



Personal Protective Equipment (PPE) for Welding and Cutting

INTRODUCTION

All welding related personnel must wear suitable Personal Protective Equipment (PPE) to protect against hazards such as burns, sparks, spatter, electric shock, and radiation. The use of PPE is a good safe practice and is required by regulatory agencies. For example, OSHA requires the use of PPE when engineering and administrative controls are not feasible or effective against the hazards.

NATURE OF THE HAZARD

Welding and cutting can produce hazards such as sparks, spatter, radiation (infrared, ultraviolet, and blue light), slag, heat, hot metal, fumes and gases, and even electric shock. Since these hazards can cause burns, injury, or death, it is important to wear proper PPE at all times.

EYE AND FACE PROTECTION

- Wear a helmet with filter lens and cover plate that complies with ANSI Z87.1 for protection from radiant energy, flying sparks, and spatter.
- According to ANSI Z49.1 and OSHA 29 CFR 1910.252, "Helmets and hand shields shall protect the face, forehead, neck, and ears to a vertical line in back of the ears, from the direct radiant

energy from the arc and from direct weld spatter."

- Filter lenses and cover plates must meet the tests prescribed in ANSI Z87.1.
- Wear approved ANSI Z87.1 safety glasses with side shields or goggles under your helmet or face shield.
- The safety glasses with side shields or goggles are used to protect against flying metal, slag chips, grinding fragments, wire wheel bristles, and similar hazards that can ricochet under the helmet.
- Choose a filter lens shade according to the Lens Shade Selector Chart in ANSI Z49.1 or AWS F2.2. *Lens Shade Selector*.
- Consult AWS Fact Sheet 31, *Eye and Face Protection for Welding and Cutting Operations*.

HEAD AND EAR PROTECTION

- Wear flame-resistant welder's cap or other head covering under your helmet. It can protect your head and hair from flying sparks, spatter, burns, and radiation.

- When working out of position, such as overhead, wear appropriate ear-plugs or muffs. They help prevent sparks, spatter, and hot metal from entering your ears and causing burns.
- Wear appropriate hearing protection, such as earplugs or muffs to protect your hearing and prevent hearing loss based on measured noise levels or for comfort.

FOOT PROTECTION

- Select boots that meet the requirements of ASTM F2412 and ASTM F2413 (or the older ANSI Z41 which has been withdrawn). Look for a compliance mark inside your boot.
- Wear leather, safety-toed, high-topped boots in good condition. They will help protect your feet and ankles from injury.
- In heavy spark or slag areas, use fire-resistant boot protectors or leather spats strapped around your pant legs and boot tops to prevent injury and burns.

HAND PROTECTION

- Always wear dry, hole-free, insulated welding gloves in good condition. They will help protect your hands from burns, sparks, heat, cuts, scratches, and electric shock.
- ANSI Z49.1 requires all welders to wear protective flame-resistant gloves, such as leather welder's gloves. They should provide the heat resistance and general hand protection needed for welding.

BODY PROTECTION

- Wear oil-free protective clothing. Heavier materials such as leather or non-melting Flame-Resistant Clothing (FRC) which has been chemically treated to reduce its combustibility or is inherently flame-resistant are preferable to lighter materials because they are more difficult to ignite. Clothing treated with flame resistant materials may lose some of its protective characteristics after repeated washing or cleaning. Follow manufacturer's recommendations for care of FRC. Materials which can melt and cause severe burns should not be used as clothing when welding or cutting.
- Shirts or jackets shall be designed to protect your arms and neck from radiation exposure and skin burns (caused by ultraviolet radiation from the arc). Choose shirts or jackets that allow freedom of movement and covers all areas of exposed skin.
- Wear long pants) without cuffs that overlap the tops of your boots to protect your lower body and legs from radiation exposure and skin burns (caused by ultraviolet radiation from the arc). Do not tuck pant legs into your boots.
- Be aware that any cuffs or open pockets can catch flying sparks and spatter which can ignite clothing. Unroll cuffs and button or cover pockets to prevent spark entry.
- Remove all flammables, matches, and cigarette lighters from your pockets

- Keep clothing dry. Change wet clothing to reduce the risk of electric shock.
- Keep clothing clean and free of oil, grease, or solvents that can catch fire. Keep it in good repair (no holes, tears, or frayed edges). Always follow the manufacturer's recommendation for use, care, and maintenance of protective clothing.
- Wear leather aprons, leggings, capes and sleeves as needed for the application. Leather protects better than most materials.

Read ANSI Z49.1. It gives a full explanation of the protective clothing needed when welding or cutting. In brief, Z49.1 states that "Clothing shall provide sufficient coverage, and be made of suitable materials, to minimize skin burns caused by sparks, spatter, or radiation." Full details are in the document.

RESPIRATORY PROTECTIVE EQUIPMENT

Wear an appropriate NIOSH approved respirator whenever necessary to prevent overexposure. For information on respirators, see ANSI Z49.1 and Safety and Health Fact Sheet 38. See also OSHA's Respiratory Protection Standard, 29 CFR 1910.134, and NIOSH's NPPTL site information.

SUMMARY

Protect all areas of your body from injury during welding or cutting by wearing the proper protective clothing and equipment. Do not weld or cut unless wearing the necessary PPE as specified in this Fact Sheet and in ANSI Z49.1.

INFORMATION SOURCES

ANSI Z49.1, *Safety in Welding, Cutting, and Allied Processes*, Z49.1, American National Standards Institute, www.aws.org.

ANSI Z87.1, *Practice for Occupational and Educational Eye and Face Protection*, American National Standards Institute, www.ansi.org.

ASTM F2412, *Test Methods for Foot Protection*, ASTM International, www.astm.org.

ASTM F2413, *Specification for Performance Requirements for Protective Footwear*, ASTM International, www.astm.org.

AWS F2.2, *Lens Shade Selector*, American Welding Society, www.aws.org.

AWS Safety and Health Fact Sheet No. 31, *Eye and Face Protection for Welding and Cutting Operations*, American Welding Society, www.aws.org.

AWS Safety and Health Fact Sheet No. 38, *Respiratory Protection Basics for Welding Operations*, American Welding Society, www.aws.org.

NFPA 51B, *Standard for Fire Prevention during Welding, Cutting, and Other Hot Work*, National Fire Protection Association, www.nfpa.org.

OSHA, Title 29, Part 1910, Occupational Safety and Health Administration, Code of Federal Regulations, www.osha.gov.

OSHA, Title 29, 1910.134, *Respiratory Protection*, Occupational Safety and Health Administration, Code of Federal Regulations, <www.osha.gov>.

OSHA, Title 29, 1910.252, *General Requirements*, Occupational Safety and Health Administration, Code of Federal Regulations, <www.osha.gov>.

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