Eye Protection in the Pottery Studio

Studio Safety

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by Jeff Zamek

When working in the ceramics studio, there are situations where eye protection is needed. While working with ceramic materials is not an inherently dangerous endeavor, using the proper safety equipment can help the potter easily avoid a few potentially hazardous situations. Fortunately, eye protection developed for use in several major manufacturing areas such as foundries, steel mills, glass production, metal fabrication and casting industries, is readily available to the studio potter.

Infrared/Ultraviolet Hazards

In the past, glassblowers were subjected to infrared and ultraviolet light when looking into high-temperature molten glass tanks. They developed “glassblowers” ailment after years of unprotected high-duration exposure, and the cumulative effect caused cataracts to develop in their eyes. Sometimes the exfoliation of the eye lens was a gradual process that went unrecognized until the damage was severe. Today, the causes of glassblowers’ cataracts and the protective methods to prevent such eye damage have made this condition a historical curiosity. (Source: Ralph Chou, “Optical Filters and Radiation Protection, published in Eye Injury Prevention in Industry, 2nd ed, edited by E. McRace and M. Grimm, June 1994.)

Infrared and ultraviolet radiation are part of the electromagnetic spectrum with visible light being just one segment of the entire range. Infrared radiation cannot be seen as it is composed of wavelengths that are longer than visible light, and ultraviolet radiation is also invisible consisting of shorter wavelengths than visible light. During a kiln firing, both infrared and ultraviolet radiation are released.

While the effects of infrared and ultraviolet light damage to the eyes are cumulative, and the process of firing a pottery kiln contains the same elements of exposure to invisible radiation, the duration of each exposure and cumulative rates of exposure are less than what glassblowers experience. But even though potters look into a firing kiln for seconds at a time, they should protect themselves from infrared and ultraviolet radiation since the alternative of not using protective glasses can result in potentially serious eye damage. By using the proper eye protection, potters can avoid any potential long-term risk to their eyes.

Standards

When considering infrared/ultraviolet eye-protection glasses or goggles, make sure the product meets the ANSI (American National Standards Institute) standards. Always look for the ANSI Z87.1-1989 label on the glasses, instruction sheet or box. However, note that the ANSI standards for protective eyewear are extensive and some products with the ANSI Z87.1-1989 label might not be suitable for infrared/ultraviolet light protection. Therefore, look for a green shade designation of #5 or above.

Infrared/Ultraviolet Eye Protection Glasses

I tested black-frame cobalt-blue #5 infrared glasses (model MR9140) sold by Sheffield Pottery Supply . These glasses have lenses that filter out 70% of infrared light in the 780-2000 nanometer (unit of measurement, one billionth of a meter) ranges and 99.9% ultraviolet wavelength light;

however, the polycarbonate lens has a darker tint than standard green-shaded welding glasses. Green-shaded welding glasses or goggles range from numbers 1.2 to 16, with the higher numbers offering greater degrees of protection against the infrared light spectrum. (Source: Eye Injury Prevention in Industry, 2nd ed., edited by E. McRace & M. Grimm, 1994, Table 3, Transmission Specification for Filters, p. 22.) At some point, a trade-off has to be made, since higher shade numbers block more light, making it more difficult to view pyrometric cones during the firing.

The cobalt-blue #5 lens is rated on a different scale and does not correspond to the green-shaded welding glasses #5. While this dual-numbering system might be confusing, the cobalt-blue #5 glasses have an advantage over green-shaded welding glasses #5, as they filter out a greater amount of the infrared light spectrum. The important point being the Cobalt Blue #5 Model MR9140 glasses offer eye protection up to 2700ºF, or approximately Cone 17, well above the temperatures reached by most potters. This model also meets or exceeds several industry standards for eye protection encountered in infrared and ultraviolet light conditions.

