

# WELDING SAFETY

## MODULE 5 – PERSONAL PROTECTIVE EQUIPMENT

### FREQUENTLY ASKED QUESTIONS



**Q: What is the most common injury to a welder?**

**A:** Burns are the most common injury to welders, due to sparks landing on the skin. Welding arcs are very intense and can cause burns to skin and eyes with just a few minutes of exposure.

**Q: What protective clothing is needed in arc welding?**

**A:** Protective clothing needed for welding includes general fire resistant clothing, safety glasses, shoes, gloves, helmet and leathers.

**Q: Can oxy-fuel tinted goggles be used to protect your eyes while arc welding?**

**A:** No, oxy-fuel goggles do not protect your eyes from the intense ultraviolet radiation (UV) produced by the welding arc. A welding helmet with the proper shaded lens must be used whenever welding.

**Q: What types of fabric are recommended for clothing worn when arc welding?**

**A:** Because of its durability and resistance to fire, wool clothing is suggested over synthetics. Synthetics should never be worn because they melt when exposed to extreme heat. Cotton can be worn if it is specially treated to retard fire.

**Q: What are steps that you can take to prevent hot sparks from being trapped in your clothing?**

**A:** Avoid rolling up your sleeves or pant cuffs, because sparks or hot metal could deposit in the folds. Also, wear your pants outside your work boots, not tucked in, to keep particles from falling into your boots.

**Q: Is it necessary to wear safety glasses if you are already wearing a welding helmet?**

**A:** Even when wearing a helmet, Z87.1 approved safety glasses with side shields, or goggles, should always be worn to protect your eyes from flying particles.

**Q: What types of footwear are recommended for welders?**

**A:** Leather boots with six- to eight-inch ankle coverage are the best foot protection. Where heavy work is done, safety toe protection boots should be worn. Metatarsal guards over the shoe laces can protect them from falling objects and sparks.

**Q: What are the two forms of radiation given off by the welding arc?**

**A:** The two types of radiation are IR and UV radiation. Infrared (IR) radiation can cause retinal burning and cataracts. IR can usually be felt as heat. Ultraviolet (UV) radiation, which cannot be felt, can cause an eye burn known as "Welder's Flash."

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**Q: How can exposure to IR and UV radiation injure your eyes?**

**A:** It is essential that your eyes are protected from radiation exposure. Infrared (IR) radiation can cause retinal burning and cataracts. IR can usually be felt as heat. Ultraviolet (UV) radiation, which cannot be felt, can cause an eye burn known as “Welder’s Flash.” This condition may not be apparent until several hours after exposure. It can cause extreme discomfort and can result in swelling, fluid excretion and temporary blindness. Normally, Welder’s Flash is temporary, but repeated or prolonged exposure can lead to permanent injury of the eyes.

**Q: Is it safe to weld without a welding helmet for a brief period of time, such as during tack welding?**

**A:** Even brief exposure to ultra-violet or UV rays can result in a burn to the eyes known as “Welders Flash.” Welders Flash may not be evident until several hours after exposure. It causes extreme discomfort and can result in swelling, fluid excretion from the eyes, and even temporary blindness. Normally, this condition is temporary, but repeated overexposure to UV radiation can result in permanent eye damage.

**Q: How do you select the proper filter lens for your welding helmet?**

**A:** The general rule of thumb is to choose a filter too dark to see the arc and then move to the next lighter setting without dropping to below the minimum recommended rating.

**Q: How can you tell that you are being overexposed to radiation from the welding arc?**

**A:** Infrared radiation cannot be seen but is felt as heat. And there is no way to sense if you are being overexposed to ultraviolet radiation – so don’t take any chances and always wear eye and face protection with the proper protective shading.

**Q: How can overexposure to the UV radiation from the welding arc injure you?**

**A:** Ultraviolet radiation can also burn exposed skin. This process is similar to getting sunburn from overexposure to the sun. Long exposure to arc rays without protection can lead to second and third degree skin burns. Repeated overexposure to ultraviolet radiation is a known cause of skin cancer.

**Q: Is it safe to wear contact lenses while arc welding?**

**A:** Welders should be able to wear contact lenses safely in most situations – provided they wear appropriate industrial eyewear and use the protection we’ve already discussed with respect to protection against arc rays. Anyone wearing contacts on the job should consult with their company medical staff and their own ophthalmologist.

**Q: How can you protect your hearing when arc welding?**

**A:** Earplugs and earmuffs keep metal sparks and airborne particles from entering your ear canal, and of course, they protect your hearing from the effects of excessive noise.

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### FREQUENTLY ASKED QUESTIONS

**Q: How do you know when the noise level to which you are exposed is potentially hazardous?**

**A:** Levels of noise over 85 decibels, averaged over an 8-hour workday, are potentially hazardous to your hearing. Noise levels that are painful or are loud enough to interfere with your ability to hear others speaking at a normal conversational volume may be potentially hazardous.

**Q: How does exposure to high noise levels damage your hearing?**

**A:** The length and number of times you are exposed to high levels of noise determines the extent of the damage to your hearing. High noise levels cause damage to the ear drum and other sensitive parts of your inner ear.

**Q: In addition to wearing hearing protection, what measures can you take to protect yourself from high noise levels?**

**A:** If it is not possible to reduce the level of noise at the source by moving either yourself or the equipment, or by using sound barriers, then you should wear adequate ear protection.

