceration
- Facial contusions and black eyes (CDC, 2014).

The primary toxic effects from direct exposure of chemicals to the eye are conjunctivitis or corneal damage. Chemicals that accidentally splash onto the face can directly contact either of these eye structures.

Acids and strong alkalis (such as lye) may cause severe corneal corrosion and may result in permanent blindness. Organic solvents (such as acetone) and detergents can cause temporary clouding of vision, primarily due to dissolving of fats from the cornea. Some chemicals can cause toxic effects to the eye even if they do not directly contact the eye.

Chemicals that are inhaled or ingested may move to the eye through the blood circulation and produce eye damage. 2-4-Dinitrophenol (a wood preservative) can cause cataracts after ingestion. The ingestion of thallium salts (found in some pesticides) and methanol (wood alcohol) has been associated with blindness due to damage to the optic nerve. Retina damage has been associated with exposures to arsenicals and carbon disulfide (United States Department of Labor, 2014).

## 7. First Aid for Eye Injury

### 7.1 Chemical Splash

If an eye injury occurs, quick action can prevent a permanent disability. For this reason:

- Emergency eyewashes should be placed in all hazardous areas (OSHA, 2014).
- Don't squeeze eyes shut. Hold them open with thumb and index finger.
- First-aid instructions should be posted close to potential danger spots (OSHA, 2014).
- Employees must know where the closest eyewash station is and how to get there with restricted vision (OSHA, 2014).
- Flood eyes with cool, clean water for 15-20 minutes.
- Get medical attention immediately. Have the chemical container and its label available for evaluation.
- Don't use another chemical to neutralize the spilled chemical (Noone, 2003).

### 7.2 Flying Particles

- Don't try to remove anything embedded in the eye. You could cause more damage.
- Don't pull or squeeze the eye. Cover it and get medical attention immediately.

### 7.3 Radiation/Burns

- If the eyes are exposed to intense heat, flames, lasers or arc welding radiation, apply ice packs to relieve pain.
- Get medical attention immediately.

### 7.4 Blows to the Eyes

- Apply ice packs to control swelling and relieve pain.
- Get medical attention as soon as possible.

### 7.5 Eyestrain

- Glare, poor lighting and long periods spent at a video display terminal can cause eye fatigue, soreness and headaches.
- Improve the lighting in the area.
- Give eyes adequate rest (Noone, 2003).

## 8. The proper Care of the PPE

Scheduled and daily maintenance of protective eyewear is mandatory. To reduce the risk of eye injuries proper maintenance should include the following:

- Adjust eyewear for a snug fit and reasonable comfort
- Secure loose parts
- Replace scratched, cracked, pitted
- Clean eyewear after each shift or as needed
- Clean shared eyewear by washing with warm, soapy water, and rinsing thoroughly
- Use a disinfectant and hang eyewear to dry in a clean place
- Store eyewear in a case to prevent scratching
- Use an anti-fogging product to reduce or eliminate fogging
- Label each person's eyewear with their name (TDI, 2014).

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Appendix

**Appendix-I:** Hazard Assessment Checklist

## Hazard Assessment Checklist

Eye and Face Protection

Reviewed by: _____

Date: _____

| Yes | No | Work Related Hazards | Existing PPEs |
|---|---|---|---|
| | | Do employees engage in tasks that include chipping, grinding, machining, masonry work, wood working, sawing, drilling, chiseling, powered fastening, riveting, and sanding? [Potential Impact Hazards] | |
| | | Describe Hazard and Location: | |
| | | Are there other tasks prone to generating flying objects such as large chips, fragments, particles, sand, and dirt? [Potential Impact Hazards] | |
| | | Describe Hazard and Location: | |
| | | Do employees engage in tasks that include furnace operations, pouring, casting, hot dipping, and welding? [Potential Heat Hazards] | |
| | | Describe Hazard and Location: | |
| | | Are employees exposed to equipment or machinery that emits extreme heat? [Potential Heat Hazards] | |
| | | Describe Hazard and Location: | |
| | | Do employee tasks include acid and chemical handling, degreasing, plating, and working with blood? [Potential Chemical Hazards] | |
| | | Describe Hazard and Location: | |
| | | Are employees exposed to potential chemical splash, fumes, vapors, or irritating mists. [Potential Chemical Hazards] | |
| | | Describe Hazard and Location: | |
| | | Do employees engage in tasks such as woodworking, buffing, or other activities that generate dusty conditions? [Potential Dust Hazards] | |
| | | Describe Hazard and Location: | |
| | | Are employees exposed to dusty conditions in the workplace? [Potential Dust Hazards] | |
| | | Describe Hazard and Location: | |
| | | Do employee tasks include Welding, torch-cutting, brazing, soldering, or laser work? [Potential Optical Radiation Hazard] | |
| | | Describe Hazard and Location: | |
| | | Does work area expose employees to radiant energy, glare, and intense light? [Potential Optical Radiation Hazard] | |
| | | Describe Hazard and Location: | |

## Eye and Face Hazard Summary

| | |
|---|---|
| **Existing Hazards** [Check all that apply] | Impact ☐ Heat ☐ Chemicals ☐ Dust ☐ Radiation ☐ |
| **Hazard Locations** | Identify common or restricted areas impacted by these hazards: |
| **Employee Disclosure** | Have employees been notified of hazard(s)? Describe form of communication, date of disclosure, and form of acknowledgement by employee. |
| **Employee Training** | Have employees received any training related to hazard(s)? If so, describe. |
| **Existing PPEs** | Describe existing Personal Protective Equipment (PPE), requirements for use, and available emergency preparedness (i.e. emergency eyewash or shower in the vicinity of hazard). |
| **Recommended Changes** | Recommended upgrades to PPEs and requirements for their use.<br><br>To be implemented by [date]: |
| | Recommended disclosures, training, and/or acknowledgement procedure.<br><br>To be implemented by [date]: |

**FOLLOWUP:**

| | | |
|---|---|---|
| **Date:** | **Changes Implemented? [Yes/No/Exceptions]** | **Reviewed by:** |
| **Comments:** | | |