I found the glasses comfortable to wear with a flip-up shade that reveals a set of clear lenses. The glasses have side shields that are an added eye protection safety feature. The cobalt-blue #5 glasses are rated at 0.2% VLT, or visual light transmission, while green-shaded #5 welders glasses are rated at 2% VLT (the lower the VLT percentage, the less visible light that can be seen through the glasses). This made it harder to view the pyrometric cones during the firing as compared with green-shaded welders' glasses, but there are a few procedures to help make viewing cones better while wearing the glasses. The Model MR9140 glasses are more expensive than most other products of similar type, but the extra protection is worth any price. Eye protection is not an area to cut costs in any studio operation.

Shielded Headgear and Safety Glasses

Several activities in a pottery studio require safety glasses or face shields to prevent eye injury. The most hazardous activity is scraping kiln wash or glaze drips off kiln shelves. Many potters use a high-speed grinding wheel to remove glaze drips or rough surfaces from their pots, creating a dangerous situation where hard projectiles may be thrown off the spinning wheel that can then hit soft body tissue. Mixing slips, clays and glazes is also hazardous, since liquids and dry materials can spatter in all directions.

Safety glasses offer eye protection, but shielded headgear provides a greater degree of covering for the entire face and neck. Either type of eye protection should be employed whenever there is a possible risk from liquid or solid flying objects.

All eye safety goggles and headgear shields should meet or exceed government OSHA/ANSI Z87.1 (Occupational Safety & Health Administration/American National Standards Institute) standards for eye protection. The label ensures the safety device has been tested for impact and penetration resistance, corrosive factors and optical clarity.

Wilson Headgear & Visor Set

I tested a Wilson headgear and visor set from Sheffield Pottery Supply. At first the headgear and visor felt a little top heavy, but after I adjusted the head strap, it proved to be very comfortable. I have no doubt that any slight inconvenience of wearing the headgear and accompanying visor will be more than offset by the eye and face protection offered by this industrial-quality safety equipment. The grading system for scratch resistance in visors has poor, fair, good and excellent

ratings. The clear propionate visor has a rating of good for scratch resistance. The visor's resistance to scratch marks is an important value-added feature for a long service life.

With the Wilson safety shield in place (and wearing protective gloves), I used a high-speed grinding wheel to smooth the bottom edges of fired pots. When I applied greater pressure against the grinding wheel, two H-inch-size chips flew off the pot. One landed about 10 feet away and the other hit the bottom section of my face shield, bouncing off but causing no damage to the shield or my neck. After such "real life" testing, I would recommend the face and upper neck protection offered by this headgear and visor set.

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Tips for Viewing Cones

There are a few ways to improve the viewing of cones during firing:

* When loading the kiln, paint a kiln wash of flint and water onto a soft brick and place the brick behind the pyrometric cones. The white background of the soft brick offers a contrast to the cones during the firing.
* Paint red iron oxide in vertical or horizontal stripes onto a soft brick to provide a contrasting background pattern for viewing cones. Don't paint the cones with iron oxide or any contrasting coloring oxide as it interferes with the melting properties of the cone.
* Cut 1/4-inch horizontal or vertical lines into a soft brick to offer a contrasting background pattern for viewing the cones.
* Shine a flashlight into the kiln to increase the visibility of the cones during firing.

Resources

* ANSI Z87.1-1989 Standard, American National Standards Institute, 11 W. 42nd St., New York, NY 10036; (212) 642 4980; web site http://www.ansi.org
* 1999 Annual Book of ASTM Standards, Vol. 15.02, Designation: C1023 Section X2.41, page 321. American Society for Testing and Materials, 100 Barr Harbor Dr., West Conshohocken, PA 19428-2959; phone (610) 832 9500, fax (610) 832 9555; web site http://www.astm.org.
* CSA (Canadian Standards Association), 178 Rex Dale Boulevard, 80 B COKE, M9W1R3, Ontario, Canada; (416) 247-4000, (800) 463-6727; web page http://www.csa.ca/about_csa/index_loca.html
* The cobalt-blue #5 infrared/ultraviolet glasses and the Wilson headgear and visor evaluated in this article were purchased from Sheffield Pottery, Inc., U.S. Route 7, P.O. Box 399, Sheffield, MA 01257. Check with your local pottery supplier for availability.

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