**Q: When should I use respiratory protection?**

**A:** Whenever possible, ventilation systems or other controls should be used to remove harmful fumes and gases. However, if these measures do not adequately reduce exposure levels, a respirator may be necessary. Various types of respirators each have their own benefits and limitations. A summary of common welding respirator categories is shown in **Table 2**.

**Q: How is the correct filter selected?**

**A:** First an industrial hygienist or other safety professional should tell you which respirator type should be used. Particulate (Dust) Filters: Fumes can only be captured with particulate filters. **Table 1** lists particle filter classifications defined by the National Institute for Occupational Safety and Health (NIOSH). Always look for the NIOSH mark and classification code when choosing a particulate filter.

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### FREQUENTLY ASKED QUESTIONS

#### PARTICLE DUST FILTER CLASSIFICATION

| TABLE 1    |                             |                                 |                               |
|------------|-----------------------------|---------------------------------|-------------------------------|
| EFFICIENCY | RESISTANCE TO OIL MIST      |                                 |                               |
|            | N-Series<br>(not resistant) | R-Series<br>(medium resistance) | P-Series<br>(high resistance) |
| 95%        | N95                         | R95                             | P95                           |
| 99%        | N99                         | R99                             | P99                           |
| 99.97%     | N100                        | R100                            | P100                          |

Source: • NIOSH  
• AWS Factsheet No. 38

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#### COMMON RESPIRATORS

**TABLE 2**

|             | DISPOSABLE<br>HALF FACEPIECE                                                                                                                                                                     | ELASTOMERIC<br>HALF FACEPIECE                                                                                                                                                                                 | POWERED-AIR,<br>LOOSE-FITTING FACEPIECE                                                                                                                                                                                               | POWERED-AIR,<br>HELMET (HARD HAT)                                                                                                                                                                                                                                                                | SUPPLIED-AIR,<br>(LOOSE-FITTING<br>OR HELMET)                                                                                                                                                                             |
|-------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| DESCRIPTION |                                                                                                                |                                                                                                                             |                                                                                                                                                    |                                                                                                                                                                                                              |                                                                                                                                       |
| APF         | 10                                                                                                                                                                                               | 10                                                                                                                                                                                                            | 25                                                                                                                                                                                                                                    | 25 / 1000*                                                                                                                                                                                                                                                                                       | 25 / 1000                                                                                                                                                                                                                 |
| BENEFITS    | <ul style="list-style-type: none"> <li>• No maintenance</li> <li>• Low unit cost</li> <li>• Fits under any welding helmet</li> <li>• Light weight</li> </ul>                                     | <ul style="list-style-type: none"> <li>• More filter options</li> <li>• More size options</li> <li>• Moderate unit cost</li> <li>• Light weight</li> </ul>                                                    | <ul style="list-style-type: none"> <li>• Reduced stuffiness</li> <li>• Cooling effect</li> <li>• No breathing resistance</li> <li>• No fit testing</li> <li>• Hard hat options</li> <li>• Accommodates limited facial hair</li> </ul> | <ul style="list-style-type: none"> <li>• Same as Loose-Fitting Headpiece Plus: <ul style="list-style-type: none"> <li>- Hard hat included</li> <li>- Higher protection factor</li> <li>- Better neck protection</li> </ul> </li> <li>• Accommodates facial hair including some beards</li> </ul> | <ul style="list-style-type: none"> <li>• Maximum contaminant versatility</li> <li>• Chilled or heated air</li> <li>• No breathing resistance</li> <li>• No filters to change</li> <li>• No batteries to change</li> </ul> |
| LIMITATIONS | <ul style="list-style-type: none"> <li>• Not compatible with facial hair</li> <li>• For particles only</li> <li>• Increase heat retention and stuffiness</li> <li>• Fit-test required</li> </ul> | <ul style="list-style-type: none"> <li>• Not compatible with facial hair</li> <li>• May not fit all welding helmets</li> <li>• Increase heat retention and stuffiness</li> <li>• Fit-test required</li> </ul> | <ul style="list-style-type: none"> <li>• Increased weight</li> <li>• Higher unit cost</li> <li>• Increased maintenance</li> <li>• Increased user training</li> </ul>                                                                  | <ul style="list-style-type: none"> <li>• Same as Loose-Fitting Headpiece</li> </ul>                                                                                                                                                                                                              | <ul style="list-style-type: none"> <li>• Attachment to air line</li> <li>• Increased weight</li> <li>• Higher unit cost</li> <li>• Requires compressor</li> </ul>                                                         |

\*AFP refers to Assigned Protection Factor which is the minimum anticipated level of protection provided by each type of respirator worn in accordance with an adequate respiratory protection program. For example, an APF of 10 means that the respirator should reduce the airborne concentration of a particulate by a factor of 10 (or to 10% of the workplace concentration). August 2006 OSHA amended 29 CFR 1910.134 by adding requirements for APF's. For Powered Air Purifying (PAPR) helmets, the manufacturer must have a Workplace Protection Factor (WPF) or Simulated Workplace Protection Factor (SWPF) study data to substantiate APF of 1000. Refer to OSHA Final Rule: [http://www.osha.gov/pls/oshaweb/owadisp.show\\_document?p\\_table=FEDERAL\\_REGISTER&p\\_id=18846](http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=FEDERAL_REGISTER&p_id=18846)