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Welder Safety

High Technology Improves Welder Vision and Protection

Auto-darkening lens and helmet combined with a NIOSH-approved powered air-purifying respirator.

By Paul Anacki, Hornell, Inc.

The increasing popularity of auto-darkening welding lenses is understandable given the difficulty of working with "conventional" lenses that require constant lifting and lowering of the helmet, while providing zero visibility when not actually welding.

Auto-darkening welding lenses, on the other hand, darken the moment an arc is struck and lighten again when welding stops-all the time with full UV/IR protection. User benefits are increased safety, productivity and comfort. Welders can always see their work, at comfortable light levels, with constant eye and face protection. They can enter "tight" locations with their protection in place, and quickly and accurately strike the crucial initial arc.

How Automatic Lenses Work

Auto-darkening welding lenses have three major components:

1) A UV/IR filter.
2) One or more liquid crystal light shutters.
3) Electronics for detecting welding arcs and controlling the shutters.

All auto-darkening lenses have a UV/IR filter that continually provides protection from damaging ultraviolet and infrared radiation. The UV/IR filter is completely independent of the electronic operation of the lens. The UV/IR filter constantly blocks radiation, whether the lens is transparent or dark, turned "ON" or "OFF," operational or without batteries.

The lens's sensors detect the arc, triggering the liquid crystal elements to change their alignment into a shuttering (darkening) effect. The shuttering effect eliminates the arc's very bright, irritating light. Welders always ask: "But what about the split second it takes the lens to change from light to dark?"...the answer: the static UV/IR filter always blocks harmful radiation, regardless of the state of the liquid crystal shutters.

Improved Welder Safety

With auto-darkening lenses, welders can always see clearly with the helmet in the down position, meaning:

1) Increased protection from accidental "arc flashes" from nearby welders.
2) Elimination of helmet nodding and the resulting neck strain.
3) The capacity to visually inspect weld pools while protected from unexpected "pops" of molten metal.
5) Constant view of items around them, including potential hazards such as vehicles.
6) Welders avoid the temptation to not use their welding helmets when doing very short ("tack") welds.

67% of welding injuries are to the eyes, and half of those injuries occurred when no welding helmet was worn (U.S. Bureau of Labor Statistics). Conventional lenses require the welder to align the electrode with the helmet up and then to "nod" the helmet down before striking the arc. Unfortunately, this "nodding" causes an involuntary movement of the welder's hands, frequently ruining the careful placement of the electrode. Frustrated welders sometimes just close their eyes or look away before the initial arc is struck. Welders doing tack welds are particularly infamous for welding without safety headgear in place.

Welders are most frequently "flashed" by other welders working nearby. Some production welding requires two or more welders to work on the same piece at the same time, increasing the likelihood of accidental flashings. In addition, walls, equipment, partitions, and the workpiece itself can "bounce" UV radiation, causing harmful indirect arc exposure.

Safety Standards for Auto-Darkening Lenses

Both traditional lenses and auto-darkening lenses must meet requirements for eye and face protection set by the American National Standards Institute, standard ANSI Z87.1.

Hard hat helmets with auto-darkening lenses for areas with overhead hazards, such as overhead cranes.

Prior to welding.

When the arc is stuck.

Never having to lift the helmet means more protection, but also means more heat inside the helmet. One manufacturer has invented a "helmet that breathes" to reduce both heat and CO_2 build-up.

Even more visibility: this helmet design includes two shade 5 peripheral vision lenses that increase the welder's viewing area by over 100%. Excellent for avoiding hazards such as protruding beams, oncoming vehicles, etc.

Application Considerations

Automatic darkening lenses are simple to use. Typically, the welder just turns the lens "on" and puts on the helmet. Some models have user-selectable dark shade levels, which is convenient for welders who frequently change welding processes or amperages.

Arc detection sensitivity options, available on some models, are handy for unusual processes that might confuse the lens's sensors, such as low-amp TIG. Not all brands work under all lighting conditions; very bright sunlight or very reflective interior conditions (for example, lots of polished aluminum under bright lights) can cause some models to constantly flicker between light and dark states when the welder isn't welding. To avoid welder frustration, be sure the model you specify works well under all your lighting conditions.

Most models are battery-powered, with batteries lasting up to 3000 hours. Some models have an "auto-off" feature to save battery life. And some models are "solar-powered" or "solar-power assisted" by the welding arc itself.

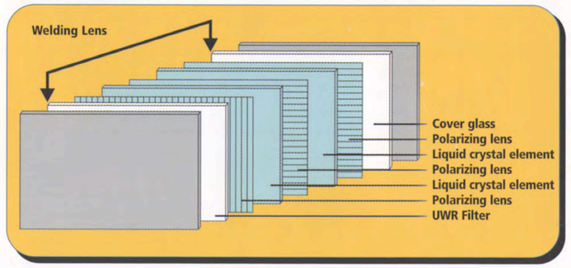
Other than occasionally replacing batteries and the inner and outer lens protection plates, no special care or maintenance is required for auto-darkening lenses.

Optical Quality (or "optical clarity") varies greatly among different models. Basically, the welder should never have to even think about lens clarity. Poor lens clarity can include shadowing, fluttering, hallo-effects around the edges of the lens, and "image persistence." Avoid these models.

Ruggedness is very important to welders. Some auto-darkening models can be treated like any other welding helmet; others are fragile. A simple test of ruggedness: ask the salesperson to drop a helmet and installed lens from at least table height (the higher, the better).

Welder Education & Acceptance

Welders can be very reluctant to change. But a brief explanation about constant radiation protection from the non-electronic UV/IR filter, as well as a demonstration the new lens, will usually get them excited about these lenses.

Have your welders try the shade they're used to, as well as the shade above and below it, to find the one that works best; or go with a variable dark shade model.

Lens Lamination